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Source: Criminal Law/Scientific Evidence in California Criminal Cases/Preface

Preface

It is with great pleasure that CEB introduces this eagerly awaited publication on *Scientific Evidence in California Criminal Cases*. While television's "CSI: Crime Scene Investigation" may be keeping contemporary audiences glued to the screen, the depiction of fictional scientific evidence in the popular media means that juries and perhaps even judges need to be disabused of some fantastic notions before an attorney's hard work of presenting and challenging *real* scientific evidence begins in the courtroom.

With this book, CEB hopes to offer both prosecution and defense counsel not only an overview of the latest forensic techniques available, but also a blueprint for collecting and presenting evidence in the most effective way. When practical, we have included concrete examples in the form of foundational and evidentiary procedures and sample direct and cross-examination questions. And when the science and case law are not yet firmly established, we have attempted to guide the reader to external resources that may assist in handling the specific technique in a trial context.

The first four chapters provide a general overview of presenting scientific evidence at trial, with Elliot S. Beckelman and Judge Darrell S. Mavis guiding the reader through the introduction of evidence in a trial setting. Next, E. Thomas Dunn, Jr. and Scott Wm. Davenport discuss the *Kelly* rule, which dovetails into San Diego public defender Michael Begovich's chapter on preparing and presenting expert testimony. District Attorney Elliot S. Beckelman and Judge Darrell S. Mavis then provide a discussion of the areas on which an expert may be challenged. Because both prosecution and defense may find themselves in the position of proponent as well as challenger of expert testimony, it may benefit both sides to study both of these chapters with care.

Next, we explore specific types of physical evidence from the cutting edge to tried-and-true methods already known to most of us. In Chapter 5, Judge Mark E. Windham provides detailed information on DNA evidence, which has dramatically changed the criminal trial landscape for both prosecution and defense. Hudson Bair and Jeffery L. Zehnder discuss tools for determining evidence of alcohol intoxication in Chapter 6. Forensic toxicology and drug evidence are explained by David J. Cohen, Lisa C. DewBerry, Kali S. Grech, and Judith L. Stewart in Chapter 7. In Chapter 8, Judge Gregory A. Dohi introduces us to trace evidence and the subtleties inherent in the famous Locard Exchange Principle: "Whenever two objects come into contact, they exchange material." Even little old ladies in Agatha Christie novels know that the perpetrator must wear gloves to avoid detection of gunshot residue on guilty hands, but the modern scanning electron microscopes may help attorneys answer questions that may have remained mysteries in earlier times.

The popular fictional detective Sherlock Holmes utilized fingerprints to exonerate a suspect as early as 1903; and John E. Costain and Dr. Lyn Haber bring us up to date on the modern uses of fingerprinting comparison in Chapter 9. John E. Costain then explains in his chapter on questioned documents (Chapter 10) the most frequently asked question in document comparison: Whose signature is *really* on the document? In his chapter on firearms (Chapter 11), Mr. Costain then goes on to explain why firearms and toolmarks are often grouped together because their "examinations entail examining the marks left by the harder of two objects (the tool) on a softer object." In Chapter 12, Ulises Castellon, Donald J. Perkins, Douglas K. Wood, and Dr. Joseph Zicherman demonstrate how to determine the cause and origin of a fire so that the attorney can develop evidence that may connect a fire to deliberate human activity.

Recent events in the headlines have made us aware of the prevalence and potential for white-collar crime at the highest levels. In Chapter 13, Kerry L. Francis and Margaret L. Wu explain how critical the work of the forensic accountant can be in criminal cases. In Chapter 14, John Janes and Margaret L. Wu provide a description of the challenges presented to forensic computer experts in a world where everything from banking records to sophisticated intellectual property documentation is stored in a potentially ephemeral electronic depository. In Chapter 15, Elena Condes examines the technological complexity as well as fine points of admissibility of information acquired by electronic tracking in its various forms.

Finally, our authors tackle the complex psychological and social science issues that may play a role in a criminal prosecution. In Chapter 16, John T. Philipsborn explores the use of mental health experts in assessing mental health and functioning. In Chapter 17, Andy Gutierrez explains the relatively new area of gang expert testimony, arising out of legislation and case law related to the increase of gang activity in California. In Chapter 18, Michael J. Aye explains the procedure by which a person may be found to meet the criteria for incarceration as a "sexually violent predator" and describes the avenues for challenging such a determination.

Chapters 13 and 14 (*Use of Forensic Accounting to Identify Evidence of Crime* and *Computer Forensic Investigations in Corporate Environments,* respectively) contain general information only and Deloitte Financial Advisory Services LLP is not, by means of this publication, rendering accounting, business, financial, investment, legal, tax, or other professional advice or services. This publication is not a substitute for such professional advice or services, nor should it be used as a basis for any decision or action that may affect your business. Before making any decision or taking any action that may affect your business, you should consult a qualified professional advisor. Deloitte Financial Advisory Services LLP, its affiliates, and related entities shall not be responsible for any loss sustained by any person who relies on these chapters.

In preparing this book, CEB was fortunate to have the assistance of Consulting Editors Justice Thomas E. Hollenhorst (of the Fourth District Court of Appeal) and Elena Condes (a criminal practitioner in Berkeley). We are also grateful to Dr. Ralph N. Haber and Kenton Wong, who reviewed chapters in this work. The valuable insights of our authors and consultants have made the book accurate, practical, and reflective of California practice. To each we give our special thanks.

CEB Practice Group Manager Robin D. Kojima (Managing Editor); Attorney Editors Jon E. Heywood, Christina Lauridsen, and Nancy Yuenger; and Legal Editors Erica Edmonds, Tamarah B. Haet, Sarah Beth Pate, Amy Righter, Bonnie L. Riley, and Dorothy M. Robins contributed to this title. Additional legal research assistance was provided by Catherine S. Daly, Alice Kostin, Andy Rosner, and Kristin Schwaighart. Sara H. Ruddy also contributed to this title. Administrative support was provided by Nila Kanzaria. Linda Marousek handled copyediting and production. Robert Burke created the index. Composition was performed by CEB's Electronic Publishing staff.

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CEB is grateful for the contribution Dr. Ralph Haber made as an update author to chapter 11. CEB Attorney Editor Amy Righter and Legal Editors Sarah Beth Pate, Dorothy M. Robbins, and Tamarah Haet contributed to this title. Administrative support was provided by Kenya Denman and Nila Kanzaria. Laura Linden handled copyediting and production. Kathryn Te Selle updated the index. Composition was performed by CEB's Electronic Publishing staff.

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Source: Criminal Law/Scientific Evidence in California Criminal Cases/Foreword

Foreword

Scientific evidence in American trial courts has become commonplace. It is unfortunate that most students who enter law school have little or no scientific background, and law school provides little or no training in scientific issues affecting the practice of law. *Every attorney,* not just criminal law practitioners, should have some exposure to scientific fundamentals because they affect the practice of law. Clearly, the influence of science on the practice of law will continue to grow.

Criminal law practitioners must develop at least a basic expertise in science because forensic science is now an integral part of the practice. Basic legal competency requires attorneys to stretch their educational endeavors beyond traditional legal studies by expanding them into areas such as forensic DNA, criminalists, and new scientific areas that lend themselves to the practice of criminal law. Every criminal law practitioner should have a goal of scientific literacy in the areas of science that touch the practice.

Simple familiarity may be enough to protect a client's rights and safeguard the validity of scientific testing. If cross-examination is the engine of truth in a criminal courtroom, scientific knowledge is the fuel that drives that engine on cross-examination of scientific experts. Moreover, prosecutors have a special role in our system of justice to ensure that only reputable and valid science is presented. If prosecutors lack the fundamental scientific background to question science presented by agents of law enforcement, they will be less effective in their role of screeners of evidence to protect the public, the integrity of the justice system, and the rights of the accused.

For these reasons, I commend the efforts of the numerous contributors of this book and believe it will be extraordinarily useful in the practice of law.

Justice Thomas E. Hollenhorst
Associate Justice, Fourth District
Court of Appeal, Division 2

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Source: Criminal Law/Scientific Evidence in California Criminal Cases/Selected Developments

Selected Developments

September 2010 Update

Forensic evidence. Defense counsel's failure to consult forensic expert rose to the level of ineffective assistance of counsel. *Richter v Hickman* (9th Cir 2009) 578 F3d 944, cert granted in *Harrington v Richter* (2010) 176 L Ed 2d 108, ___ S Ct ___. See §1.1.

Lab reports. The California Supreme Court has granted review in a number of cases in which it appears the court will consider how *Melendez-Diaz v Massachusetts* (2009) ___ US ___, 174 L Ed 2d 314, 129 S Ct 2527 affects the earlier California decision, *People v Geier* (2007) 41 C4th 555, 61 CR3d 580 (expert opinion testimony based on non-testifying DNA analyst's report admissible). See §§1.27, 5.38, 7.3, 8.66.

Chapter 1 contains a practice tip for laying the foundation for a lab supervisor's testimony when an analyst is unavailable to testify and retesting the evidence is not possible. See §1.27.

DNA evidence. The forcible extraction of a DNA sample from a pre-trial detainee for inclusion in a cold case data bank, without a warrant and without suspicion, violated the Fourth Amendment. *Friedman v Boucher* (9th Cir 2009) 580 F3d 847. The nonconsensual extraction of biological samples from adult convicted felons does not violate the Fourth Amendment. *People v Robinson* (2010) 47 C4th 1104, 1121, 104 CR3d 727. See §5.35.

Although a California arrest warrant must contain the "name" of the suspect (Pen C §§804, 815), when no more "particular, accurate, or reliable" identification is available, a John Doe arrest warrant or complaint that describes the suspect's unique DNA profile or incorporates by reference an affidavit containing the DNA profile, satisfies the "particularity" requirements under the Fourth Amendment, Cal Const art I, §13 and Pen C §804(d). *People v Robinson* (2010) 47 C4th 1104, 1137, 104 CR3d 727. See §5.35.

At least one appellate court has permitted constructive filing of a writ petition under Pen C §1405(j) challenging a postjudgment denial of DNA testing. See *In re Antilla* (2009) 176 CA4th 622, 627, 97 CR3d 849. See §5.85.

Blood alcohol content. Recent studies dispute that alcohol molecules from "deep lung" air are actually measured by breath samples but, suggest instead, that alcohol molecules from the alveolar sacs ("deep lung") are exchanged in equilibrium with the respiratory tract (*i.e.*, interact with airway tissue) at a variable rate depending on body temperature and breathing technique which then dramatically affects the concentration of alcohol in a breath sample. See Hlastala, *Paradigm Shift for the Alcohol Breath Test,* 55(2) J Forensic Science, (March 2010). See §§6.24, 6.35.

Medical marijuana. The Medical Marijuana Program has been invalidated to the extent that its quantitative limits deprive people who meet the definition of qualified patient and primary caregiver under the Compassionate Use Act of the defense that he or she possessed or cultivated marijuana in an amount reasonably related to meet his or her current medical needs. *People v Kelly* (2010) 47 C4th 1008, 1049, 103 CR3d 733. See §7.74.

The authorized use of medical marijuana cannot, as a matter of law, support a finding of unamenability to drug treatment under Proposition 36. *People v Beaty* (2010) 181 CA4th 644, 659, 105 CR3d 76. See §7.76

Immigration consequences of drug convictions. Defense counsel's duty to advise a defendant of the adverse immigration consequences of a plea fall within the ambit of the Sixth Amendment right to counsel. When the law is not clear, counsel need do no more than advise the defendant that the charges may carry a risk of adverse immigration consequences but when the consequence is clear, counsel has a duty to give the correct advice. *Padilla v Kentucky* (2010) 559 US ___, 176 L Ed 2d 284, 130 Sp Ct 1473. See §7.78.

Workplace privacy. An individual challenging the search of workplace areas beyond his or her own office must show a "personal connection" to the places searched and the materials seized. *U.S. v SDI Future Health, Inc.* (9th Cir 2009) 568 F3d 684, 698. See §14.53.

Electronic communications. The affidavit in support of a broad warrant for the seizure of computer media should explain the necessity for a blanket seizure. *U.S. v Comprehensive Drug Testing, Inc.* (9th Cir 2009) 579 F3d 989, 998. Courts may require, as well, other precautions in segregating specific evidence supported by probable cause from other data in the computer, such as having personnel other than the investigating agent perform the segregation. *Comprehensive Drug Testing,* 579 F3d at 1006. See §14.56.

Reversing an earlier Ninth Circuit decision finding a government employer's search of employee text messages violated the

Fourth Amendment, the U.S. Supreme Court declined to specifically rule on the parameters of a public employee's expectation of privacy in work-related electronic communications. "Employer policies concerning communications will of course shape the reasonable expectations of their employees, especially to the extent that such policies are clearly communicated." *City of Ontario* (June 17, 2010, No. 08-1332) 2010 US Lexis 4972. See §§14.53, 15.24.

Mental competency hearings. It is counsel's role to determine if a defendant should testify at a competency hearing and the court erred in permitting the defendant to testify over counsel's objection. *People v Bell* (2010) 181 CA4th 1071, 1074, 105 CR3d 259. See §16.43.

Gang expert testimony. Testimony that simply informed the jury of how the gang expert felt the case should be resolved was improper opinion that could not provide substantial evidence to support the jury's finding under Pen C §186.22(b)(1). *People v Ramon* (2009) 175 CA4th 843, 849, 96 CR3d 459. See §17.25.

Expert testimony concerning gang rivalry was admissible to lay the foundation for a second degree murder conviction under the natural and probable consequences doctrine. *People v Ayala* (2010) 181 CA4th 1440, 1450, 105 CR3d 575. See §17.2.

Sexually Violent Predator (SVP) evaluations. 9 Cal Code Regs §§4000 and 4005 were finalized as the new regulatory authority under which the Department of Mental Health (DMH) must conduct SVP evaluations. For persons who were evaluated prior to the adoption by the DMH of 9 Cal Code Regs §4005, there is now authority for asking the court to order a new evaluation pursuant to Welf & I C §6601(c). *In re Ronje* (2009) 179 CA4th 509, 101 CR3d 689.

Forms and checklists. Chapter 3 contains three new tools for use in the investigation of capital or serious cases: Client Interview Form, Client Release of Confidential Information Form and Checklist of Guilt and Mitigation Evidence. See §§3.54A-3.54C.

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1

Introducing Scientific Evidence at Trial

Elliot S. Beckelman
Judge Darrell S. Mavis, Los Angeles Superior Court

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§1.1 I. INTRODUCING SCIENTIFIC EVIDENCE

Scientific and expert opinion evidence generally consists of a properly qualified person who observed an aspect of the case and who then, based on comparison or experience or both, testifies to findings or inferences.

Although this evidence is generally technical, it is introduced in the same manner as any other evidence: the attorney must lay the foundation, make the testimony understandable, and anticipate attacks. The attorney should use a common sense approach and proceed with caution. This evidence single-handedly can make or break a case. It can corroborate a weak eyewitness, upset a tight multiple-witness case, and may be the only strong neutral witness for your opponent. A trial may be a search for the truth, but a jury must be told the truth if they are to find it, and scientific or expert evidence can light the way.

Most people generally envision the prosecutor as the chief proponent of scientific evidence and expert testimony in court. However, defense attorneys also often retain their own experts to analyze disputed scientific or social science evidence, or to introduce competing scientific evidence in court. See *Richter v Hickman* (9th Cir 2009) 578 F3d 944, cert granted in *Harrington v Richter* (2010) 176 L Ed 2d 108, ___ S Ct ___ (defense counsel's failure to consult forensic expert rose to level of ineffective assistance of counsel). This book, therefore, considers the admission of scientific evidence from the points of view of the "proponent" and the "opponent" of the evidence. Depending on the case and the evidence at issue, a prosecutor or a defense attorney may assume either or both of these roles.

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§1.2 A. The "CSI" Effect

A criminal jury's expectations of the quality of forensic evidence has changed greatly due to a juror phenomenon known as the "CSI effect." This phenomenon is named after the popular police television series "CSI: Crime Scene Investigation," which depicts forensic science as the magical key to solving grisly crimes. Many jurors who watch these shows may now erroneously believe that they have great knowledge and insight about the use of this evidence, even when their understanding of forensic evidence is largely based on the fictional portrayals of crime scene technicians and the evidence they are able to procure in their cases.

Most criminal attorneys know that it is unrealistic to believe that forensic evidence is always present at a crime scene, that lab testing is quick, that cost is never a factor, and that forensic results are always decisive and accurate. Unfortunately, the CSI effect surfaces during jury deliberations despite court admonitions and attorneys' pleas, and this can pose problems for both prosecutors and defense attorneys. Jurors who are unsatisfied with a case based on impractical or even fictional scientific processes they have seen on television may have unrealistic expectations (*e.g.,* "Why didn't they fingerprint the shell casing?") that may pose problems for prosecutors and result in a false acquittal. On the other hand, jurors who believe in the infallibility of scientific or forensic evidence based on what they have seen on television may pose problems for defense attorneys (*e.g.,* "If they have his DNA, he must be guilty").

Trial attorneys should be concerned about the CSI effect and should address this phenomenon at the start of a trial, during voir dire. Attorneys may discuss with potential jurors their possible misconceptions about forensic evidence by asking what television programs they watch. At a minimum, it is critical for attorneys to identify those jurors who feel a need for scientific evidence in order to reach a decision (*i.e.*, convict or acquit). Attorneys who plan to present scientific evidence in their case-in-chief might use these jurors as a platform to discuss the limitations of the scientific evidence, and then excuse the jurors if they seem to require more scientific evidence than will be introduced at trial. Likewise, opponents of the forensic evidence may use voir dire to identify jurors who are skeptical of this type of evidence presented by prosecutors as well as jurors who appear open to alternative theories or experts that the defense plans to present.

Another tactic to address the CSI effect may be employed after the jury is seated and during the introduction of evidence. At trial, prosecutors can introduce "negative evidence" that explains, for example, why fingerprints were not present on an item of evidence. The negative evidence can be introduced through a lead investigator who lays out in detail the investigation and any problems that ensued in the collection or analysis of evidence, or through the lab analyst who explains why only part of an item was tested. Defense attorneys, in turn, may wish to emphasize the absence or inadequacy of this evidence and ask for jury instructions when applicable, especially if negative inferences may be permitted.

There is a developing body of scholarly thought that argues the CSI effect is just another media-created phenomena, like "litigation crisis" to explain unexpected jury verdicts. See, *The CSI Effect: Fact or Fiction*, 116 Yale L.J. Pocket Part 70 (2006); *The 'CSI Effect' and Other Forensic Fictions*, 27 Loy.L.A.Ent. L. Rev. 87 (2007); *The 'CSI Effect': Does it Really Exist?* 259 NIJ Journal (March 2008); *Investigating the 'CSI Effect' Effect: Media and Litigation Crisis in Criminal Law*, 61 Stan. L. Rev. 1335 (2009). Whether it is fact or fiction, the presence or absence of this phenomenon is now a subject commonly discussed during the voire dire and may be a prism through which jurors would view the evidence and thus should be considered by the advocates in structuring the case, opening and closing arguments, and jury instructions.

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§1.3 B. Trends in the Analysis of Scientific Evidence

Two major trends in scientific evidence relate to the use of DNA evidence. One trend is the application of DNA technology to very small amounts of biological evidence, which may result in the analysis and report of results below the normal interpretative threshold. This is called "low copy" or "touch" DNA. This type of DNA analysis may be useful when, for example, trace amounts of biological evidence are left on the object by someone who touched it. In the past, crime labs resisted requests from law enforcement to test for DNA on objects touched by suspects, such as gun triggers. Now, more labs are testing these surfaces because of the favorable results and the success of DNA in solving crimes, which also has led to increased staffing for these labs. See Budowle, Bruce et al., *Low Copy Number—Consideration and Caution*, Genetic Identity Conference Proceedings, Twelfth International Symposium on Human Identification (2001).

Another trend in scientific evidence comes largely from the defense community. Many defense attorneys now challenge the reliability of the traditional forensic sciences that pre-date DNA, such as fingerprints, questioned documents, trace evidence, toolmarks, and all other traditional pattern-matching sciences. In essence, many defense attorneys now claim that the traditionally admissible forensics methods of identification should be held to the same scientific rigorous standards that now apply to DNA. Defense counsel are filing pretrial motions on these methods to force *Kelly* hearings in an effort to bar their admissibility, or in limine motions to challenge experts and limit what they can say regarding a "match." Some defense attorneys assert that non-DNA forensic science is too subjective and, therefore, not reliable. Instead, attorneys argue that for the traditional sciences to be regarded as forensically reliable, the sciences need to be more objective, and that the traditional sciences should be treated statistically as is DNA. The defense challenge to the non-DNA forensic identification sciences has been recently emboldened by the 2009 report from the National Research Council of the National Academies entitled *Strengthening Forensic Science in the United States: A Path Forward* (available online at http://www.nap.edu/catalog.php?record_id=12589#toc). The report is critical of the forensic identification sciences, questioning their scientific bases and validity. In return, critics of the publication claim that the committee has ignored peer-reviewed publications that validate the work. Defense attorneys may seek to use the report in their efforts to re-open the doors to *Kelly/Frye* admissibility hearings.

Interestingly, when DNA emerged as a forensic tool, many DNA opponents mounted a challenge attacking the statistical significance of the DNA match. These challenges attacked the adequacy of DNA databases, the computation of DNA match probabilities, and the presentation of DNA matches in the courtroom. But now many members of the defense community are mounting arguments that, as in DNA cases, there should be statistical databases for firearms, toolmark identifications, fingerprints, and other traditional forms of scientific evidence.

The proponents of the traditional methods of identification like firearms, fingerprints, and toolmarks are vigorously resisting any such invasion into their ranks. Their argument is that the traditional forensic sciences have been generally accepted under *Kelly* for many years, and unless there is a change in the science, the reliable methodology should not be disturbed. See *People v Kelly* (1976) 17 C3d 24, 30, 130 CR 144; *People v Leahy* (1994) 8 C4th 587, 612, 34 CR2d 663; see also chap 2 (*Kelly* rule).

Prosecutors and proponents of such evidence argue that law review articles and books by critics, who are mostly university professors and defense attorneys, do not represent a change in the science. The proponents reject the claim that a "paradigm" or shift in thinking about forensic identification science has occurred as a result of DNA litigation. See Saks, *The Coming Paradigm Shift in Forensic Identification Science,* 309 Science 892 (Aug. 5, 2005). Instead, proponents may dismiss their detractors, labeling them as advocates not scientists. The proponents argue that if there is a question about the validity of a link made by a traditional science, then there is one sure way to prove them wrong: by retesting the evidence. These arguments raise the question of whether there is a role for statistics in the traditional sciences. It will be interesting to see how each jurisdiction resolves this debate.

For further discussion, see chaps 5 (DNA), 9 (Fingerprints), and 11 (Firearms and Toolmarks).

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Source: Criminal Law/Scientific Evidence in California Criminal Cases/1 Introducing Scientific Evidence at Trial/§1.4 C. Discovery Issues

§1.4 C. Discovery Issues

In criminal cases, discovery is available based on the reciprocal discovery scheme detailed in Pen C §§1054-1054.10, or as mandated by the U.S. Constitution. Pen C §1054(e). Under the reciprocal discovery provisions of Cal Const art I, §30(c) and Pen C §§1054-1054.10, both the prosecution and the defense are entitled to discovery in criminal cases. See *Izazaga v Superior Court* (1991) 54 C3d 356, 285 CR 231 (reciprocal discovery is constitutional).

Discovery is often conducted informally between the parties by unwritten request. Counsel should always check local discovery rules. Some courts maintain a standing discovery order requiring the parties to turn over standard items (*e.g.,* police reports, names and addresses of anticipated witnesses, expert's reports, rap sheets) on request of the other party. An informal discovery request is required before formal court enforcement of discovery can be requested. See Pen C §§1054(b), 1054.5(b). Once counsel receives the items required to be disclosed by the standing order, that disclosure may suggest the need for a formal discovery motion to request additional material. In particular, in cases featuring scientific evidence when numerous tests are conducted or numerous documents are generated, or both, there may be unique material not specifically enumerated or disclosed under the standing discovery requests that is still arguably discoverable. Disputes over whether a particular item is required to be disclosed under the standing discovery order are generally resolved by the judge at a pretrial conference. See California Criminal Law Procedure and Practice, chap 11 (Cal CEB Annual). The prosecution is required to disclose to the defense all relevant real evidence seized or acquired as part of the investigation of the offenses charged, if it is in the possession of the prosecution or if it is in the possession of an agency acting on behalf of the government. Pen C §1054.1(c); see *In re Brown* (1998) 17 C4th 873, 879, 72 CR2d 698; *In re Littlefield* (1993) 5 C4th 122, 135, 19 CR2d 248.

NOTE: It is important for the defense to move for additional discovery as early as possible in order to examine real evidence, such as bullets and bodily fluids, early in the case to decide whether independent forensic testing of that evidence is needed.

The defense may also find it useful to make a motion to obtain real evidence from the prosecution for testing or retesting. See *Walters v Superior Court* (2000) 80 CA4th 1074, 1078, 95 CR2d 880; *Prince v Superior Court* (1992) 8 CA4th 1176, 1180, 10 CR2d 855. See the sample defense motion for transfer of evidence for retesting in California Criminal Law Forms Manual §11.10 (2d ed Cal CEB 2005). It may also be useful to consider making a *Hammon-Reber* motion to discover the psychiatric records of a witness. See *People v Gurule* (2002) 28 C4th 557, 592, 123 CR2d 345; *People v Hammon* (1997) 15 C4th 1117, 1128, 65 CR2d 1; *People v Reber* (1986) 177 CA3d 523, 530, 223 CR 139, disapproved on other grounds in *People v Hammon* (1997) 15 C4th 1117, 1123, 65 CR2d 1 (to preclude pretrial privileged discovery). For a discussion of trial motions for discovery of such materials, see Crim Law §11.29.

Additionally, the prosecutor has a constitutionally mandated obligation to disclose to the defendant all "evidence favorable to an accused" that is "material either to guilt or to punishment." *U.S. v Bagley* (1985) 473 US 667, 674, 87 L Ed 2d 481, 489, 105 S Ct 3375; *Brady v Maryland* (1963) 373 US 83, 87, 10 L Ed 2d 215, 218, 83 S Ct 1194. See Pen C §1054(e) (discovery required by U.S. Constitution must occur); *Izazaga v Superior Court* (1991) 54 C3d 356, 378, 285 CR 231. Evidence is "favorable" if it either helps the defendant or hurts the prosecution. *People v Coddington* (2000) 23 C4th 529, 589, 97 CR2d 528, overruled on other grounds in *Price v Superior Court* (2001) 25 C4th 1046, 1069, 108 CR2d 409. The prosecutor's duty to disclose material exculpatory evidence continues after the trial is over. *Imbler v Pachtman* (1976) 424 US 409, 427 n25, 47 L Ed 2d 128, 141 n25, 96 S Ct 984. See *People v Johnson* (2006) 142 CA4th 776, 782, 48 CR3d 439 (prosecutor improperly withheld police reports of gang-related incident involving chief prosecution witness that occurred between defendant's first and second trials). The defense should always be vigilant in seeking potentially exculpatory scientific and expert-generated material that may be in the hands of the prosecution, such as exculpatory tests (*i.e.,* DNA tests), forms, and notes.

NOTE: The criminal discovery procedures of Pen C §§1054-1054.10 do not regulate discovery of information in the possession of uninvolved third parties (*Teal v Superior Court* (2004) 117 CA4th 488, 491, 11 CR3d 784; *People v Superior Court (Broderick)* (1991) 231 CA3d 584, 594, 282 CR 418), such as uninvolved governmental agencies (see *People v Superior Court (Barrett)* (2000) 80 CA4th 1305, 1317, 96 CR2d 264), hospitals (*People v Superior Court (Mem. Med. Ctr.)* (1991) 234 CA3d 363, 381, 286 CR 478), doctors (see *People v Superior Court (Broderick), supra*), public institutions, and private businesses. But see *Hurd v Superior Court* (2006) 144 CA4th 1100, 1109, 50 CR3d 893 (court distinguished *Barrett* and found administrative materials may be discoverable if they pertain to the investigation and prosecution of the defendant), and *Scripps Mem. Hosp. v Superior Court* (1995) 37 CA4th 1720, 44 CR2d 725 (allowing criminal discovery against dietitians, podiatrists, psychologists, and general peer review bodies only). In any event, counsel should take care to determine whether relevant and discoverable materials exist in the possession of third parties, and if so, a subpoena duces tecum (Pen C §§1326-1328) should be used to compel their production. Prosecutors are also responsible for conducting background checks on all its witnesses including scientific or expert witnesses whether they are employed by law enforcement or private labs. Do not assume that the employer of the witness has conducted the type of background check (*e.g.* felony convictions, reported acts of moral turpitude or professional disciplines) that is required of the

prosecution. The failure to conduct this type of investigation can lead to an alleged *Brady* violation that could jeopardize a conviction.

Special issues concerning discovery are further discussed in this book in each chapter pertaining to the type of scientific evidence. For general discussion of discovery in criminal cases, see Crim Law, chap 11.

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II. COLLECTION OF PHYSICAL EVIDENCE

§1.5 A. Evidence Collection at Crime Scene or From Persons

Most criminal evidence is collected either at the crime scene or from persons (victim or suspect) associated with the events of the crime. The body of the victim of a violent crime should be regarded as a crime scene itself, and evidence should be collected and can be interpreted as such from the body of the victim.

The basic principle in evidence collection is to collect a large amount, because the significance of the evidence is not yet apparent, particularly when forensic science can test for information that cannot be seen by the naked eye.

Law enforcement agencies in different jurisdictions often address evidence collection in different ways. Evidence may be collected by the first reporting officer, by a civilian who works for law enforcement, or by a crime scene investigation unit. No matter who retrieves the evidence, the goal is the same: collect, retain, and manage. Often, the lead investigator in the case has not even consulted with the person who collected the evidence at the scene. Crime scene management is as important as the actual evidence collection, because there will be a time when the work done to manage the crime scene collection will be recounted in excruciating detail at trial.

Although the principle is to collect a lot of evidence, not every piece will be analyzed. Fleeting evidence may be booked into a freezer where it may be available for testing, but never actually tested. It is generally too costly and too time consuming for law enforcement agencies to test everything, but at a minimum the evidence collected should be available for later testing, including by the defense. In many cases, it may not be known until later what was the best evidence—the most damning or the most compelling—to collect.

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Source: Criminal Law/Scientific Evidence in California Criminal Cases/1 Introducing Scientific Evidence at Trial/§1.6 B. Importance of Immediate Collection of Fleeting Evidence

§1.6 B. Importance of Immediate Collection of Fleeting Evidence

One important decision in evidence collection is determining what evidence is fleeting and, thus, must be collected immediately.

Examples of fleeting evidence at the crime scene include:

- Blood spatter, which should be photographed and collected for later interpretation and DNA analysis;
- Fingerprints, which degrade over time (obtaining only a partial fingerprint may be enough to exclude a suspect, even if it is not enough to identify);
- Swabs taken from key surfaces, such as from steering wheels, that may yield DNA; and
- Casings and fragments in shooting cases. The investigator should collect these and make trajectory evaluations as soon as possible; collections done at the scene could explain or eliminate later scenarios that may arise at trial (*e.g.,* the number of shooters, their movements, and self-defense claims).

Examples of fleeting evidence on persons include:

- Gunshot residue (GSR) on hands or clothes worn (because GSR loses its forensic value after 4 hours); and
- In sexual assault cases, evidence collected from the suspect by swabbing his penis in rape cases and his or her mouth and fingers in oral intercourse or digital penetration cases, as well as evidence collected from the victim's orifices and body parts that correspond with the victim's account of events.

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§1.7 C. Testing by Qualified Forensic Expert

After the physical evidence is collected, it is typically stored and tested by one or more qualified forensic experts. Whether an item is tested depends on what question is sought to be answered. The general question is whether or not the item is associated with the crime and whether it includes or excludes the person accused. It is important to formulate this question because a test is costly in terms of time, effort, and money. In addition, a test may consume a piece of evidence and it may influence whether or not other scientists join in the case or not.

When it is appropriate and practical, the proponent of the evidence, whether the defense or the prosecution, may wish to have two labs test the item. This procedure allows the second test to confirm results and to serve as a backup if, for some reason, the initial testifying expert does poorly on the stand and it becomes necessary to introduce the evidence with another witness in the proponent's case-in-chief or rebuttal. Most evidence is initially tested in government labs and by police departments without consulting prosecutors. However, after a case is charged by the prosecutor, the decisions about what and how to test should be made by the prosecutor who will be responsible for presenting the case in court.

Defense attorneys, on their own or in consultation with others, make all the decisions on when, what, and how to test, and on what expert to use to perform the test or to introduce and discuss the results in court, or both. When testing occurs later in the case after charging, and there is a possibility that the item at this later testing may be consumed, a situation may arise in which a representative for one side wants to be present when the other side conducts the later test.

The more experienced attorney may not want his or her agents present at the testing because their presence may be represented as acknowledging the reliability of the result of the test. At trial, often the opponent of the evidence seeks to attack the reliability of some aspect of the test. If being present at the opponent's laboratory test does not result in discovering a point at which to attack, this fact can be used by the opponent to corroborate the evidence by arguing that if there were anything wrong with the test or result then the jury would have heard of it because counsel or his or her agent was present when the test occurred. In any event, it is important that the attorney use a properly qualified expert who will be able to communicate clearly the results of the test in each and every situation.

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§1.8 III. LAYING A FOUNDATION

A proper foundation must be laid before any item can be admitted into evidence. The basic foundation for generally accepted scientific evidence is sufficient chain of custody and a qualified analyst. *People v Williams* (1989) 48 C3d 1112, 1134, 259 CR 473. See *People v Adams* (1976) 59 CA3d 559, 561, 131 CR 190.

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§1.9 A. Chain of Custody

The chain of custody accounts for the item's identity. If the item was tested, then the chain must account for its condition, *i.e.,* that the item had remained unaltered between the time the item was seized and tested. *People v Williams* (1989) 48 C3d 1112, 1134, 259 CR 473. The condition of the item may be the most important feature of the chain of custody (particularly since the O.J. Simpson trial, because the jury may be predisposed to defense claims of evidence contamination). Even if the opponent of the evidence may be unable to master a technical challenge to the testing procedure, he or she may be capable of fashioning a credible argument of *garbage in-garbage out*. Showing that the item has remained unaltered will satisfy the item's foundation and counter the jury's predilection to believe that dark forces manipulated the evidence.

The chain of custody starts with a collection witness and ends with the scientist. After testing, the scientist repackages the item and returns it to safekeeping. This will allow the trial attorney to argue later that if there was any real dispute about the reliability of a test result, then there is sufficient material left over for retesting.

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§1.10 B. Correct Procedures and a Working Device

Generally, the foundation does not require a showing that the analyst or technician used correct procedures or that the device was in good working order. Those two subjects are weight issues for the jury to consider in determining the reliability of the test result. *People v Venegas* (1998) 18 C4th 47, 74 CR2d 262. However, there are always exceptions, since some courts will persist, without legal justification, in expecting a *Kelly* third-prong showing, as with DNA evidence, that correct procedures were used before allowing the evidence before the jury. *People v Venegas, supra*. Demonstrating correct procedures or a properly functioning device should be done with little time and effort. The foundation for correct procedures or device can be done with just a few questions:

Q: Did you use correct procedures [*or Was the device in good working order*]?

Q: How do you know?

Q: Where are the procedures located [*laboratory or manufacturer's handbook*]?

Q: If another qualified scientist followed the same procedures, would they get the same result?

For further discussion of *Kelly* third-prong showings, see chap 2.

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§1.11 C. Controlling Exhibits at Trial

During the trial, the attorney must appear to be in charge of his or her own exhibits. Appearing to be in control may be challenging because of all the different persons who have already handled and documented the items of physical evidence with their own identification numbers. For example, as described above, physical evidence collected at a crime scene is typically first identified by a police officer who assigns it a number and records its location at the crime scene. When seized, the item may get a second number on an inventory sheet. A third number may be written on the envelope or bag in which it was placed. A fourth number marks its storage location. If tested, the lab will use a fifth number to identify it in a report. Finally, at trial, the item is tagged as an exhibit using yet another number. It is, therefore, essential to organize the physical evidence. The attorney should begin this process as early as possible to keep track of the evidence, and to provide better organization and easy access to exhibits and evidence during the trial.

NOTE: The authors recommend using a chronological system that tracks the history of each item from collection through preservation and testing, identifying each event by date, person, and identification number.

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§1.12 IV. PRETRIAL MOTIONS

The pretrial in limine motion is used to exclude or restrict all or some aspect of the evidence. The motion is filed before the trial, but it is also available during the trial. *People v Vanbuskirk* (1976) 61 CA3d 395, 401, 132 CR 30. A court is not bound by its initial ruling and may change its position during the trial as new evidence is admitted.

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Source: Criminal Law/Scientific Evidence in California Criminal Cases/1 Introducing Scientific Evidence at Trial/§1.13 A. The '402 Motion'

§1.13 A. The "402 Motion"

Scientific and expert opinion evidence is particularly suited for a pretrial motion brought pursuant to Evid C §402. The "402 motion" is filed by the opponent of the evidence. The motion challenges a preliminary fact that must first be established before the evidence is allowed to be shown to the jury. If the motion is granted, it forces the proponent of the evidence to conduct a pretrial evidentiary hearing and prove that disputed preliminary fact. An example of a preliminary fact that can be challenged before trial is the qualifications of an expert witness. Evid C §400. The 402 motion is well suited for scientific expert opinion evidence because the trial court must make three separate judicial findings before allowing a witness to testify as an expert:

- The expert needs to be properly *qualified* by "special knowledge, skill, experience, training, or education" in the expert subject matter. Evid C §720.
- The *subject matter* of the expert's opinion must be "sufficiently beyond common experience" and the opinion "would assist the trier of fact." Evid C §801(a).
- The opinion can only be *based* on what is personally known by the expert or the type of hearsay that other experts in the field would reasonably rely on. Evid C §801(b).

Tactically, the opponent of the evidence must decide whether to challenge the preliminary fact before or during the trial. A trial court is not obligated to conduct a pretrial hearing or rule on the evidence out of the presence of the jury, except in one situation, which is when the defendant challenges the admissibility of a confession or admission and requests that the challenge not be heard by the jury. Evid Code §402(b).

PRACTICE TIP: If the attack is made before the jury and fails, it may bolster the evidence because the jury may think it was a significant defeat to your case. If a pretrial attack succeeds, then the evidence proponent may fail to meet its burden of proof or persuasion (*e.g.,* because the expert was not fully qualified in a certain area and, therefore, was not allowed to opine on that subject matter).

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§1.14 B. Challenging the Subject Matter

An Evid C §402 motion ("402 motion") can challenge the subject matter of the expert's opinion. A witness who qualifies as an expert does not have carte blanche to express any opinion within the area of expertise. *Summers v A.L. Gilbert Co.* (1999) 69 CA4th 1155, 1178, 82 CR2d 162. In criminal law, an expert cannot give an opinion on the defendant's guilt (*People v Brown* (1981) 116 CA3d 820, 828, 172 CR 221), nor an opinion on whether a defendant lacked or possessed a specific intent at the time of the alleged crime (Pen C §29; *People v Rocha* (1996) 48 CA4th 1060, 56 CR2d 212). An expert may not give an opinion based on assumed facts only, or where there are no facts in the record. *Pacific Gas & Elec. Co. v Zuckerman* (1987) 189 CA3d 1113, 1135, 234 CR 630. An expert cannot give an opinion that is based on speculation conjecture, *i.e.,* suspicions. *Lockheed Martin Corp. v Superior Court* (2003) 29 C4th 1096, 1110, 131 CR2d 1. Experts cannot give opinions on a subject that does not require expert opinion because the subject falls within common knowledge and ordinary experience. Evid C §801(a); *People v Killebrew* (2002) 103 CA4th 644, 658, 126 CR2d 876 (the opinion does nothing more than inform the jury on how the case should be decided). No expert opinion evidence is allowed on the credibility of a particular witness who is not an expert on the subject matter. *People v Sergill* (1982) 138 CA3d 34, 41, 187 CR 497.

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§1.15 C. Challenging the Basis of the Opinion

An Evid C §402 motion ("402 motion") can challenge the basis on which the opinion relies. Evidence Code §801(a) defines the terms on what an expert opinion can be based: "special knowledge, skill, experience, training, and education … perceived by or personally known to the witness or made known to him at or before the hearing, whether or not admissible, that is of a type that reasonably may be relied upon by an expert in forming an opinion upon the subject to which his testimony relates."

Most challenges will attack the hearsay basis of the expert's opinion. The proponent should be prepared to prove that the hearsay basis "is of a type that reasonably may be relied upon by an expert" in their field. Evid C §801(a). The classic example is the physician who relies on the history provided by the patient. *People v Wilson* (1944) 25 C2d 341, 348, 153 P2d 720. If the preliminary fact cannot be established, then the opinion is without a proper basis and it should not be allowed. Evid C §803.

If a hearsay basis is allowed, then the opponent should move to limit its use. The expert should not become a substitute for the nontestifying witnesses. *People v Killebrew* (2002) 103 CA4th 644, 659, 126 CR2d 876. The expert may be allowed to identify the hearsay basis; however, on direct examination, the expert is not permitted to testify to its details. *People v Price* (1991) 1 C4th 324, 416, 3 CR2d 106, disapproved on other grounds in *People v Hinks* (1997) 58 CA4th 1157, 68 CR2d 440 (witness cannot state incompetent hearsay under guise of stating opinion). The opposing counsel is entitled to call the hearsay declarant, but it does not appear that unavailability of that person precludes the testifying expert from relying on the information. Evid C §804.

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§1.16 D. Preventing Cross-Examination Based on Hearsay

The proponent of the evidence may want to file a pretrial motion that prevents a cross-examination that is based on hearsay evidence. Opponents of scientific evidence may attempt to use hearsay evidence that is allowed during pretrial admissibility litigation also during the trial itself. During the admissibility phase of the trial, when the challenge is to the general acceptance of a subject matter or forensic science, the cross-examiner may use authoritative hearsay publications to challenge its reliability. However, in trial before the jury, cross-examination that attacks the reliability of a science or methodology is irrelevant. A jury trial is empanelled to resolve the historical merits of the case. General acceptance is no longer an issue once the matter is placed before a jury. It is legally irrelevant to the fact-finder what nontestifying hearsay declarants think or write about general acceptance or that there may be other or more precise methods of collection, processing, or testing of the evidence. In *People v Kaurish* (1990) 52 C3d 648, 692, 276 CR 788, the defense offered testimony about a technique other than the one used in the prosecution's case to attack the reliability of the work done by the laboratory. Noting that the expert admittedly had not actually observed the technique or results used in the prosecution's case, the court held that the defense expert's proposed testimony about the "similarity of the methods" had not been adequately established. Therefore, testimony about the two procedures, particularly a comparison of the two techniques that would find the technique actually used less reliable, was not relevant or material. *Kaurish,* 52 C3d at 692.

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V. EXPERT TESTIMONY

§1.17 A. General Rules of Admissibility

When admissible, scientific and expert opinion evidence generally consists of a properly qualified person who has observed an aspect of the case and then, based on comparison or experience or both, testifies to findings or inferences. Expert testimony is admissible in California on a wide variety of scientific and technical subjects such as ballistics, fingerprints, and drug analyses. Experts in California can also be called to testify about other aspects of criminal cases, including psychological conditions, subjective mental states, specialized subject matter such as gang membership, and emerging areas of expertise such as forensic accounting and specialized computer evidence. For further discussion of qualifying and presenting expert testimony, see chap 3.

Although expert testimony is generally technical, it is introduced like any other evidence: the attorney must lay the foundation, make the testimony understandable, and anticipate attacks. The attorney must also lay a proper foundation for admitting any related physical evidence. In every case, attorneys introducing the evidence should use a common sense approach and proceed with caution, as scientific and expert testimony often becomes the focal point of a complex criminal case. This evidence can single-handedly make or break a case. It can corroborate a weak eyewitness, upset a tight multiple-witness case, or provide the only strong neutral witness for an opponent. A trial may be a search for the truth, but a jury must be told the truth if they are to find it, and scientific or expert evidence can light the way.

For discussion of challenging expert testimony, see chap 4.

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§1.18 B. Application of the *Kelly* Rule for New, Novel, or Experimental Evidence

Expert testimony generally is not subject to the foundational requirements for new or novel scientific techniques set forth in the *Kelly* rule (*People v Kelly* (1976) 17 C3d 24, 130 CR 144). See, *e.g., Wilson v Phillips* (1999) 73 CA4th 250, 254, 86 CR2d 204 (expert testimony explaining theory of "repressed memory" did not invoke *Kelly* rule). If trial counsel wishes to introduce evidence that is based on a new or novel scientific technique, however, he or she must first establish the reliability of the new or novel technique under the *Kelly* rule. See *Kelly,* 17 C3d at 30; *People v Leahy* (1994) 8 C4th 587, 598, 34 CR2d 663. A *Kelly* challenge to the admission of new, novel, or experimental scientific evidence may be made either during trial or before trial by an in limine motion. In either instance, the "general acceptance" of the evidence in question is a foundational fact that may be challenged outside of the presence of the jury. Evid C §402. For detailed discussion of the *Kelly* rule, see chap 2.

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§1.19 C. Expert Preparation

Counsel should meet with his or her expert as many times as necessary to feel comfortable and confident. It is important to impress on the expert that the courtroom is the attorney's laboratory or the attorney's forum, and irrespective of the expert's expertise, he or she needs to follow the attorney's lead at all times. Some experts may look down on the attorney's work because it does not have the exactitude of their own field or they may have a bias against the courtroom because of some past experience. Hopefully, the witness is a true expert and not an advocate. The attorney can only make the determination that his or her expert will assist the case by meeting with him or her. If the attorney finds that the expert may be subject to a damaging attack, or suspects that the jury just will not like the person, then the attorney's options include finding an alternative to present the evidence, such as hiring a backup expert who can come in and testify in that person's place. The attorney's job is to win, not to make that expert look good.

At the attorney's first and sometimes only meeting, the attorney should have the expert bring the entire case file for the attorney to handle and review. The attorney should see every document and every communication. He or she should make certain that any information that should have been discovered is done so. The attorney should also review all discovered matters (reports, laboratory notes, and photos) as he or she should expect they will be a major basis of any cross-examination. If no report was generated, the attorney should be prepared to explain why not.

The attorney should also discuss how the expert prefers to be qualified before the jury, *e.g.,* by specific questions or by a narrative. Find out how the expert has been proffered in the past. Explain in general terms the structure of direct examinations, but especially discuss key issues, such as hypotheticals, comparisons, or how materials or tests are consistent or inconsistent. If there is a demonstrative exhibit, which should whenever possible be used to illustrate the testimony, work with the expert in advance to make certain it is simple and easily shows the point the attorney wants to make.

The attorney should ask the expert what areas of his or her opinion may be challenged by the opponent and why. Find out if there is anything in the expert's past that may come out during cross-examination that the attorney needs to know now. Discuss ways to strengthen those areas during direct examination and what can be done to rehabilitate those same points after cross-examination. For further discussion of expert preparation, see chap 3.

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§1.20 D. Structure of Direct Examination

Direct examination lays a foundation for exhibits, introduces facts, enhances the credibility of witnesses and disputed facts, and establishes final argument points. Leading questions are permitted during direct examination for experts (*People v Campbell* (1965) 233 CA2d 38, 44, 43 CR 237), but should be used sparingly to keep the jury interested.

The structure of the direct examination for any scientific or expert witness includes five general questions:

1. Who are you?

2. What did you do in this case?

3. Why did you do that?

4. What are the results?

5. Is there evidence left over for retesting?

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§1.21 1. First Question: Who Are You?

The answers to the first question (*Who are you?*) establish the expert's qualifications, which in turn bolsters his or her credibility and educates the jury about the subject. Qualifying a witness to be an expert is the same regardless of the scientific or expert field. After the witness gives his or her name, you may want to introduce your witness to the jury and explain why the witness is there, *e.g., In a few minutes I am going to ask you questions about the tests you performed in this case, but first I am going to ask you about your qualifications to perform the test*:

Q: What is your job?

Q: Who is your employer?

Q: How long have you been performing that job?

Q: What is your education that is related to your job?

Q: What is your training that is related to your job?

Q: What is your experience that is related to your job?

Q: In this case, you performed the _____ test; how many other times have you performed this test?

Q: What percentage of your work day is related to that test?

Q: What is your certification [*licensing*]?

Q: Are you a member of any professional organizations related to your field?

Q: Do you keep abreast with the literature and developments in that field?

Q: Do you supervise others [*teach, quality control person, or second reader*]?

Q: Do you publish [*in any peer reviewed articles*] in that field?

Q: Have you previously qualified as an expert in this field?

Q: If so, how many times?

Q: Which courts?

Q: Have you ever not qualified as an expert?

Q: Your Honor, I request that Witness be declared an expert and offer opinion in the area _____.

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§1.22 2. Second Question: What Did You Do in This Case?

The answers to the second question (*What did you do in this case?*) complete the chain of custody and tell the jury the role of the witness in the case:

Q: Did you test the following item(s)?

Q: What was the test used?

Q: What is the purpose of that test?

Q: What is being compared [*evaluated, tested*]?

Q: What are the potential outcomes?

Q: Where or from whom did you receive the item(s)?

Q: How was the item(s) packaged?

Q: Describe its condition [*e.g., it was in a sealed envelope*].

Q: Did you record or photograph the package and its contents?

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§1.23 3. Third Question: Why Did You Do That?

The answers to the third question (*Why did you do that?*) complete the foundation and address the reliability of the methodology:

Q: Briefly, what are the procedures of that test?

Q: Are those the correct procedures?

Q: Are those procedures generally accepted?

Q: Are you familiar with the procedures used by other forensic laboratories?

Q: Are the procedures that you used in this case essentially the same standard operating procedures used by other forensic laboratories, both private and public?

Q: Are those the same procedures used by both public and private laboratories?

Q: Are those the same procedures used whether it is law enforcement or defense work?

Q: What are some non-law enforcement examples of using the same test?

Q: If some other qualified scientist or expert used the same procedures, would that person get the same results?

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§1.24 4. Fourth Question: What Are the Results?

The answers to the fourth question (*What are the results?*) will introduce facts and interpretations that you will argue during the closing argument:

Q: What are the results of the test [*or evaluation*]?

Q: Do you have an opinion on whether or not _____?

Q: What is your opinion?

Q: What is the basis of your opinion?

Q: What is the significance of that result?

Q: Does that result show _____?

Q: Is that result consistent with _____?

Q: Is that result inconsistent with _____?

Q: Is that result not only consistent but also more likely than not _____?

Q: In reviewing the report of your opponent, does it show that the defendant did _____?

In this section, you can lay the ground for a cross-examination of the defense expert who did not issue a report:

Q: Did you publish your findings in a report?

Q: Why did you produce a report?

Q: Why is publishing findings in a report part of the generally accepted scientific procedures?

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§1.25 5. Fifth Question: Is There Evidence Left Over for Retesting?

The answers to the fifth question (*Is there evidence left over for retesting?*) will help create juror confidence in the test results and the analyst as well as dilute the impact of the cross-examination because it implies that if there was a true dispute about test results, then it would be resolved by retesting:

Q: Did you consume all of the evidence?

Q: Is there sufficient evidence for retesting if someone disputed the results?

Q: In science, what is the purpose of retesting?

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§1.26 E. Redirect and Rebuttal

After the opponent's cross-examination, the proponent will need to decide whether to redirect the witness or put on a rebuttal case. Redirect and rebuttal reassures the jury that the evidence is still what you said it was in the opening and direct examination. A common theme of cross-examination of a scientific or expert witness is the implication that there is "more" to the evidence than what the proponent is revealing. This "more" argument includes claims that the other evidence that the prosecution is not producing shows contamination, the true guilty party, that the defendant is excluded by the test, that the analyst is biased, that the test is unreliable, or that the test result is inadequate or too vague to support an opinion.

To decide whether to redirect or rebut the "more" evidence argument, first break down what exactly your opponent is claiming:

- If the opponent claims contamination, then rebut it by breaking apart the argument and specifically determine where and when the alleged contamination occurred: at the scene, during collection or transport, or at the laboratory. Then, reassure the jury about the security, quality control, and professionalism of key persons who handled the item. Explain what contamination means, such as in a DNA case where it would mean a mixture of DNA—and even so, that it would never transform a person's DNA into someone else's DNA.

- If the opponent claims that evidence was planted or switched, then rebut by establishing a detailed timeline from crime through collection to impounding and testing. Again, analyze the opponent's argument. Does it argue the evidence was planted? If so, then how, when, who, and why? Then interject the defense argument into the timeline and determine who must be involved in the alleged conspiracy.

- If the opponent calls an expert, then the proponent must decide whether or not to call an expert to rebut. Determine what to do by looking at the opponent's credentials, the sophistication of the opponent's arguments, the other evidence in the case, and the importance of the case to the community and office. You may find that your expert is simply better. Your expert may have more forensic training and experience with the science and the equipment and should know the specifics of the testing better than the party who attacks it.

- If you are confused and have no idea what your opponent is challenging, then chances are the jury is confused too. Use your expert to guide you out of the woods, *e.g., You heard the defense attorney raise the issue of X—what is the significance of X and how does it relate to this case?*

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VI. DOCUMENTARY EVIDENCE

§1.27 A. Admission by Types of Documentary Evidence

Common types of documentary evidence include laboratory reports, medical reports, autopsy reports, psychological reports, and police reports. While documentary evidence likely contains hearsay, many types are admissible under either the business records exception (Evid C §§1270-1272) or the official records exception (Evid C §§1280-1284). For the business records exception to apply, the writing must be made "in the regular course of business" and "at or near the time of the act, condition, or event." Evid C §1271(a)-(b). The record must be trustworthy, and a custodian or witness must authenticate the record. Evid C §1271(d); *People v Maki* (1985) 39 C3d 707, 711, 217 CR 676. The official records exception is similar, although the custodian or witness will not generally recall specifics about an individual document and must rely instead on the record. Evid C §1280; *People v Arreola* (1994) 7 C4th 1144, 1156, 31 CR2d 631. See Comment to Evid C §1284; *People v Byars* (1961) 188 CA2d 794, 806, 10 CR 677; *People v Crozier* (1953) 119 CA2d 204, 208, 258 P2d 1029.

Medical reports and autopsy reports have been held admissible by some California courts, whereas reports containing subjective opinions, such as psychological reports, have not. *People v Beeler* (1995) 9 C4th 953, 978, 39 CR2d 607 (autopsy report properly admitted under Evid C §1271 because it was trustworthy and did not contain medical hearsay opinions); *People v Reyes* (1974) 12 C3d 486, 502, 116 CR 217 (court properly refused to admit psychiatrist's report because opinion was "not an act, condition or event" as specified under Evid C §1271); *In re Troy D.* (1989) 215 CA3d 889, 902, 263 CR 869 (medical records detailing injury to infant during pregnancy admissible under Evid C §1271 because Department of Social Services complied with all procedures required for a subpoena duces tecum); *People v Wardlow* (1981) 118 CA3d 375, 387, 173 CR 500 (autopsy report properly admitted under Evid C §1280 with testimony about hiring standards). See *People v Williams* (1960) 187 CA2d 355, 364, 9 CR 722 (dicta that a report stating mere diagnostic facts, such as "a man has suffered a compound fracture of the femur," might be admissible if not accompanied by the "reasoning" of the doctor). Police accident and arrest reports are usually held inadmissible because the reports are based on statements of people who are not acting under a duty to report to the police. Comment to Evid C §1271; *MacLean v San Francisco* (1957) 151 CA2d 133, 142, 311 P2d 158. However, portions of the report relating to statements and observations of the investigating officers could be held admissible under the business records exception. See *Taylor v Centennial Bowl, Inc.* (1966) 65 C2d 114, 126, 52 CR 561.

Melendez-Diaz. The U.S. Supreme Court has finally ruled on the much-discussed and long-awaited case, *Melendez-Diaz v Massachusetts* (2009) ___ US ___, 174 L Ed 2d 314, 129 S Ct 2527, which directly addresses the admissibility of scientific test results into evidence. The specific question asked was whether a lab report alone is ever sufficient to establish the results of the test. In *Melendez-Diaz,* a certified lab report ("evidence affidavit") was introduced into evidence at trial to establish the fact that the evidence seized from the defendant was cocaine. The analyst who performed the test and who generated the report did not testify. The defendant objected on the grounds that his rights under the Confrontation Clause were violated, citing *Crawford v Washington* (2004) 541 US 36, 158 L Ed 2d 177, 124 S Ct 1354. The Court agreed with the defendant by a 5-4 vote. Justice Scalia, writing for the majority, held that "[u]nder our decision in *Crawford* the analysts' affidavits were testimonial statements, and the analysts were 'witnesses' for purposes of the Sixth Amendment." *Melendez-Diaz,* ___ US at ___, 174 L Ed 2d at 321. In other words, the analyst who performed the test must testify; without the testimony of the analyst, the lab report is inadmissible hearsay.

The lingering question is what the broad implications of the case are. The majority holds that anything less than in-court confrontation is insufficient. Does this mean that autopsy reports that are admitted under the documentary hearsay exceptions of business records or official (public) records are no longer sufficient and that the pathologist must testify? If so, what does that mean for cold cases in which the forensic pathologist is deceased? What does it mean for any forensic examination when the examiner is no longer available and the examination cannot be recreated? What about the busy underfunded public laboratory where often the lab supervisor will testify about test results on behalf of an unavailable analyst or multiple analysts who each participated at an important stage of the examination?

The Dissent seeks to answer these questions. Justice Kennedy comments in the first paragraph: "The Court sweeps away an accepted rule governing admission of scientific evidence. Until today, scientific analyst could be introduced into evidence without testimony form the 'analyst' who produced it. This rule has been established for at least 90 years."

Melendez-Diaz appears to gut the official records exception, which allowed the introduction of documentary evidence to prove a fact because it was in the public interest to have a neutral government official, who had no interest in either the event or the defendant and who regularly carried out his or her business of performing tests, introduce the results in an official record (lab report). The underlying sense is that the majority no longer trusts the reliability of public laboratories, although in a footnote Scalia wrote that the Court would reach the same decision "if all the analysts always possessed the scientific acumen of Mme.

Curie and the veracity of Mother Theresa." *Melendez-Diaz,* ___ US at ___, 174 L Ed 2d at 327 n6. Whether or not this sentiment is true, *Melendez-Diaz* holds that reliability is achieved by confrontation in the courtroom only.

***Melendez-Diaz* and *Geier*.** In the wake of *Melendez-Diaz*, state and federal courts have been attempting to balance the needs of law enforcement with protecting the rights of the accused. The U.S. Supreme Court has not yet addressed another case on the forensic issues raised by this landmark case. Though 26 states asked the Court to reconsider *Melendez-Diaz* in *Briscoe v Virginia* (2009) ___ US ___, 174 L Ed 2d 600, 129 S Ct 2858, it declined to do so and instead vacated and remanded the decision of the Virginia Supreme Court for further proceedings not inconsistent with *Melendez-Diaz*. *Briscoe v Virginia* (2010) ___ US ___, 175 L Ed 2d 966, 130 S Ct 1316.

A debate is playing out in California. On the one hand, in a case that is still good law, the California Supreme Court has upheld the admission of DNA test results through the testimony of an expert who did not personally perform the tests. *People v Geier* (2007) 41 C4th 555, 61 CR3d 580. The *Geier* Court reasoned that the DNA report, which formed the basis of the expert's testimony, was a contemporaneous record of observable events, prepared as part of a non-adversarial process, using standardized scientific protocol and, therefore, was non-testimonial (*i.e.* not violative of *Crawford*, *supra*). *Geier*, 41 C4th at 607. The expert was a lab supervisor who had a connection with the case having both direct involvement in the lab's technical process and a relationship with the non-testifying technician who performed the test. *Geier* appears to stand for the general proposition that courts can allow the testimony of a lab supervisor who had some role in producing the forensic report or the more traditional principle that an expert may give an opinion based on inadmissible hearsay. So long as the report itself is not introduced into evidence, opinion evidence should be admissible under *Geier*.

On the other hand, however, *Geier* preceded *Melendez-Diaz* and a split has developed in the appellate courts as to the validity of *Geier* and whether forensic test results must be admitted through the testimony of the technician who conducted the test or can be admitted through the testimony of a properly qualified expert.

The California Supreme Court has granted review in the following cases:

People v Bowman (review granted Jun. 9, 2010, S182172; superseded opinion at 182 CA4th 1616, 107 CR3d 156) (supervisor could testify based on non-testifying analyst's notes).

People v Benitez (review granted May 12, 2010, S181137; superseded opinion at 182 CA4th 194, 106 CR3d 39) (acting supervisor of the county's crime laboratory could testify about drug results based on notes made by another analyst);

People v Rutterschmidt (review granted Dec. 2, 2009, S176213; superseded opinion at 176 CA4th 1047, 98 CR3d 390) (chief lab director who signed the reports, could testify regarding results of drug analysis performed by analysts under his supervision);

People v Gutierrez (review granted Dec 2, 2009, S176620; superseded opinion at 177 CA4th 654, 99 CR3d 369) (lead nurse practitioner permitted to testify about findings and draw conclusions from report of sexual assault examination conducted by another nurse practitioner);

People v Dungo (review granted Dec 2, 2009, S176886; superseded opinion at 176 CA4th 1388, 98 CR3d 702) (Confrontation Clause violated when pathologist offered opinion based on nontestifying pathologist's report);

People v Lopez (review granted Dec 2, 2009, S177046 superseded opinion at 177 CA4th 202, 98 CR3d 825) (error to admit blood test report from non-testifying analyst).

PRACTICE TIP: If an advocate believes he or she has a *Geier* situation where the analyst who performed the test is unavailable and it is not possible to conduct a re-test but there is a supervisor who can testify to the results, then the following key points in the foundation, where appropriate, should be laid for the testifying supervisor:

- his or her extensive experience and training as an analyst, supervisor, and trainer;
- his or her direct supervision and training of the unavailable analyst;
- his or her familiarity with the work of the unavailable analyst;
- a description of the lab's protocols and procedures for testing the substance in question and for reporting its results;
- that analysts similarly situated to the unavailable analyst are required to generate contemporaneous or near contemporaneous notes as each step is performed;
- that he or she, regularly reviews the notes generated by the analysts;

- that he or she reviewed the notes in this case as part of his or her regular supervision and before he or she knew that he or she would be testifying in this case (perhaps as a second reader);
- that the unavailable analyst followed the above procedures and protocols as described above (or are found in the manuals maintained at the lab and either discovered or available for inspection and copy);
- that the notes contained nothing unusual (were "valid and unexceptional");
- that the report (do not admit into evidence) appeared to be made near the time of results of the testing became known and appeared to be in standard format;

Once the above foundation has been laid, then the advocate should be able to ask the testifying supervisor: "What were the results of the analysis of the evidence that was submitted in this case?"

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§1.28 B. Authentication

Authenticating documentary evidence essentially means showing the documentary evidence is what you claim it is. Evid C §§403, 1400. Authentication must take place before the documentary evidence may be received in evidence. Evid C §1401. For example, the attorney may show a hand-drawn map to the witness and ask, "What is this?" When the witness states, "It is a map of the Wilshire and Westwood intersection that I drew," then the map has been authenticated. The documentary evidence can now be received in evidence barring any successful objections to admission.

Some common methods of authenticating documentary evidence include calling a witness who saw the writing made or executed (Evid C §1413) or having an expert (Evid C §1418), an appropriate lay witness (Evid C §1416), or the jury (Evid C §1417) perform a handwriting comparison. See Evid C §§645.1, 1419-1421, 1450-1454, and 1530-1532 for additional methods enumerated in the Evidence Code. Most importantly, keep in mind there is *no limit* to the methods in which the attorney may authenticate evidence. Evid C §1410.

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§1.29 C. Stipulations

Attorneys for both sides may stipulate that certain documentary evidence be admitted, subject to the court's permission. Stipulation prior to trial is efficient and allows attorneys to focus efforts on specific, controversial documentary evidence.

PRACTICE TIP: Assess your documentary evidence and determine which evidence is likely undisputed and noncontroversial, and work with the opposition to stipulate the admissibility of that evidence. Be prepared to evaluate proffered documentary evidence from the opposition to determine whether to stipulate as to its admissibility.

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Source: Criminal Law/Scientific Evidence in California Criminal Cases/1 Introducing Scientific Evidence at Trial/§1.30 D. Objections

§1.30 D. Objections

Objections to the admission of documentary evidence include:

- The evidence is not relevant (Evid C §350),
- The evidence includes hearsay (Evid C §1200), and
- Admission of the evidence would be time-consuming, prejudicial, or misleading, or would confuse the issues (Evid C §352).

PRACTICE TIP: If the opposition attempts to admit documentary evidence that is damaging to your case, try to keep it out with a timely objection. Keep in mind that the attorney is not limited to one objection. If your first objection fails, make a second objection. However, before you make an objection, make sure you are ready to explain how the objection applies and why it should be granted by the court. Conversely, make sure you are prepared to oppose objections to documentary evidence that you seek to admit. Be familiar with all the potential objections and the arguments that you can make opposing the objections.

When you evaluate the documentary evidence the opposition seeks to admit, be sure to assess whether it includes "hearsay within hearsay." While the opposition may have a strong argument as to an exception for one level of the hearsay, he or she may not be prepared to argue what exception applies to the second level of hearsay. Additionally, make yourself familiar with all the hearsay exceptions and recent case law limiting and expanding the exceptions. See California Trial Objections, chap 19 (Cal CEB Annual).

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VII. ADDITIONAL EVIDENTIARY ISSUES

§1.31 A. Concealment, Alteration, or Destruction of Evidence

In criminal cases, bad faith concealment, alteration, or destruction of evidence are subject to the sanctions of Pen C §1054.5 when that evidence is required to be disclosed under Pen C §1054.1 or §1054.3. See Pen C §1054.5(b). Those sanctions include disclosure of the evidence, contempt, continuance, prohibiting or postponing the presentation of evidence or the testimony of a witness, an appropriate jury instruction, dismissal of the case when required by the U.S. Constitution, and any other lawful order. See Pen C §1054.5(b)-(c). The imposition of sanctions might be subject to a due process challenge on a case-by-case basis. Destruction of evidence can also be attacked by a *Trombetta-Youngblood* motion, as discussed in §1.33.

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§1.32 B. Loss of Evidence

Loss of evidence in criminal cases is governed by Pen C §1054.5, which allows the trial court to make any lawful order when a party fails to disclose evidence covered by Pen C §1054.1 or §1054.3 after a proper request. See §1.4 for further discussion of Pen C §§1054-1054.10. Loss of evidence is also subject to challenge by a *Trombetta-Youngblood* motion, as discussed in §1.33.

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§1.33 C. Failure to Preserve Evidence

In criminal cases, the government has a duty to preserve evidence that might be expected to play a significant role in the suspect's defense. *California v Trombetta* (1984) 467 US 479, 488, 81 L Ed 2d 413, 421, 104 S Ct 2528 (case that set standard); *People v Johnson* (1989) 47 C3d 1194, 1234, 255 CR 569 (*Trombetta* standard controls in California state courts). To meet the *Trombetta* standard, evidence must (1) be apparently exculpatory before the evidence was destroyed, and (2) be found to be evidence that defendant is unable to obtain, even in comparable form by other reasonably available means. *California v Trombetta,* 467 US at 489, 81 L Ed 2d at 422.

In 1988, the U.S. Supreme Court ruled that the prosecution's failure to preserve potentially useful evidence does not constitute a denial of due process unless the defendant can show bad faith. See *Arizona v Youngblood* (1988) 488 US 51, 58, 102 L Ed 2d 281, 289, 109 S Ct 333. See also *Illinois v Fisher* (2004) 540 US 544, 545, 157 L Ed 2d 1060, 1064, 124 S Ct 1200.

With a "*Trombetta-Youngblood motion,*" the showing the defense must make to obtain relief varies, depending on whether the loss of the evidence was in bad faith. *People v Pastor Cruz* (1993) 16 CA4th 322, 324, 20 CR2d 13. A defendant who can establish that the prosecution acted in bad faith in destroying or failing to preserve evidence is entitled to relief on a showing that the lost or destroyed evidence might have exonerated him or her. *Arizona v Youngblood*, *supra*. See also *Illinois v Fisher, supra*; *People v Memro* (1995) 11 C4th 786, 831, 47 CR2d 219. If the defendant cannot establish bad faith (which is the usual case), then the defendant is entitled to relief only on a showing that the lost or destroyed evidence was material and exculpatory. *California v Trombetta*, 467 US at 488, 81 L Ed 2d at 421; *People v Pastor Cruz, supra*.

The sanctions available for failure to comply with *Trombetta* and *Youngblood* are either a bar of further prosecution or suppression of the state's most probative evidence, and of any testimony about it. See *California v Trombetta,* 467 US at 487, 81 L Ed 2d at 420. A court may also allow the defense to present evidence to the trier of fact that the prosecution, knowing that the evidence it had might exculpate the defendant, either failed to preserve it or destroyed it. *People v Cooper* (1991) 53 C3d 771, 810, 281 CR 90.

For further discussion of the government's duty to preserve evidence in criminal cases, see California Criminal Law Procedure and Practice, chap 11 (Cal CEB Annual).

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2

Novel Scientific Techniques Subject to the *Kelly* Rule

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I. THE *KELLY* RULE

§2.1 A. Statement of the Rule: The "Three Prongs"

Before evidence of a new or novel scientific technique, procedure, or device can be admitted in evidence in California courts, the proffering party must meet the requirements of a three-pronged test. Until 1993, the rule was known as the "*Kelly/Frye*" rule. However, after the Supreme Court's decision in *Daubert v Merrell Dow Pharms., Inc.* (1993) 509 US 579, 587, 125 L Ed 2d 469, 113 S Ct 2786, and the California Supreme Court's decision in *People v Leahy* (1994) 8 C4th 587, 612, 34 CR2d 663, the state law rule is now known generally as the "*Kelly*" rule. See *People v Bolden* (2002) 29 C4th 515, 546, 127 CR2d 802. For purposes of this chapter, we will refer to the former *Kelly/Frye* rule as the "*Kelly* test" or the "*Kelly* rule."

As mentioned above, the *Kelly* rule is a three-pronged test, as follows:

- The first prong requires that the "reliability" of a new scientific technique be established by showing that the technique has "gained general acceptance in the particular field to which it belongs." *People v Kelly* (1976) 17 C3d 24, 30, 130 CR 144, quoting *Frye v U.S.* (DC Cir 1923) 293 F 1013, 1014, superseded by Fed R Evid 702 as stated in *Primiano v Cook* (9th Cir 2010) 2010 US App Lexis 8859.

- The second prong requires that any witness testifying on general acceptance be properly qualified as an expert to give an opinion on the subject. *People v Kelly, supra*.

- The third prong of the test is that the proponent of the evidence must demonstrate that correct scientific procedures were used in the particular case. See *People v Venegas* (1998) 18 C4th 47, 78, 74 CR2d 262, quoting *People v Kelly, supra*.

In *People v Leahy,* the California Supreme Court, in finding that the testimony of police officers who merely administer HGN (horizontal gaze nystagmus) field sobriety tests is, by itself, inadequate for the purpose of meeting the *Kelly* test, reaffirmed the *Kelly* doctrine as controlling law in California and explained that "general acceptance" under the first prong of the *Kelly* rule "means a consensus drawn from a typical cross-section of the relevant, qualified scientific community."

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§2.2 B. Historical Origins: *Frye v U.S.*

The first prong of the rule concerning the introduction of scientific evidence in California has its genesis in the seminal case of *Frye v U.S.* (DC Cir 1923) 293 F 1013, superseded by Fed R Evid 702 as stated in *Primiano v Cook* (9th Cir 2010) 2010 US App Lexis 8859. In *Frye,* a criminal defendant sought to introduce the results of a systolic blood pressure deception test (an early version of a lie-detector test). The test was said to measure increases in systolic blood pressure brought about by nervous impulses associated with deception. The prosecution opposed the introduction of the proffered scientific evidence, contending that no prior case had found such evidence admissible and that the test had failed to earn sufficient scientific recognition. The trial court sustained the objection. On appeal, the D.C. Circuit agreed and affirmed the judgment, stating (293 F at 1014):

Just when a scientific principle or discovery crosses the line between the experimental and demonstrable stages is difficult to define. Somewhere in this twilight zone the evidential force of the principle must be recognized, and while courts will go a long way in admitting expert testimony deduced from a well-recognized scientific principle or discovery, the thing from which the deduction is made must be sufficiently established to have gained general acceptance in the particular field in which it belongs.

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§2.3 1. California Adopts *Frye* "General Acceptance" Rule in *People v Kelly*

Over 50 years after *Frye,* the California Supreme Court issued its unanimous opinion in *People v Kelly* (1976) 17 C3d 24, 130 CR 144. In *Kelly,* the court grappled with the admissibility of voice spectrographic analysis, commonly described as a "voice print," in which "spectrograms" are made of human voices. These spectrograms, which consist of a series of lines or bars plotted across electronically sensitive paper, are visually compared by an examiner, who then determines whether the voices match.

The California Supreme Court observed that it had expressly adopted the *Frye* test in prior cases and held that, when faced with a novel method of proof, California courts require a preliminary showing of general acceptance of the new technique in the relevant scientific community. 17 C3d at 30. The *Frye* standard, thus, looks to members of the scientific community rather than trial judges to determine whether the techniques are sufficiently reliable to be admitted into evidence. *People v Kelly, supra*; see also *U.S. v Addison* (DC Cir 1974) 498 F2d 741, 743.

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§2.4 2. Federal Standard of *Daubert*; *Kelly* Rule Revisited in *People v Leahy*

In 1993, the U.S. Supreme Court issued its decision in *Daubert v Merrell Dow Pharms., Inc.* (1993) 509 US 579, 125 L Ed 2d 469, 113 S Ct 2786, holding that *Frye* was abrogated by Fed R Evid 702. *Daubert* set forth a different standard of admission of scientific, technical, or other specialized fields of knowledge. As interpreted by the U.S. Supreme Court, Fed R Evid 402 vests discretion in the trial court judge to admit qualified expert testimony related to scientific, technical, or other specialized fields of knowledge so long as the court concludes that (1) the testimony is based on sufficient facts or data; (2) the testimony is the product of reliable principles and methods; and (3) the witness has applied those principles and methods reliably to the facts of the case. Thus, courts in *Daubert* jurisdictions are no longer obliged to defer to the scientific community in order to determine whether scientific evidence should be admitted. However, the court may, at will, consider widespread acceptance when assessing the reliability of the proffered evidence. *Daubert,* 509 US at 594.

In the wake of *Daubert,* the California Supreme Court also took the opportunity to revisit the issue in *People v Leahy* (1994) 8 C4th 587, 612, 34 CR2d 663, and reaffirmed the "general acceptance" rule originally articulated in *Frye*. The court concluded that "the *Kelly/Frye* formulation (or now more accurately, the *Kelly* formulation) should remain a prerequisite to the admission of expert testimony regarding new scientific methodology in this state." 8 C4th at 591. The court reasoned (8 C4th at 604):

In sum, *Kelly* sets forth the various reasons why the more "conservative" *Frye* approach to determining the reliability of expert testimony regarding scientific techniques represents an appropriate one. *Daubert,* which avoided the issue of *Frye*'s "merits," presents no justification for reconsidering that aspect of our holding in *Kelly*. Thus, we conclude that the *Kelly* formulation survived *Daubert* in this state, and that none of the above described authorities critical of that formulation persuades us to reconsider or modify it at this time.

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§2.5 C. California's *Kelly* Rule Contrasted With Federal *Daubert* Standard

Prior to the Supreme Court's decision in *Daubert,* the *Frye* rule had been adopted by a majority of state and federal courts. However, support for its approach had been steadily eroding. As a result of the decision in *Daubert,* a majority of jurisdictions have now abandoned *Frye* and adopted the approach in *Daubert*. See Hamilton, *The Movement From Frye to Daubert: Where Do the States Stand?,* 38 Jurimetrics J 201, 208 (Winter 1998).

The *Kelly* court acknowledged that criticism had been directed at the *Frye* standard as being "too conservative," resulting in the exclusion of relevant evidence. *People v Kelly* (1976) 17 C3d 24, 31, 130 CR 144. The court concluded, however, that there was "ample justification for the exercise of judicial caution in the acceptance of evidence developed by new scientific techniques." *People v Kelly, supra*. The *Kelly* court explained that the primary advantage of the *Frye* test is its "essentially conservative nature" (17 C3d at 30):

For a variety of reasons, *Frye* was deliberately intended to interpose a substantial obstacle to the unrestrained admission of evidence based on new scientific principles. "There has always existed a considerable lag between advances and discoveries in scientific fields and their acceptance as evidence in a court proceeding." *People v Spigno* (1957) 156 Cal.App.2d 279, 289. Several reasons founded in logic and common sense support a posture of judicial caution in this area. Lay jurors tend to give considerable weight to "scientific" evidence when presented by "experts" with impressive credentials.

Such a conservative approach is consistent with the court's admonition in *People v Law* (1974) 40 CA3d 69, 85, 114 CR 708, that it is the duty of the courts "to be particularly careful that there is not only substantial evidence to support the implied finding of [a defendant's] identity but that the finding is based upon admissible and nonprejudicial evidence." Accordingly, the "general acceptance" rule "serves the salutary purpose of preventing the jury from being misled by unproven and ultimately unsound scientific methods." *People v Shirley* (1982) 31 C3d 18, 53, 181 CR 243.

In sum, considered in its best light, California's approach to the admissibility of scientific evidence after *Frye* and *Kelly* arguably (1) permits disputes about scientific validity to be resolved by the relevant scientific community; (2) ensures that a minimal reserve of experts exist who can critically examine the validity of a particular scientific determination; (3) spares courts from the time-consuming and difficult task of repeatedly assessing the validity of the same innovative scientific techniques; and (4) promotes uniformity of decisions throughout a jurisdiction. See *State v Vandebogart* (NH 1992) 616 A2d 483, 489.

NOTE: The National Research Council of the National Academies has conducted a study for Congress on forensic science and has prepared a report called *Strengthening Forensic Science in the United States: A Path Forward* (2009). The report contains numerous observations and suggestions affecting crime labs and may very well lead to changes to the process of analyzing evidence. The report is available online at http://www.nap.edu/catalog.php?record_id=12589. It should also be noted that the Obama administration has indicated a willingness to re-evaluate the federal government's view of the scientific community, and this may impact the procedures for examining scientific evidence in the federal courts.

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D. When *Kelly* Rule Is Applicable

§2.6 1. Technique Must Be New, Novel, or Experimental

The "common sense purpose" of the *Kelly* rule is that it is applicable whenever scientific techniques are sought to be introduced that, though "new, novel, or experimental, convey a misleading aura of certainty." *People v Stoll* (1989) 49 C3d 1136, 1156, 265 CR 111, citing *People v Kelly* (1976) 17 C3d 24, 30, 130 CR 144 (internal quotations omitted). The test applies to a "limited class" of expert testimony based on a "technique, process, or theory which is *new* to science, and even more so, the law." *People v Kelly, supra.* The test does not apply to general expert opinion testimony, "absent some special feature which effectively blindsides the jury." 49 C3d at 1157. Compare *People v Shirley* (1982) 31 C3d 18, 66, 181 CR 243 (posthypnotic testimony of witness subject to *Kelly/Frye*), with *People v McDonald* (1984) 37 C3d 351, 208 CR 236, overruled on other grounds in *People v Mendoza* (2000) 23 C4th 896, 914, 98 CR2d 431 (defense expert testimony on psychological factors relating to eyewitness identification not subject to *Kelly/Frye*). See also *People v Stoll,* 49 C3d at 1156.

The *Kelly* court held that proof of a technique's or process's general acceptance in the scientific community is no longer necessary after a published appellate decision affirms a trial court determination admitting evidence obtained by that technique, "at least until new evidence is presented reflecting a change in the attitude of the scientific community." *People v Bolden* (2002) 29 C4th 515, 544, 127 CR2d 802, citing *People v Kelly,* 17 C3d at 30. In *Bolden,* the California Supreme Court noted that a previously published appellate opinion had held that the electrophoretic multisystem testing of blood stains was generally accepted as reliable in the scientific community. Therefore, the *Bolden* court held that a defendant later challenging the technique's validity could only do so by presenting new evidence relating to a change in the attitude of the scientific community. In the absence of such evidence, the court held that a court need only consider whether the proffered evidence satisfied the third *Kelly* prong of whether the person performing the tests used the proper scientific procedures. 29 C4th at 546.

Whereas Fed R Evid 702 applies to "scientific, technical or other specialized knowledge," the *Kelly* rule applies only to "expert testimony which is based, in whole or part, on a technique, process or theory which is new to science and, even more so, the law." *People v Stoll,* 49 C3d at 1156. The express purpose of the rule is to limit the introduction of scientific evidence until it is "reasonably certain that the pertinent scientific community no longer views [the technique] as experimental or of dubious validity." *People v Stoll, supra*.

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§2.7 2. Applies Only to Unproven Techniques, Procedures, or Devices

The *Kelly* rule applies only to an "unproven technique or procedure" or a "machine." *People v Stoll* (1989) 49 C3d 1136, 1156, 265 CR 111. This limitation is in place because "[l]ay minds might easily, but erroneously, assume that such procedures are objective and infallible." As such, the test is applied to new techniques, procedures, or devices "which carry an equally undeserved aura of certainty." Moreover, whether a particular technique, procedure, or device passes California's test is distinct from whether the technique, procedure, or device was used properly. Questions regarding the latter generally go to the weight of such evidence, not to its admissibility. *People v Farmer* (1989) 47 C3d 888, 913, 254 CR 508, overruled on other grounds in *People v Waidla* (2000) 22 C4th 690, 724, 94 CR2d 396.

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§2.8 3. Does Not Apply Unless Technique Is New or Novel

The *Kelly* rule applies only to new scientific techniques, procedures, or devices. Thus, if the court does not first perceive a new or novel technique, procedure, or device, the *Kelly* rule is inapplicable. See, *e.g., People v Pride* (1992) 3 C4th 195, 238, 10 CR2d 636 (hair comparison not a new technique); *People v Clark* (1993) 5 C4th 950, 1018, 22 CR2d 689, disapproved on other grounds by *People v Doolin* (2009) 45 C4th 390, 421 n22, 87 CR3d 209 (test inapplicable to "blood splatter" evidence). The *Kelly* threshold requirements are not applied to tests or techniques that are not new, but employ matters of "common knowledge, readily understood by the jury," such as the blood splatter evidence in *Clark*.

Moreover, absent evidence that "effectively blindsides the jury," the *Kelly* rule does *not* apply to expert testimony in general. *People v Stoll* (1989) 49 C3d 1136, 1156, 265 CR 111. Thus, for example, the *Kelly* rule does not apply to expert testimony regarding the reliability of eyewitness identification. *People v McDonald* (1984) 37 C3d 351, 208 CR 236, overruled on other grounds in *People v Mendoza* (2000) 23 C4th 896, 914, 98 CR2d 431. Similarly, the *Kelly* rule has never been applied to expert medical or psychiatric testimony. *People v Stoll,* 49 C3d at 1157; *Wilson v Phillips* (1999) 73 CA4th 250, 254, 86 CR2d 204. In addition, *Kelly/Leahy* is no bar to the admission of evidence that a defendant's personality was such that he or she was not likely to commit certain acts in the future. *People v Burnick* (1975) 14 C3d 306, 312, 121 CR 488; *People v Monroe* (1985) 168 CA3d 1205, 1214, 215 CR 51. In addition, the "product rule" used in DNA cases is not subject to a *Kelly* test of acceptance in the scientific community, but raises only a question of relevance. *People v Nelson* (2008) 43 C4th 1242, 78 CR3d 69. For further discussion of *People v Nelson* and the product rule in DNA cases, see chap 5.

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§2.9 4. Expert Testimony Generally Not Subject to *Kelly* Rule

Expert testimony generally is not subject to the foundational requirements for new or novel scientific techniques set forth in the *Kelly* rule. See, *e.g.,* *Wilson v Phillips* (1999) 73 CA4th 250, 254, 86 CR2d 204 (expert testimony explaining theory of "repressed memory" did not invoke *Kelly* rule); *People v Rowland* (1992) 4 C4th 238, 265, 14 CR2d 377 (*Kelly* not applicable to expert medical testimony that lack of genital trauma is not inconsistent with rape). If, however, the expert's opinion is based on a new or novel scientific technique or test, the technique or test must satisfy the requirements of the *Kelly* rule before the expert's opinion is admissible. *People v Parnell* (1993) 16 CA4th 862, 868, 20 CR2d 302. For further discussion, see chap 3.

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§2.10 5. Effect of Published Appellate Decision Finding General Acceptance

In *Kelly,* the California Supreme Court noted that one of the primary benefits of the application of the conservative "general acceptance" rule is that it relies on members of the scientific community rather than trial judges to determine whether the techniques are sufficiently reliable. *People v Kelly* (1976) 17 C3d 24, 30, 130 CR 144. In addition, the application of the conservative *Frye* test is believed to promote a degree of uniformity of decision based on substantial agreement and consensus in the scientific community. Once a trial court has admitted evidence based on a new scientific technique, and that decision is affirmed on appeal by a published appellate decision, the precedent so established may control subsequent trials, at least until new evidence is presented reflecting a change in the attitude of the scientific community. *People v Kelly,* 17 C3d at 32.

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§2.11 E. List of Approved Techniques Under *Kelly* Rule

The following techniques have been approved under the *Kelly* rule in published California decisions. Thus, they are no longer considered "new" for reliability purposes. Note that general acceptance of these techniques may change.

- Agglutination-inhibition blood testing. *People v Yorba* (1989) 209 CA3d 1017, 1024, 257 CR 641.
- Ballistics examinations. *People v Trujillo* (1948) 32 C2d 105, 111, 194 P2d 681.
- Battered women's syndrome in criminal cases. Evid C §1107(b); *People v Humphrey* (1996) 13 C4th 1073, 1082, 56 CR2d 142.
- Blood tests for nonpaternity. *Cramer v Morrison* (1979) 88 CA3d 873, 153 CR 865. Human leukocyte antigen (HLA) test to establish paternity (*Cramer v Morrison, supra*) now referred to in Fam C §7551 as a "genetic" test rather than a blood test.
- Blood (*In re Newbern* (1959) 175 CA2d 862, 865, 1 CR 80), breath (*People v Adams* (1976) 59 CA3d 559, 561, 131 CR 190), and urine (*Quesada v Orr* (1971) 14 CA3d 866, 869, 92 CR 640) tests for intoxication.
- DNA polymerase chain reaction (PCR) analysis for DQ alpha gene. *People v Morganti* (1996) 43 CA4th 643, 657, 50 CR2d 837. See also *People v Doolin* (2009) 45 C4th 390, 446, 87 CR3d 209.
- DNA PCR analysis and short tandems repeat (STR) test. *People v Allen* (1999) 72 CA4th 1093, 1099, 85 CR2d 655.
- DNA profiling or typing for identification using restriction fragment length polymorphism (RFLP) method. *People v Soto* (1999) 21 C4th 512, 514, 88 CR2d 34; *People v Venegas* (1998) 18 C4th 47, 84, 74 CR2d 262.
- DNA profiling using Profiler Plus kit. *People v Hill* (2001) 89 CA4th 48, 58, 107 CR2d 110.
- DNA profiling using Identifiler test kit. *People v Jackson* (2008) 163 CA4th 313, 323, 77 CR3d 474.
- DNA profiling involving multiple mixtures using Profiler Plus and COfiler kits and ABI Prism 310 Genetic Analyzer. *People v Smith* (2003) 107 CA4th 646, 666, 132 CR2d 230.
- Using unmodified product rule to calculate statistical probabilities in DNA analysis. *People v Soto, supra*.
- Electrophoretic testing of dried blood stains. *People v Fierro* (1991) 1 C4th 173, 214, 3 CR2d 426; *People v Morris* (1991) 53 C3d 152, 206, 279 CR 720, disapproved on other grounds in *People v Stansbury* (1995) 9 C4th 824, 38 CR2d 394; *People v Reilly* (1987) 196 CA3d 1127, 1148, 242 CR 496.
- Fingerprint analysis. *People v Riser* (1956) 47 C2d 566, 589, 305 P2d 1, overruled on other grounds in *People v Chapman* (1959) 52 C2d 95, 338 P2d 428, and *People v Morse* (1964) 60 C2d 631, 637 n2, 36 CR 201.
- Handwriting comparison. *People v Storke* (1900) 128 C 486, 488, 60 P 1090.
- Horizontal gaze nystagmus (HGN) test. *People v Joehnk* (1995) 35 CA4th 1488, 1505, 42 CR2d 6.
- Odontology. *People v Peneda* (1995) 32 CA4th 1022, 38 CR2d 312; *People v Marx* (1975) 54 CA3d 100, 126 CR 350.
- Radar speedometer to determine vehicle speed. *People v MacLaird* (1968) 264 CA2d 972, 71 CR 191.

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Source: Criminal Law/Scientific Evidence in California Criminal Cases/2 Novel Scientific Techniques Subject to the Kelly Rule/§2.12 F. List of Disapproved Techniques Under Kelly Rule

§2.12 F. List of Disapproved Techniques Under *Kelly* Rule

The following formerly new or novel techniques have been specifically disapproved under *Kelly* by California courts:

- Voice identification through spectrographic analysis. *People v Kelly* (1976) 17 C3d 24, 30, 130 CR 144; see also *U.S. v Drones* (5th Cir 2000) 218 F3d 496, 503.
- Polygraph test, also called a lie detector test. See *People v Price* (1991) 1 C4th 324, 419, 3 CR2d 106, disapproved on other grounds in *People v Hinks* (1997) 58 CA4th 1157, 68 CR2d 440.

NOTE: Most states still exclude polygraph tests, but since the decision in *Daubert v Merrell Dow Pharms., Inc.* (1993) 509 US 579, 125 L Ed 2d 469, 113 S Ct 2786, various state and federal courts have split on their admissibility. In *U.S. v Scheffer* (1998) 523 US 303, 140 L Ed 2d 413, 118 S Ct 1261, the court held that a categorical ban on admissibility is constitutionally permissible (exclusion of polygraph evidence offered by defendant to show innocence did not violate Sixth Amendment right to present defense). Because Evid C §351.1 makes polygraph evidence inadmissible unless the parties stipulate to admissibility, a party is not entitled to a *Kelly* hearing on the reliability of the technique. *People v Wilkinson* (2004) 33 C4th 821, 845, 16 CR3d 420.

- Posthypnotic testimony, except in limited circumstances provided in Evid C §795. See *People v Shirley* (1982) 31 C3d 18, 66, 181 CR 243.
- Sodium pentothal (truth serum). See *People v Cullen* (1951) 37 C2d 614, 626, 234 P2d 1.
- Penile plethysmograph test. *In re Mark C.* (1992) 7 CA4th 433, 444, 8 CR2d 856; *People v John W.* (1986) 185 CA3d 801, 806, 229 CR 783, disapproved on other grounds in *People v Stoll* (1989) 49 C3d 1136, 265 CR 111.
- Defendant's scent purportedly identified by dog using scent transfer device and scent identification lineup procedure. *People v Mitchell* (2003) 110 CA4th 772, 793, 2 CR3d 49. See also *People v Willis* (2004) 115 CA4th 379, 385, 9 CR3d 235.
- Detection of child abuse by reports of abuse and observations of child with anatomically correct dolls. *In re Amber B.* (1987) 191 CA3d 682, 691, 236 CR 623; *In re Christine C.* (1987) 191 CA3d 676, 679, 236 CR 630.
- Retrieval of repressed memories of sexual molestation by using sodium amytal. *Ramona v Superior Court* (1997) 57 CA4th 107, 116, 66 CR2d 766.

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II. THE *KELLY* HEARING

A. Moving for or Opposing a Kelly Hearing

§2.13 1. When to Make Challenge

A challenge to the admission of new, novel, or experimental scientific evidence can be made either during trial or before trial by way of an in limine motion. In either instance, the "general acceptance" of the evidence in question is a foundational fact that may be challenged outside the presence of the jury. Evid C §402. However, because such an evidentiary hearing could take several days of nonjury time, the party opposing the evidence should raise the issue as soon as possible to avoid inconveniencing the court and jurors.

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§2.14 2. What Opponent of Evidence Must Show to Get Hearing

As a threshold matter, counsel opposing the introduction of the evidence under *Kelly* should be prepared to show that the proffered evidence is either "new or novel" or otherwise not "generally accepted" in the relevant scientific community. In so doing, counsel should be cognizant of the fact that just because a technique has been in effect for a number of decades does not mean that it will not be considered new and subject to the test. See, *e.g.*, *People v Leahy* (1994) 8 C4th 587, 612, 34 CR2d 663 (horizontal gaze nystagmus (HGN) field sobriety test used in conjunction with drunk driving arrests considered "new" even though it had been used by officers for over 30 years).

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§2.15 3. Burden of Proof at Hearing

The burden of proof is on the party seeking to introduce the new, novel, or experimental scientific evidence. If the proffering party fails to establish reliability and general acceptance, the evidence is not relevant and must be excluded. Evid C §403(a)(1); *People v Leahy* (1994) 8 C4th 587, 612, 34 CR2d 663.

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B. First Prong: General Acceptance in the Relevant Scientific Community

§2.16 1. Reliability Requirement

For scientific evidence to be admissible in California, it must satisfy a reliability requirement. But the California Supreme Court has made it clear that it is not the role of the trial judge or California's appellate courts to determine whether a challenged scientific technique or procedure is reliable as a matter of fact. Rather, that is a task reserved for the relevant scientific community. As the court explained in the context of deciding the admissibility of posthypnotic testimony (*People v Guerra* (1984) 37 C3d 385, 418, 208 CR 162, disapproved on other grounds in *People v Hedgecock* (1990) 51 C3d 395, 272 CR 803):

It is not our function … to resolve … disputes within the scientific community, any more than it is our task to determine whether posthypnotic testimony is reliable as a matter of scientific fact.… [T]he courts view the professional literature on hypnosis as "evidence," not of the actual reliability of the new scientific technique, but of its acceptance *vel non* in the scientific community. That is all the *Frye* test requires.

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§2.17 2. What Constitutes General Acceptance?

The *Frye* test does not demand the impossible—proof of an absolute unanimity of views in the scientific community before a new technique will be deemed reliable; any such unanimity would be highly unusual, especially in the field of behavioral sciences. Rather, the test is met "if use of the technique is supported by a clear majority of the members of that community." *People v Guerra* (1984) 37 C3d 385, 418, 208 CR 162, disapproved on other grounds in *People v Hedgecock* (1990) 51 C3d 395, 272 CR 803.

Thus, there need not be unanimous or total agreement among members of the relevant scientific community as to the viability of a challenged technique, procedure, or device to achieve admissibility. Rather, California courts require a "clear majority" of those in the relevant community to agree for the general acceptance requirement to be met. In determining whether a clear majority exists, the trial court cannot simply tally heads. It must also assess the quality of the evidence proffered in support of and in opposition to a finding of general acceptance. The California Supreme Court explained (*People v Leahy* (1994) 8 C4th 587, 612, 34 CR2d 663):

[*People v*] *Kelly* itself, at one point, described the *Frye* test as calling for "substantial agreement and consensus in the scientific field." Of course, the trial courts, in determining the general acceptance issue, must consider the quality, as well as the quantity, of the evidence supporting or opposing a new scientific technique. Mere numerical majority support or opposition by persons minimally qualified to state an authoritative opinion is of little value.

Assessing the quality of such evidence can be a daunting task for trial judges, many of whom are no more experienced (or, perhaps, significantly less experienced) in the particular scientific field than many jurors. One criticism of the *Kelly* rule is the argument that, in determining whether the "quality" of the proffered evidence is sufficiently deserving of acceptance, the trial judge is being asked to do what federal judges must do under the *Daubert* formulation—*i.e.,* exercise their discretion to determine whether the evidence is sufficiently reliable to be admitted, even though the California Supreme Court continues to insist that such is not the function of the court. *People v Guerra,* 37 C3d at 418.

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§2.18 3. Defining the Relevant Scientific Community

In order to satisfy the requirements of the first prong of the *Kelly* rule, the new scientific principle at issue must be generally accepted "in the particular field in which it belongs." *Frye v U.S.* (DC Cir 1923) 293 F 1013, 1014. Selecting the proper field can have a dispositive impact on whether or not the technique is found to be "generally accepted," and sometimes determining the relevant community is easier said than done.

For instance, in *People v King* (1968) 266 CA2d 437, 456, 72 CR 478 (referenced by the Supreme Court in *Kelly*), the trial court admitted testimony concerning voiceprint evidence from a witness with an electrical engineering and physics background who had performed voiceprint analysis on many occasions. In reversing the judgment, the Court of Appeal found that "communication by speech" did not fall into just one established category of science but required "an understanding of anatomy, physiology, physics, psychology and linguistics"—qualifications the witness did not satisfy by his training, education, or experience. The court held that general acceptance in each of the relevant fields had to be shown before the evidence could be admitted.

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§2.19 4. Requisite Showing to Establish General Acceptance

The party seeking to introduce the new, novel, or experimental scientific evidence must present opinion evidence from a qualified expert showing that the evidence in question is generally accepted in the relevant scientific community and that proper procedures were used. *People v Joehnk* (1995) 35 CA4th 1488, 1493, 42 CR2d 6.

As indicated in the discussion above, in order to be successful, the proponent of the evidence need not establish "absolute unanimity of views in the scientific community." *People v Guerra* (1984) 37 C3d 385, 418, 208 CR 162, disapproved on other grounds in *People v Hedgecock* (1990) 51 C3d 395, 410, 272 CR 803. "Rather, the test is met if use of the technique is supported by a clear majority of the members of that community." *People v Guerra, supra*. However, in determining the general acceptance issue, trial courts "must consider the quality, as well as quantity, of the evidence supporting or opposing a new scientific technique. Mere numerical majority support or opposition by persons minimally qualified to state an authoritative opinion is of little value under the foregoing cases." *People v Leahy* (1994) 8 C4th 587, 612, 34 CR2d 663.

Additionally, in some instances, preliminary foundational facts must be established upon which the relevance of the proffered evidence rests. *People v Pizarro* (2003) 110 CA4th 530, 542, 3 CR3d 21. Under such circumstances, "the proponent of the evidence has the burden of producing evidence of the preliminary fact sufficient for a trial of fact to reasonably find by a preponderance of the evidence that the fact exists" and "[u]nless this preliminary fact is established, the proffered evidence depending on it is neither relevant nor admissible." *People v Pizarro, supra*; see also Evid C §403.

Finally, once the reliability of new, novel, or experimental scientific evidence has been determined, the party seeking to introduce the evidence still must establish that correct scientific procedures were used in administering the test. See *People v Venegas* (1998) 18 C4th 47, 78, 74 CR2d 262.

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C. Second Prong: Proper Qualification of Experts

§2.20 1. Who Is Qualified to Testify as an Expert?

While Evid C §§720 and 801 permit any person to testify as an expert if he or she possesses "special knowledge, skill, experience, training, and education" sufficiently beyond common experience that his or her opinion "would assist the trier or fact," witnesses who testify in connection with new or novel scientific evidence must be members of the relevant scientific community in which the technique, procedure, or device is used. See *People v King* (1968) 266 CA2d 437, 456, 72 CR 478.

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§2.21 2. General Qualifications of Expert to Prove "General Acceptance"

A person is qualified to testify as an expert if he or she has special knowledge, skill, experience, training, or education sufficient to qualify him as an expert on the subject to which his testimony relates. Whether a person qualifies as an expert in a particular case, however, depends on the facts of the case and the witness's qualifications. *People v Bloyd* (1987) 43 C3d 333, 357, 233 CR 368.

It is the function of a trial court to determine the qualifications of an expert, and the degree of his knowledge is a matter which affects the weight of his testimony, not its admissibility." *People v Stuller* (1970) 10 CA3d 582, 597, 89 CR 158 (fingerprint technician who had made 10,000 comparisons considered an expert). Accordingly, a university degree is not necessarily indispensable to expertise.

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§2.22 3. Qualified to Understand Principles and to Evaluate Differences of Opinion

A party who challenges the basis for an expert's opinion may request a preliminary fact hearing outside the presence of the jury, pursuant to Evid C §405. At this hearing, the party offering the evidence bears the burden of demonstrating that the expert's opinion is based on information that would be deemed reliable under the circumstances. Evid C §801.

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§2.23 D. Third Prong: Test Was Performed in Accordance With Correct Scientific Procedures

The *Kelly* rule's third prong does not apply the *Frye* requirement of general scientific acceptance—it assumes that the methodology and technique in question have already met that requirement. Instead, it inquires into the matter of whether the procedures actually utilized in the case were in compliance with that methodology and technique, as generally accepted by the scientific community. The third-prong inquiry is, thus, case specific; it cannot be satisfied by relying on a published appellate decision. *People v Venegas* (1998) 18 C4th 47, 78, 74 CR2d 262.

Before any challenged scientific evidence can be admitted under *Kelly,* the proffering party must lay a proper foundation showing the accuracy of any scientific or mechanical instruments used in the test. He or she must also show that the instrument was properly operated or the procedure was properly conducted. One commentator has suggested that three questions must be answered (Imwinkelried, The Methods of Attacking Scientific Evidence (4th ed 2004)):

1. Is a particular test or maintenance procedure required?

2. Did the witness comply with that procedure?

3. If not, what effect does the noncompliance have on the testimony's admissibility?

In answering the first question—determining the correct test protocol or machine maintenance—testimony can refer to learned treatises, relevant articles, or instruction manuals that accompany the scientific device or instrument. The second question can be answered by the testimony of the individual machine technician who operated the instrument or another qualified witness percipient to the test, by the use of business records, or even by testimony of habit and custom. It is also important that the party proponent establish that the instrument has been properly and regularly maintained. This can be shown in similar fashion.

Finally, what effect does noncompliance with these procedures have on admissibility? In California, the answer to this third question depends on whether the noncompliance was a failure to follow test protocol or merely a matter of carelessness in the manner in which the test was conducted. If noncompliance consists of a failure to follow test protocol (*i.e.,* correct scientific procedures essential to an accurate test result), then noncompliance will result in exclusion of the evidence. On the other hand, mere carelessness or sloppiness in the testing does not necessarily negate the accuracy of the test but affects only the weight of the evidence and does not preclude its admission. *People v Venegas,* 18 C4th 47 at 99.

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III. REVIEW OF TRIAL COURT'S RULING

§2.24 A. Independent Review of General Acceptance

Once a trial court has admitted evidence of new, novel, or experimental scientific evidence and that decision is affirmed in a published appellate decision, this determination may control future trials unless and until new evidence reflecting a change in attitude in the scientific community is presented. *People v Kelly* (1976) 17 C3d 24, 32, 130 CR 144.

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§2.25 B. Deferential Review of Expert Qualifications

"It is the function of a trial court to determine the qualifications of an expert, and the degree of [his or her] knowledge is a matter which affects the weight of [his or her] testimony, not its admissibility." *People v Stuller* (1970) 10 CA3d 582, 597, 89 CR 158. Accordingly, a university degree is not necessarily indispensable to expertise. The determination of an expert's qualification is primarily the function of a trial court, and its ruling will not be disturbed in the absence of an abuse of discretion. *People v McWhorter* (2009) 47 C4th 318, 367, 97 CR3d 412; *People v Cruz* (1968) 260 CA2d 55, 59, 66 CR 772.

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§2.26 C. Reviewing Court May Look Beyond Trial Court Record

The California courts' examination of prior case authority establishing the "general acceptance" of new, novel, or experimental scientific evidence is not limited to those cases decided in California. Because appellate endorsement of a technique ends the need for case-by-case adjudication, courts have sometimes looked beyond the trial record (examining California precedent, cases from other jurisdictions, and the scientific literature itself) to ascertain whether a particular technique is generally accepted. *People v Allen* (1999) 72 CA4th 1093, 1099, 85 CR2d 655.

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3

Preparing and Presenting Expert Testimony on Scientific Evidence

Michael Begovich

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I. PRETRIAL STRATEGIC CONSIDERATIONS

§3.1 A. Preparing Top Ten Points of Case

In his Rhetoric and Poetics, Aristotle teaches us, "The first step in any science is the most important one." If the presentation of an expert witness at trial is in any way a "science," then the first step is preparation, preparation, and more preparation for trial counsel. Before the decision is made to have an expert witness testify, trial counsel must have developed the case theme and know how the expert's testimony will buttress that theme.

Attorneys are advised to prepare a "Top Ten Points" of the case. Simply stated, the trial attorney lists no less than five and no more than ten key evidentiary points, and then writes two to three sentences for each point. The attorney should do this after reading the discovery, viewing the crime scene or accident scene, and conducting an independent investigation on behalf of the client.

PRACTICE TIP: It is crucial to write "points" that harm your client's case. Why? Because these "points" are salient facts that the jury will receive and evaluate in their overall assessment of the evidence, in order to reach a verdict.

After the "Top Ten Points" are committed to writing, trial counsel, co-counsel, and other members of the trial team should confer and analyze the points. The goal is to list them—from most important to least important—in terms of the likely persuasive impact on the jury. This is actually a difficult and time-consuming process—but an invaluable one for case preparation.

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§3.2 B. Developing Case Theme: The "Telegram"

After the "Top Ten Points" of the case are determined (see §3.1), the attorney should prepare the "telegram." The telegram is the theme of the client's case persuasively written in 10-15 words. Assume the childhood story of *Goldilocks and the Three Bears* and that the Bears have sued Goldilocks for burglary and vandalism for entering the residence without permission, eating Baby Bear's food, and breaking a chair. The attorney represents Goldilocks. His or her telegram might be the following: "A desperate and hungry eight-year-old seeks refuge in an open house."

The telegram is trial counsel's preparation beacon. Every piece of evidence, every exhibit and photograph, every direct and cross-examination, counsel's opening statement, and counsel's closing argument are all focused on proving the telegram. If the exhibit or point in cross-examination is not relevant to proving the telegram, then the trial attorney should seriously consider leaving it out.

In conclusion, the expert witness testimony must be integrated into a client's case as a critical piece of evidence that supports, or proves, the telegram. In the observation of trial performance, it seems clear that preparation is the key to the effective presentation of expert witness testimony. Indeed, the jury can usually tell when the trial attorney has not mastered the complex medical or other forensic testimony during a direct examination.

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§3.3 C. Using a Three-Part Approach: Qualifying the Expert, Asking Forensic Questions, Asking Hypothetical Questions

In the art of trial advocacy, there is no "right way" to present a direct examination of an expert witness. The goal is to make the presentation persuasive within the confines of sui generis personalities, approaches to advocacy, and types of experts and cases presented. With this goal in mind, this chapter details the following "checklist" approach to the direct examination of an expert witness, consisting of three parts in the following order:

- Qualifying the expert (see §§3.25-3.31);
- Asking forensic questions (presenting the expert's opinion and the basis for the opinion) (see §§3.32-3.33); and
- Asking hypothetical questions (see §§3.34-3.37).

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§3.4 D. Trial Tips for Proper Questioning of Expert

To properly question an expert, counsel must truly know the subject matter and must organize the examination in such a way that it is logical, theme-based, and consistent with storytelling techniques; is less than 1 hour on direct; and employs visual aids. More specifically, counsel should keep the following in mind when presenting expert witnesses in jury trials:

- Make sure to logically organize your content with two or three (but no more than five) main points. Having more than five is likely to result in less retention and understanding of the expert testimony by the jury. Effective organization is, therefore, *very* important for persuasion.
- Limit the direct examination to less than 1 hour. This enhances jurors' retention of material and makes the overall expert opinion more persuasive.
- Ask short questions and avoid lengthy, narrative responses from the expert.
- Use simple terms versus complex ones to aid in understanding the expert's opinion and analysis. Avoid complex medical or scientific terminology; if such terms must be used, ask the expert to define them in concise and clear language.
- Use simple and concise examples to explain medical, financial, and scientific concepts. This enhances understanding and persuasion.
- Use exhibits, physical evidence, graphs, charts, diagrams, video clips, tape recordings, and PowerPoint presentations to make complex material comprehensible for the jury.
- Be sure that the expert has some eye contact with the jury. This is crucial. Although the expert will typically be focused on counsel during questioning, it is important that the expert—during salient portions of the examination—turn toward the jury and make eye contact with three or four of them during an answer.
- Pause during key parts of the questioning so the jurors can meaningfully integrate what they have heard. In addition, watch jurors who write in their notebooks during your expert's testimony. Pause or slow down in between questions to allow the jurors to finish writing. If jurors conclude that what they just heard is important enough to write down, counsel should do them the courtesy to not rush them in the process.
- Make eye contact with jurors who are writing things down during the expert's direct. Pause, face the jury box, and watch one or more jurors finish writing in their notebooks. As each one stops writing, the attorney should make eye contact and slightly move his or her head forward. Typically, the juror will look up and smile. By doing this, the attorney shows respect and deference to each juror as the attorney nods when each juror is done writing. This, in effect, communicates the attorney's thanks for the jurors' diligence in listening on behalf of the attorney's client.

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§3.5 E. Attorney's Preparation for Presentation of Expert Testimony

Before deciding whether to retain an expert witness, trial counsel must (1) have developed the telegram (see §3.2; it can always be changed on further case investigation); (2) have decided that an expert must be consulted; and (3) know how the expert's testimony will buttress that theme. Expert witness testimony must be integrated into a client's case as a critical piece of evidence that supports or proves the telegram.

To find the best expert for a particular case, counsel should consult with other experts in the field and obtain referrals. Counsel should also seek referrals from colleagues or other attorneys with experience litigating the forensic issue at bar. Because fellow attorneys may provide drastically contrasting views concerning a particular expert witness, counsel should contact the expert personally, review his or her résumé, and conduct a phone interview. Ideally, counsel should watch the expert testify in a trial.

When a decision is made to hire an expert, the attorney should retain the expert and discuss what he or she wants the expert to do. Discuss fees and confirm the employment agreement with specificity in a letter that the attorney promptly sends to the expert. With this letter, the attorney can include the discovery, photographs, CDs, recordings, and other material that the expert needs to evaluate the case, conduct tests and experiments, re-create the scene, and so forth.

After the expert completes the task he or she was hired to do, the attorney should conduct a telephone consultation during which the attorney and expert analyze preliminary findings. For this conversation to benefit the client, the attorney must be prepared. Consequently, to ask intelligent questions and fully appreciate what the expert is saying, trial counsel is best served by researching the medical, financial, scientific, or other forensic issue in advance of the consultation with the expert. Perhaps a Google search of the topic can lead to books and scholarly articles. The attorney can ask his or her expert what leading books and articles the expert suggests for background reading. If the attorney is prepared before speaking and meeting with the expert, the attorney can ask the right questions and be better prepared for ultimately presenting the expert's testimony at trial.

Next, after reviewing the expert's findings, counsel must decide whether a written report should be generated. Counsel should discuss the contents of the report with the expert. If additional fees need to be negotiated for the written report, confirm the details in a phone conversation and then memorialize the details in a letter and promptly send it to the expert.

What should counsel do once he or she receives the expert's report? If the attorney has questions, he or she should consult with the expert. Some experts want the attorney's input and want the attorney to edit the report. The attorney can discuss the changes and edits with the expert, and if the expert is comfortable, the attorney can e-mail the changes to the expert for final approval. Some experts, however, never want their reports altered—that is, a written report is final. By contrast, some experts prefer to send a draft and seek the attorney's input. The key for trial counsel is to work with the expert and never push him or her regarding the expert's findings or lack of them. One suggested approach is to tell any expert hired for the first time, "I want the truth and nothing else, whether or not it helps or hurts my client." Too often, experts report that they are pushed too hard for a particular opinion or finding.

Assuming that both the attorney and the expert are satisfied with the written report, the next step is witness preparation. Some experts like to meet in person. Some like you to e-mail the outline of the direct. Again, the attorney should do what the expert feels most comfortable with. In the attorney's communication, the key is to focus on the big picture in your preparation for trial. In other words, the direct examination must be organized logically to persuasively present the three or four salient points that support your case strategy or "telegram." If the expert is comfortable with PowerPoint, then use it. If not, then do not use it. The general rule is to "let your expert be him or herself" on the witness stand. Ultimately, this author encourages some review with the expert of a general outline of the direct and anticipated cross-examination.

Finally, have a face-to-face meeting with your expert shortly before the actual testimony. Prepare a final outline of questions to show the expert, so that the attorney and the expert can review and practice the appropriate questions and answers. Often, the expert will help to clarify certain questions to make the presentation on the stand even more persuasive. Expert witnesses appreciate trial counsel's efforts in getting prepared for the testimony and for taking the time to review questions and answers in a face-to-face meeting.

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§3.6 F. Discovery

For discovery of information concerning experts in criminal cases, the prosecutor and defense counsel must disclose (Pen C §§1054.1 and 1054.3(a)):

- The names and addresses of persons he or she intends to call as witnesses at trial; and
- Relevant written or recorded statements by persons intended to be called as witnesses, or reports of the statements of those witnesses, including any reports or statements of experts associated with the case, including the results of any mental or physical examinations, scientific tests, procedures, experiments, or comparisons that the prosecutor or defense counsel intend to offer at trial.

Counsel should discuss with and provide to the expert the specific discovery the expert will need to perform necessary tasks, such as a psychological evaluation of a client or a firearm operability test. After discussing findings with the expert, counsel should determine whether he or she must provide the expert's report to opposing counsel. For example, in a criminal case when a defense expert's psychological evaluation shows that the accused is a pedophile, that expert will not testify for the defense and, consequently, defense counsel will not disclose the report under the discovery rules. The confidential report will remain shielded under attorney work-product protection and physician-patient and attorney-client privileges, and counsel should place a copy of the report in the defendant's file. On the other hand, if an expert's psychological report is favorable to the defendant (*e.g.,* finding that the defendant does not have psychological traits found in men who sexually abuse children) and the expert will testify to this, then defense counsel must provide the report to the prosecution at least 30 days before the start of trial. See Pen C §1054.7. See also *People v Stoll* (1989) 49 C3d 1136, 265 CR 111 (on admission of expert testimony regarding absence of sexual deviance).

For detailed discussion of discovery of information relating to experts in criminal cases, see California Criminal Law Procedure and Practice, chap 11 (Cal CEB Annual).

NOTE: In response to *Verdin v Superior Court* (2008) 43 C4th 1096, 77 CR3d 287, the legislature amended Pen C §1054.3 to authorize the court to order a defendant or juvenile in a Welf & I C §602 proceeding to submit to testing by a prosecution-retained mental health expert whenever the defendant has placed his or her mental state at issue. Under the statute, (1) the prosecution must make a timely request and; (2) submit a list of "tests," including any and all assessment techniques, such as a clinical interview, that its expert proposes to administer; (3) a hearing must be held at the request of the defense to consider objections to the proposed tests; and (4) before issuing an order, the trial court must make a threshold determination that the proposed tests bear some reasonable relation to the mental state placed in issue. Pen C §1054.3(b)(1). The constitutionality of the newly enacted statute has yet to be resolved.

PRACTICE TIP: When faced with a court-ordered mental health exam under Pen C §1054.3(b)(1), defense counsel should confer with the client and determine one of two key strategies: (1) cooperate with the prosecution-requested mental health examination, with the intent to get the prosecution expert to agree with the defense expert; or (2) advise the client not to cooperate or talk to the prosecution expert so that no adverse statements or reports can be used against your client at trial. Beware, however, that with the second strategy, the prosecutor is likely to request a jury instruction indicating that the defendant refused to cooperate or communicate per court order with the prosecution's mental health expert. Most defense attorneys likely consider the second tactical option as the "safe course." This author has used both strategies and, whenever utilized, had success with the first. Indeed, the prosecution expert agreed with the findings of my expert and my client's case was in a stronger position than it would have been had I selected the second option. Finally, defense counsel must federalize objections to the new statutory scheme overruling *Verdin*, especially since the likelihood of a reversal will come in federal court.

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II. PRINCIPLES GOVERNING ADMISSION OF EXPERT TESTIMONY

§3.7 A. Qualification Requirements

To testify as an expert, a person must have special skill, knowledge, experience, education, or training sufficient to qualify that person as an expert on the subject on which he or she will testify. Evid C §720(a); see *People v Watson* (2008) 43 C4th 652, 692, 76 CR3d 208; *People v Hoyos* (2007) 41 C4th 872, 910, 63 CR2d 1. A witness's qualifications may be shown by any admissible evidence, including the witness's own testimony. Evid C §720(b).

To find the "best" expert for a particular case, counsel should consult with other experts in the field and obtain referrals. Counsel should also seek referrals from colleagues or other attorneys with experience litigating the forensic issue at bar. Because fellow attorneys may provide drastically contrasting views concerning a particular expert witness, counsel should contact the expert personally, review his or her résumé, and conduct a phone interview. Ideally, counsel should watch the expert testify in a trial.

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§3.8 B. Trial Judge Determines Whether Witness Qualifies to Testify as Expert

The trial judge must make the foundational or preliminary fact determination that the witness who is asked to testify as an expert on a particular subject is qualified on that particular subject. *People v Hayes* (2007) 41 C4th 872, 910, 63 CR2d 1. Possessing qualifications on related subjects is insufficient. *People v Hogan* (1982) 31 C3d 815, 851, 183 CR 817, disapproved on other grounds in *People v Cooper* (1991) 53 C3d 771, 836, 281 CR 90.

The trial court's determination will be reversed on appeal only for an abuse of discretion when the appellate court finds on the evidence that a witness (a) clearly is qualified as an expert witness and the trial judge has held that the witness lacks the required qualification, or (b) clearly is not qualified as an expert, and the judge has held that the expert is qualified. See *People v Wallace* (2008) 44 C4th 1032, 1062, 81 CR3d 651; *People v Chavez* (1985) 39 C3d 823, 828, 218 CR 49; *People v Hogan* (1982) 31 C3d 815, 852, 183 CR 817, disapproved on other grounds in *People v Cooper* (1991) 53 C3d 771, 836, 281 CR 90; Jefferson's California Evidence Benchbook §30.24 (4th ed CJA-CEB 2009).

If counsel has any doubt whether the court will allow his or her potential expert witness to testify at trial, it is prudent to submit a written in limine motion with a proffer of the expert's qualifications and testimony. If opposing counsel objects, the trial judge can order an Evid C §402 hearing prior to jury selection at which the expert witness will testify about qualifications, the ultimate opinion, and the reasons for the opinion. Opposing counsel and the trial judge will have an opportunity to cross-examine. On completion of the hearing, the trial judge will either allow or disallow the expert testimony, or allow it with significant limitations. At this point, trial counsel can adjust opening statement content accordingly. Also, trial judges appreciate litigating these foundational issues before the jury is empanelled to avoid delay and to move the trial along smoothly.

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§3.9 C. Proper Subject Matter of Expert Testimony

Expert testimony in the form of an opinion must concern a subject that is sufficiently beyond common experience so that the opinion would help the trier of fact. Evid C §801(a). See *People v Davis* (2009) 46 C4th 539, 605, 94 CR3d 322; *People v Sandoval* (2008) 164 CA4th 994, 1001, 79 CR3d 634. There is no requirement that the jury be entirely ignorant of the subject matter of the opinion. Rather, Evid C §801(a) requires exclusion of expert testimony "only when it would add nothing at all to the jury's common fund of information," meaning when the trier of fact is able to reach a conclusion as intelligently as the expert could. *People v McAlpin* (1991) 53 C3d 1289, 1299, 283 CR 382; *People v McDonald* (1984) 37 C3d 351, 366, 208 CR 236, overruled on other grounds in *People v Mendoza* (2000) 23 C4th 896, 913, 98 CR2d 431.

The trial court may limit the number of expert witnesses. Evid C §723. When opposing counsel uses multiple experts to repeatedly cover the same forensic issues (*e.g.,* as might occur in "Shaken Impact Syndrome" trials), counsel should also consider an objection under Evid C §352, arguing that the proposed testimony is cumulative and unduly time-consuming. In some cases, attorneys produce many doctors as experts on essentially the same issue because numerousness is often persuasive with jurors.

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§3.10 D. Requirements for Admission of Expert Testimony

To be admissible, expert opinion testimony must satisfy the following requirements:

- The subject of the opinion is sufficiently beyond common experience so that it will assist the trier of fact (Evid C §801(a)) (for discussion, see §3.9);
- The witness is qualified as an expert on that subject through sufficient "special knowledge, skill, experience, training, or education" (Evid C §720(a)) (for discussion, see §3.7);
- The expert's opinion is based on matter perceived by or personally known to the expert, or made known to the expert at or before trial, whether or not admissible, that is of a type on which an expert may reasonably rely in forming an opinion (Evid C §801(b)) (for discussion, see §§3.11-3.19); and
- If the expert's opinion is based on a new or novel scientific technique, the technique satisfies the requirements of the *Kelly* rule (*People v Kelly* (1976) 17 C3d 24, 30, 130 CR 144; *People v Leahy* (1994) 8 C4th 587, 598, 34 CR2d 663) before the expert's opinion is admissible (for discussion, see §3.16). For detailed discussion of the *Kelly* rule, see chap 2.

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E. Proper Bases for Expert Opinion

§3.11 1. Evidence Code §801(b) Requirements

An expert's opinion must be based on matter (including skill, special knowledge, experience, education, or training) that is (Evid C §801(b)):

- Observed by the expert;
- Personally known to the expert; or
- Made known to the expert at or before the trial by means such as a hypothetical question; and
- Of a type on which experts in the particular field or area of expertise may reasonably rely in forming opinions on the subject to which the opinion relates, even though the matter relied on (*e.g.*, hearsay statements of others) would not otherwise be admissible in evidence.

See Jefferson's California Evidence Benchbook §30.36 (4th ed CJA-CEB 2009).

Thus, regardless of the source of the expert witness's information, the matter relied on for the opinion must be the type of matter on which an expert may reasonably rely in forming an expert opinion on the particular subject. See Evid C §801(b); *People v Gamez* (1991) 235 CA3d 957, 967, 286 CR 894, disapproved on other grounds in *People v Gardeley* (1996) 14 C4th 605, 624 n10, 59 CR2d 356. This requirement is designed to produce reliability and trustworthiness in the information used by experts in formulating their opinions. See Jefferson's Evidence Benchbook §30.40. The proponent of expert testimony should make every effort to ensure that the bases for the expert's opinion are well founded and well stated.

For cases in which the courts have considered the basis of expert testimony under Evid C §801(b), see, *e.g.*, *In re Lockheed Litig. Cases* (2004) 115 CA4th 558, 565, 10 CR3d 34; *Roberti v Andy's Termite & Pest Control, Inc.* (2003) 113 CA4th 893, 901, 6 CR3d 827. For additional discussion of *Lockheed*, *Roberti*, and questions regarding the scope of the trial court's inquiry under Evid C §801(b), see Effective Introduction of Evidence in California §24.25 (2d ed Cal CEB 2000).

NOTE: In *In re Lockheed Litig. Cases* (2004) 115 CA4th 558, 563, 10 CR3d 34, the court construed Evid C §801(b) to mean that the matter on which an expert relies must provide a reasonable basis for the particular opinion offered. The California Supreme Court granted review in a later decision in the *Lockheed* litigation (*In re Lockheed Litig. Cases* (review granted Apr. 13, 2005, S132167; superseded opinion at 126 CA4th 271, 23 CR3d 762)) to consider whether Evid C §801(b) permits the trial court to review the evidence on which an expert relied to determine whether that evidence provides a reasonable basis for the expert's opinion.

However, the court dismissed the case because a majority of the permanent justices recused themselves because of later-realized circumstances. See *In re Lockheed Litig. Cases* (review dismissed Nov. 1, 2007, S132167; superseded opinion at 126 CA4th 271, 23 CR3d 762).

Until this issue is resolved, counsel should be prepared for the possibility that a trial court will order a review of evidence on which counsel's expert has relied to determine whether it is a proper basis for the expert's ultimate opinion. Counsel should warn the expert of the potential for this review, which most likely will occur at a hearing on an in limine motion. If the trial judge denies counsel's request for the expert to testify or limits the scope of the testimony, to fully preserve any appellate issue, counsel should object and state the grounds for the objection on the record. To increase the likelihood of a favorable outcome on appeal, it is important to specify the grounds for the objection. For a general discussion of preserving issues for appeal, see California Criminal Law Procedure and Practice, chaps 31, 44 (Cal CEB Annual).

In addition, in a criminal trial in which the court denies the defendant testimony of an expert witness, defense counsel should be cognizant of "federalizing" all objections (*e.g.*, due process, denial of the effective assistance of counsel, right to present a defense, due process of law, and equal protection arguments pertinent to a criminal defendant) by stating grounds that preserve appellate claims in federal court. For a discussion on "federalizing" objections, see Appeals and Writs in Criminal Cases (3d ed Cal CEB 2007). Finally, trial counsel should not appear defensive to a judge who wants to review the evidence on which an expert relied. Doing so only increases the likelihood that the court will preclude the evidence counsel seeks to admit.

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§3.12 2. Expert Testimony Is Not Subject to *Kelly* Rule

Expert testimony generally is not subject to the foundational requirements for new or novel scientific techniques set forth in the *Kelly* rule (*People v Kelly* (1976) 17 C3d 24, 130 CR 144). See, *e.g.*, *Wilson v Phillips* (1999) 73 CA4th 250, 254, 86 CR2d 204 (expert testimony explaining theory of "repressed memory" did not invoke *Kelly* rule); *People v Rowland* (1992) 4 C4th 238, 265, 14 CR2d 377 (*Kelly* not applicable to expert medical testimony that lack of genital trauma is not inconsistent with rape); *People v Ward* (1999) 71 CA4th 368, 371, 83 CR2d 828 (*Kelly* requirements are not applicable in sexually violent predator proceeding when expert gives opinion about individual's psychodiagnosis or prediction of future sexual misconduct). If, however, the expert's opinion is based on a new or novel scientific technique or test, the technique or test must satisfy the requirements of the *Kelly* rule before the expert's opinion is admissible. *People v Parnell* (1993) 16 CA4th 862, 868, 20 CR2d 302; but see *People v Hayes* (2007) 41 C4th 872, 910 n21, 63 CR2d 1 (expert testimony on blood spatter testing not subject to *Kelly* rule). For detailed discussion of the *Kelly* rule, see chap 2. For additional discussion of expert testimony based on a new or novel scientific technique and how the *Kelly* rule may be applicable, see §3.16.

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3. Particular Sources of Information on Which Expert May Rely

§3.13 a. Hearsay Generally

Hearsay materials may constitute proper matter to support expert opinions on some subjects, but improper matter to support expert opinions on other subjects. The trial court is given wide discretion in this matter and may exclude from the expert's testimony hearsay matter when its irrelevance, unreliability, or potential for prejudice outweighs its probative value. Evid C §§352, 801(b); *People v Carpenter* (1997) 15 C4th 312, 403, 63 CR2d 1; *People v Montiel* (1993) 5 C4th 877, 919, 21 CR2d 705; *People v Bordelon* (2008) 162 CA4th 1311, 1324, 77 CR3d 14. See *Deutsch v Masonic Homes of Cal., Inc.* (2008) 164 CA4th 748, 765, 80 CR3d 368.

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Source: Criminal Law/Scientific Evidence in California Criminal Cases/3 Preparing and Presenting Expert Testimony on Scientific Evidence/§3.14 b. Opinions of Nontestifying Expert

§3.14 b. Opinions of Nontestifying Expert

An expert may base an opinion on the opinion of a nontestifying expert and state on direct examination the basis of that opinion. See Evid C §802; *People v Campos* (1995) 32 CA4th 304, 307, 38 CR2d 113. A testifying expert, however, may not testify in front of a jury on the details of the nontestifying expert's opinion if that opinion is otherwise inadmissible. *People v Coleman* (1985) 38 C3d 69, 92, 211 CR 102; *Grimshaw v Ford Motor Co.* (1981) 119 CA3d 757, 788, 174 CR 348. See *People v Martin* (2005) 127 CA4th 970, 977, 26 CR3d 174 (allowing expert to rely on and testify about contents of probation report because court, not jury, was trier of fact).

The rationale of the rule permitting the expert to state the matter relied on but not the details of the matter is to prevent hearsay evidence from going to the jury under the guise of an expert's opinion without the opportunity for cross-examination of the nontestifying expert. *Campos*, 32 CA4th at 307 (trial court erred, but not prejudicially, in allowing expert to relate details of nontestifying expert's report on which testifying expert relied). See Jefferson's California Evidence Benchbook §30.47 (4th ed CJA-CEB 2009). Further, nothing in Evid C §802 requires a trial court to admit into evidence documentary or other evidence of matters on which an expert relied in forming an opinion. See *People v Nicolaus* (1991) 54 C3d 551, 582, 286 CR 628.

The nontestifying expert on whom the testifying expert relies should be qualified and the nontestifying expert's report should be reasonably reliable. See Evid C §§801, 803; California Expert Witness Guide §4.2 (2d ed Cal CEB 1991). Accordingly, counsel should ask questions that will establish that (1) the testifying expert is familiar with the reputation, work, and written reports of the nontestifying expert; (2) the methodology reflected in the report is fully consistent with the standard of care or norms of the profession; and (3) the report is useful to the current expert in rendering the present expert opinion at trial.

PRACTICE TIP: Should opposing counsel object to a particular report or opinion relied on by your expert, then argue that the report is reasonably reliable, and that any doubts about the report should go to its weight, not its admissibility. See *People v Phillips* (1981) 122 CA3d 69, 85, 175 CR 703; Expert Witness, chap 4.

When an expert bases an opinion in whole or in part on the opinion of another, opposing counsel may call the underlying witnesses on whose information the testifying expert relies (Evid C §804(a)), unless the person on whose opinion the testifying expert relies is (1) a party; (2) a person identified with a party under Evid C §776(d); or (3) a witness who has testified in the action about the subject matter of the opinion on which the testifying expert has relied (Evid C §804(b)). The unavailability of those underlying witnesses, however, does not render inadmissible the opinion of the testifying expert. Evid C §804(d). For additional discussion of Evid C §804, see Jefferson's Evidence Benchbook, chap 30.

WARNING: An expert may be cross-examined about a scientific, technical, or professional text, treatise, journal, or similar publication that is established as a reliable authority by the testimony or admission of the witness or by other expert testimony or by judicial notice, even if the expert did not refer to, consider, or rely on the publication in forming his or her opinion. Evid C §721(b). For additional discussion of cross-examination of expert witnesses under Evid C §721(b), see chap 4. See also Jefferson's Evidence Benchbook, chap 30.

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§3.15 c. Hypothetical Questions

Generally, an expert may give opinion testimony based on facts provided in a hypothetical question that asks the expert to assume the truth of those facts. A hypothetical question, however, "must be rooted in facts shown by the evidence." *People v Boyette* (2002) 29 C4th 381, 449, 127 CR2d 544; *People v Gardeley* (1996) 14 C4th 605, 618, 59 CR2d 356. A hypothetical question may be based on any theory that can be deduced from any evidence properly admitted at trial, including the assumed facts that fit within the parameters of the admitted evidence. *Boyette,* 29 C4th at 449; *People v Sims* (1993) 5 C4th 405, 436 n6, 20 CR2d 537; 3 Witkin, California Evidence, *Presentation at Trial* §194 (4th ed 2000).

Evidence Code §801(b) authorizes hypothetical questions because the matter on which the witness's opinion is based—the assumed hypothesis as a fact—is made known to the witness at or before the hearing. Jefferson's California Evidence Benchbook §30.48 (4th ed CJA-CEB 2009). For additional discussion of the use of hypothetical questions at trial, see §§3.34-3.37.

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§3.16 d. Tests and Experiments

Evidence Code §801(b) is the authority for an expert witness to render an expert opinion based on an experiment or scientific test that he or she conducted. See §3.11. Trial counsel must be aware that a sufficient foundation must exist to show that the test, experiment, or protocol employed by the expert is consistent with established practices in the field, so that it is "reasonably relied upon by an expert" in such field. The sine qua non to admissibility, therefore, is whether such a test, experiment, or scientific technique is generally accepted by the applicable scientific community. Evid C §801(b).

If trial counsel wishes to introduce evidence that is based on a new or novel scientific technique, however, counsel must first establish the reliability of the new or novel technique under the "*Kelly* rule." See *People v Kelly* (1976) 17 C3d 24, 30, 130 CR 144; *People v Leahy* (1994) 8 C4th 587, 598, 34 CR2d 663. For detailed discussion of the *Kelly* rule, see chap 2. For discussion of the inapplicability of the *Kelly* rule to expert testimony generally, see §3.12.

The *Kelly* rule does not apply at all when no new scientific test is involved. *People v Thang Van Bui* (2001) 86 CA4th 1187, 1196, 103 CR2d 908; *People v Stoll* (1989) 49 C3d 1136, 1156, 265 CR 111. Indeed, the trial court will not require a *Kelly* hearing for foundational purposes if the judge initially makes a finding that the procedure is not new or novel. See *People v Nolan* (2002) 95 CA4th 1210, 116 CR2d 331 (enzyme immunoassay technique for detection of drugs in urine not new).

The rationale of the *Kelly* rule is the concern that jurors may give undue weight to experimental techniques presented by persuasive and credentialed experts whose testimony might sway the jurors to believe the expert's conclusions when, in fact, sufficient agreement in the scientific community does not exist to buttress the expert's opinion. See *People v Shirley* (1982) 31 C3d 18, 53, 181 CR 243; *People v Kelly* (1976) 17 C3d 24, 31, 130 CR 144.

The *Kelly* test has been applied to a plethora of forensic techniques. By way of a brief illustration, the following techniques have been upheld under *Kelly* by appellate courts:

- Ballistics examinations (*People v Trujillo* (1948) 32 C2d 105, 111, 194 P2d 681);
- Polymerase chain reaction (PCR) DNA testing (*People v Morganti* (1996) 43 CA4th 643, 657, 50 CR2d 837);
- Restriction fragment length polymorphism (RFLP) DNA testing (*People v Soto* (1999) 21 C4th 512, 514, 88 CR2d 34);
- DNA profiling utilizing multiple mixtures using the Profiler Plus and COfiler kits and the ABI Prism 310 Genetic Analyzer (*People v Smith* (2003) 107 CA4th 646, 666, 132 CR2d 230); and
- Electrophoretic testing of dried blood stains (*People v Fierro* (1991) 1 C4th 173, 214, 3 CR2d 426).

Accordingly, if there is an issue relating to *Kelly* or sufficient foundation, trial counsel will raise this issue in writing for litigation at a pretrial hearing, pursuant to Evid C §402 or §405. The hearing typically requires counsel to call the expert witness and have the expert testify to the three prongs to satisfy the *Kelly* Rule. The three prongs are the following:

1. The test at issue must be generally accepted in the relevant scientific community (*Leahy,* 8 C4th at 612);

2. The testifying witness must be properly qualified as an expert on the particular subject (*People v Kelly* (1976) 17 C3d 24, 30, 130 CR 144; *People v Cook* (2007) 40 C4th 1334, 1346, 58 CR3d 340; *People v Jackson* (1996) 13 C4th 1164, 1212, 56 CR2d 49); and

3. Correct scientific procedures must have been used in the case at bar (see *People v Venegas* (1998) 18 C4th 47, 81, 74 CR2d 262).

For further discussion of the *Kelly* rule, see chap 2. See also California Criminal Law Procedure and Practice, chap 31 (Cal CEB Annual).

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§3.17 e. Improper Bases for Expert Opinion

An expert may not base an opinion on:

- Any matter made improper by constitutional, statutory, or case law. Evid C §801(b); Comment to Evid C §801; *In re Marriage of Hewitson* (1983) 142 CA3d 874, 885, 191 CR 392. See also Jefferson's California Evidence Benchbook §30.41 (4th ed CJA-CEB 2009).

- Conjectural or speculative matters. *People v McWhorter* (2009) 47 C4th 318, 361, 97 CR3d 412; *People v Richardson* (2008) 43 C4th 959, 1008, 77 CR3d 163. See also Jefferson's Evidence Benchbook §30.42.

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§3.18 f. Trial Court May Require Examination of Expert on Basis of Opinion Before Allowing Expert to State Opinion

The trial court, in its discretion, may require an examination of the expert about the matter on which the expert's opinion is based before allowing the expert to state an opinion. Evid C §802.

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§3.19 g. Exclusion of Opinion Based on Improper Matter

A trial court may, and on objection must, exclude an opinion that is based in whole or in significant part on a matter that is not a proper basis for the opinion. If a proper basis remains after exclusion of the improper matter, the witness then may state an opinion. Evid C §803. The question of admissibility is within the discretion of the trial court. Comment to Evid C §803. See *People v Aylwin* (1973) 31 CA3d 826, 841, 107 CR 824.

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4. Additional Considerations

§3.20 a. Expert Testimony on Ultimate Issue

An expert witness's opinion that is otherwise admissible in evidence is not objectionable because it embraces the ultimate issue to be decided by the trier of fact. Evid C §805. Expert opinion, however, on an issue of law is not admissible. *Summers v A.L. Gilbert Co.* (1999) 69 CA4th 1155, 1178, 82 CR2d 162.

Based on *Summers* and Evid C §805, the trend in California is to allow experts to testify on the ultimate issue in contravention of earlier authority that found such testimony invaded the province of the trier of fact. This trend reflects the practical reality of a complex society in which experts can assist the trier of fact by answering key questions in a case. Thus, if counsel's expert witness testimony that answers an ultimate issue benefits the client, then counsel should argue, based on *Summers,* that courts no longer embrace the common law rule of "no testimony on the ultimate issue"; that the expert's proposed testimony is relevant to the ultimate issue; and without the testimony, it is likely that the jury will improperly speculate on the evidence in their attempt to resolve the ultimate issue.

Pursuant to Evid C §805 and Pen C §1027, the question of legal insanity in a criminal case requires expert testimony from a psychologist or psychiatrist on the ultimate issue: "Was the defendant legally insane at the time he shot and killed his mother?" Counsel can argue that it would be improper for jurors to speculate about the mental disorders or diseases a defendant might have and how the conditions apply to the insanity rule. Because courts routinely require expert testimony on legal insanity, then a fortiori the court should allow proffered expert testimony on other ultimate issues.

Counsel should make a detailed record why the court should admit particular ultimate-issue testimony from a proffered expert. If the trial court denies the request to admit the testimony, to preserve the issue for appeal, counsel should immediately object and, again, make a detailed record of why the expert should be permitted to provide the testimony.

For a general discussion about preserving issues for appeal, see California Criminal Law Procedure and Practice, chaps 31, 44 (Cal CEB Annual).

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§3.21 b. Expert Testimony on Mental State of Defendant in Guilt Phase of Criminal Action

In the guilt phase of a criminal action, an expert testifying about a defendant's mental illness, mental disorder, or mental defect may not testify as to whether the defendant had or did not have the required mental states for the crimes charged. Mental states include, but are not limited to, purpose, intent, knowledge, or malice aforethought. Whether the defendant had or did not have the required mental states is a question for the trier of fact. Pen C §29. See *People v Erickson* (1997) 57 CA4th 1391, 1400, 67 CR2d 740 (expert's testimony inadmissible on whether "battered woman" acted with malice or with a particular mental state); see also *People v Czabara* (1988) 203 CA3d 1468, 1476, 250 CR 836 (psychiatric testimony that defendant acted in heat of passion was properly excluded under Pen C §29 because heat of passion is, by legal definition, absence of malice).

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§3.22 c. Effect of Expert Testimony in Criminal Cases

In any criminal trial or proceeding, the court must instruct the jury that it is not bound to accept the opinion of any expert as conclusive, but should give the opinion the weight to which the jurors find it is entitled. The court must also instruct the jury that it may disregard any expert opinion it finds to be unreasonable. Pen C §1127b. See *People v Jones* (1997) 15 C4th 119, 191, 61 CR2d 386, overruled on other grounds in *People v Hill* (1998) 17 C4th 800, 823 n1, 72 CR2d 656 (neither court nor jury is bound to accept any expert testimony as conclusive; court or jury can disregard expert testimony if such testimony is found to be unreasonable).

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F. Court-Appointed Experts

§3.23 1. On Court's Motion or Motion of Any Party

If it appears to the court, before or during trial, that expert testimony or evidence might or would assist the trier of fact, then the court, on its own motion or on motion of any party, may appoint one or more experts to investigate, prepare a report, or give expert testimony on a relevant fact or matter in the action. Evid C §730.

NOTE: Evidence Code §730 does not authorize the appointment of experts after trial in connection with sentencing proceedings. *People v Stuckey* (2009) 175 CA4th 898, 905, 96 CR3d 477. Due process, however, may require the appointment of defense experts to counter the testimony of prosecution experts at sentencing. 175 CA4th at 917.

The court or any party may call and examine a court-appointed expert. Evid C §732. If the court calls and examines the court-appointed expert as a witness, the parties may cross-examine the witness and object to questions asked of the witness by the court. Evid C §§732, 775. The appointment of an expert witness by the court may be revealed to the trier of fact. Evid C §722(a). The court appointment of expert witnesses does not prevent a party from presenting other expert evidence on the same subject. Evid C §733.

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§3.24 2. Court Appointed Scientific Experts (CASE)

Court Appointed Scientific Experts (CASE) is a service of the American Association for the Advancement of Science (AAAS) "that assists federal and state judges, administrative law judges and arbitrators in identifying highly qualified scientists, engineers, and healthcare professionals to serve as scientific experts." http://www.aaas.org/spp/case/case.htm.

Among the methods and sources CASE staff use to identify suitable experts are "professional societies and other scientific institutions, and a Recruitment and Screening Panel composed of highly-respected scientists, engineers, and health care professionals." http://www.aaas.org/spp/case/case.htm.

For information on how CASE has assisted judges, go to http://www.aaas.org/spp/case/experience.htm.

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III. QUALIFYING THE EXPERT WITNESS

§3.25 A. Procedure During Trial

Generally, during trial, the proponent of expert opinion testimony first asks the witness questions concerning the witness's qualifications to testify as an expert. If there is no objection, the proponent continues with questions about the case.

If, following the proponent's direct examination of the witness on the witness's qualification to testify, the opponent objects that the witness is not qualified, then the opponent may cross-examine the witness on the witness's qualifications. The opponent may then either accept the expert or object, under Evid C §720(a), that the expert is lacking a specified qualification. See Jefferson's California Evidence Benchbook, chap 30 (4th ed CJA-CEB 2009). For discussion on challenging a witness's qualifications to testify as an expert witness, see chap 4.

Any doubt about whether an expert has sufficient qualifications to testify as an expert at trial should be litigated and ruled on by the trial court before the jury is selected pursuant to pretrial motions at an Evid C §402 or §405 hearing. Counsel is well-advised to "test the waters" before the jury is empaneled to determine whether the expert testimony will be allowed and, if so, the scope and extent of the testimony. That way, the jury is not kept waiting during trial. Judges do not like to keep jurors waiting while they litigate issues during trial that could have been litigated during pretrial motions. In addition, counsel can avoid talking about evidence during opening statements that the trial judge might exclude later during trial. If the pretrial ruling is unfavorable, counsel should make a specific and detailed objection to preserve any appellate issues. For a general discussion about preserving issues for appeal, see California Criminal Law Procedure and Practice, chaps 31, 44 (Cal CEB Annual).

PRACTICE TIP: Never ask an expert a question during trial if you have a reasonable doubt that the response may violate the trial court's previous in limine ruling prohibiting inquiry in that area. When in doubt, ask for a sidebar or chambers conference: "Your Honor, my next question is 'X,' and I anticipate that the expert will answer 'Y.' I do not want to violate your pretrial ruling with respect to what my expert cannot say on the stand; thus, I am seeking clarification from the Court." Judges will appreciate that counsel did this, and counsel maintains credibility with the court. In contrast, if counsel did not have the sidebar or chambers conference and, during the trial testimony, counsel violated the court order, there will be an objection, it will be sustained, and counsel may be admonished in front of the jury. Here, a prosecutor risks a mistrial.

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B. Specific Area of Questioning

§3.26 1. Teaching Experience

When considering questions about the expert's teaching experience, counsel should keep in mind that the teaching should be related to the issue before the jury. For example, a pediatrics faculty position would be relevant if the expert was testifying that certain vaginal findings are not conclusive of sexual molestation. It is also important to have the expert explain the courses, institutions, and number of years of experience teaching, if applicable. If not a faculty member of a prestigious institution (*e.g.*, a medical school), the expert can still relate applicable teaching experience (*e.g.*, teaching while chief resident), but most importantly, the expert can talk about professional seminars at which he or she was an invited speaker, describing the number and type of presentations made over the years. The rhetorical point is that an expert on whom other professionals rely to teach them should be a more credible expert in the minds of the jurors.

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§3.27 2. Publications

It is important for the jury to know if the expert has published a book or article that relates to the issue about which the expert will testify. One approach to asking the expert about his or her publications, assuming he or she is a leader in the particular field, is to suggest that the expert answer the question in the following manner, for example: "I have published four books in forensic pathology and have written or co-written 145 scholarly articles relating to my field." Then, follow up with a question that communicates to the jury that your expert is published in the precise forensic area at issue in the case, for example: "Do you have any publications relating to the differentiation of gray and white matter from MRI scans of children?" The expert will respond affirmatively, providing the titles of the articles.

Modesty is important when conveying to the jury that your expert is arguably the top expert in the particular field. Ask the expert whether there are one or two widely recognized books in the particular field. The expert will answer that the one book is "X." Then have the expert specify his or her contribution to book "X." For example, ask: "Did you contribute Chapter 6, entitled [*specify*] to book 'X'?" The expert will answer affirmatively and can also state whether he or she is working on an update or revision. In addition, when cross-examining opposing experts, get them to admit that book "X" is indeed the leading publication in the particular field. Then, when performing a direct examination of another expert, ask, for example: "Are you familiar with the work of [*specify expert*]?" The expert will respond, for example: "Oh yes, we have collaborated on a few cases over the years. She wrote the chapter on [*specify*] in the leading publication in our field, and by reputation and my experience, she is probably the best of all pediatric pathologists in the world." Opposing counsel's experts will not be able to undo this damage. Consequently, counsel will have some powerful words in closing argument on which experts should be believed and why.

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§3.28 3. Awards and Honors

Jurors are impressed if the expert has some key awards in his or her field such as having been elected a Fellow or having received major grants for research. In the interest of time, however, when questioning the expert, do not mention awards that are not as significant; instead, decide with the expert in advance which two or three awards are most impressive.

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§3.29 4. Professional Affiliations

Whether to ask the expert about membership or affiliation with professional organizations is a judgment call depending on the witness and the particular case. It is generally worth the time only when the expert is a current or past president of a leading medical or professional organization or when the expert has received some type of major award from the organization.

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§3.30 5. Previous Experience as Expert Witness

It is the author's preference to hire expert witnesses who have testified for both the prosecution and the defense, and for the jury to know this. The rationale supporting this approach is that such experts are arguably less likely to be viewed by jurors as being biased for or against one side or the other. Thus, experts who have testified for both sides gain some credibility; indeed, they are less vulnerable to the "hired gun" argument by opposing counsel. Note also that post-verdict interviews with jurors have revealed that they found the relative lack of sophistication of experts who either have never testified or have testified only a few times actually inuring to the credibility of the expert. Jurors indicated that the person "just seemed honest." The inexperienced testifying expert appears to help jurors disabuse themselves of the notion that defense counsel's experts are truly "hired guns." See also *McCleery v City of Bakersfield* (1985) 170 CA3d 1059, 1066, 216 CR 852 (trial court should not exclude proposed expert from testifying solely because expert has never testified before).

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§3.31 C. Suggested Questions for Qualifying Expert

Experience has taught that spending 20-30 minutes to lay a foundation to show the jury that this expert is "the best" is not a prudent use of time. Rather, post-verdict interviews have revealed that it is "the message" or "story" that counts. Thus, it is very important to elicit an overview or "thesis statement" for the jury with the first question to the witness and then to quickly explore the following areas to qualify the witness as an expert:

Q: Why are you here today? [*e.g., I am here to offer an expert opinion that Mr. Decedent's manner of death is "undetermined." The cause of death is a heart attack resulting from congestive heart failure, kidney failure, an enlarged heart, and a massive plaque build-up throughout the heart.*]

Q: What do you do for a living?

Q: Who is your employer?

Q: Please describe your education that qualifies you for this position. [*For a medical doctor, it is recommended that you have the expert start with undergraduate school and major. Next, the expert should state when he or she started medical school, date of graduation, and then the type and duration of internship. Of course, if your expert was chief resident, you may wish to ask how he or she obtained that designation and what his or her duties were. Fellowships, if applicable, must then be discussed. Date of Board Certification(s) and recertification(s) should be provided.*]

Q: What is your work history that qualifies you for this position? [*Do not use this question for a physician because that information is contained in the above question. If relevant to a particular client's case, however, you may wish to ask the medical doctor about work history after completion of any fellowship.*]

Q: Do you possess any licenses or certifications?

Q: Do you teach in your field? (See §3.26.)

Q: Have you been published in your field? (See §3.27.)

CAUTION: Obviously, if the expert has not been published, never ask this question.

Q: Have you received any awards or honors in your field? (See §3.28.)

Q: Have you ever made any television appearances relating to your work as [*specify, e.g., a forensic pathologist*]?

PRACTICE TIP: Experience has taught that jurors are very impressed if your expert has been featured on a popular television program, such as 60 Minutes or Larry King Live. Focus on major media appearances and have the expert briefly discuss the case on which he or she worked that was the subject of the program.

Q: Do you belong to any professional organizations related to your field? (See §3.29.)

Q: Have you previously qualified as an expert witness in this field? (See §3.30.)

Q: How many times?

Q: What percentage of the time, when you have testified as an expert witness, was on behalf of the prosecution versus the defense?

If the expert will base his or her opinion on a test that the expert conducted, consider the following questions:

Q: In this case, did you perform the [*describe test*]?

Q: How many other times have you performed this test?

Q: What percentage of your everyday work day is related to the test?

Q: Were you trained in the accurate administration of that test?

Q: What was that training?

Q: Do you receive ongoing training relating to the latest developments for the test that you perform?

Q: Please describe this training.

Q: Did the test you performed follow applicable scientific protocol and procedures?

Q: Is the test you performed, and the way you performed it, generally accepted in the relevant scientific community? Please explain.

Q: Your Honor, at this time we respectfully proffer [*specify expert*] as an expert witness in the area of [*specify, e.g., forensic pathology and manner and cause of death*].

NOTE: Most California state courts do not require, as a matter of custom and habit, counsel to proffer the witness as an expert before the trial judge. There are tactical reasons to proffer and not to proffer. One danger to the proffer is that the court may allow opposing counsel to voir dire the expert on his or her qualifications; in effect, opposing counsel gets two opportunities at cross-examination. Opposing counsel should learn the trial judge's preference on this issue by simply asking the judge at the time of in limine motions or by speaking with other attorneys who have appeared before the judge.

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IV. ASKING FORENSIC QUESTIONS

§3.32 A. Presenting Expert's Opinion and the Basis for Opinion

After qualifying the expert, counsel should transition to the "forensic questions" designed to elicit the expert's opinion and the basis for it. Initially, counsel should explain to the jury why the expert will be testifying. In other words, explain to the jury the key question at issue in the case that the expert will answer. It is best to have the expert answer this question at the outset so that the subsequent testimony is more logical and easy to follow.

California law does not prohibit an expert from giving an opinion *before* giving the reasons for it. See Evid C §802. Thus, a prudent approach is to have the expert give the opinion, explain how he or she arrived at that opinion, and then conclude with hypothetical questions. Stated differently, giving the opinion at the outset works like a thesis statement; it makes the subsequent testimony more comprehensible—and hence persuasive—for the jury. The sample questions in §3.33 illustrate this approach.

PRACTICE TIP: One suggested approach is to ask as a first question: "Why are you here today, Dr. Carroll?" And his response: "To provide this jury with an expert opinion that Mr. X gave a false confession to the murder because of his low IQ, brain damage, and diagnosis of paranoid schizophrenia." Notwithstanding the statute, the trial judge has broad discretion how to run his or her courtroom. The author has never had someone object to this format. Why? Because it is obvious to judges and opposing counsel that this approach clarifies things and makes the subsequent presentation more understandable.

Organization of the material that the expert analyzes is critical. Work with the expert to decide the areas of most importance in the direct examination—those that will help the jury understand the expert opinion and the basis for that opinion. Each case is different. Keep the total direct examination, if at all possible, to no longer than 1 hour from start to finish. At the extreme, a direct examination should not be more than 90 minutes.

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Source: Criminal Law/Scientific Evidence in California Criminal Cases/3 Preparing and Presenting Expert Testimony on Scientific Evidence/§3.33 B. Suggested Direct Examination Questions

§3.33 B. Suggested Direct Examination Questions

Have the expert give the opinion, explain how he or she arrived at that opinion and then conclude with hypothetical questions (see §§3.34-3.37):

Q: Were you hired by [*specify the defense, prosecution, or plaintiff*] to review the data and possibly give an expert opinion?

Q: Do you have an opinion as to whether or not [*specify subject of opinion*]?

Q: What is your opinion?

Q: What is the basis for your expert opinion?

A: [*Here, the expert should give a concise narrative answer highlighting the major factors supporting the opinion. This is the "thumbnail" version of the reasons that support the expert's subsequent testimony. Once the jury knows the direction you are going with the expert, focus on the material and data reviewed. The jury knows the conclusion and the "big picture" reasons for the conclusion, so now you must show the jury the process for reaching the conclusion.*]

Q: Did you review any material before coming to court this morning?

Q: What did you review?

PRACTICE TIP: As a tactical matter, if prudent, ask the expert to bring the data and material reviewed and place it in front of him or her on the witness stand. That way, the expert can point to the material reviewed in front of the jury and, if cross-examined with a particular document, has it readily accessible. Jurors should see the plethora of data reviewed to impress on them that the expert logically and scientifically analyzed much data in order to render a reasonable expert opinion. In short, this approach augments the credibility of the expert.

Q: What were your significant findings?

A: [*Here the expert should give a narrative answer, while making eye contact with the jury.*]

Q: What does this mean [*or what does this result show*] relating to [*specify the material forensic issue*]?

Q: Is that result consistent with [*specify*]?

Q: Is that result inconsistent with [*specify*]?

Q: Is that result not only consistent but also more likely than not [*specify*]?

Q: In your opinion, does it show that the defendant did [*specify*]?

NOTE: These questions build up material that ultimately supports the expert opinion.

Consider the following questions that address chain of custody and tell the jury the role of the witness in this case:

Q: Did you test the following item?

Q: What was the test used?

Q: What is the purpose of that test?

Q: What is being [*compared/evaluated/tested*]?

Q: What are the potential outcomes?

Q: Where or from whom did you receive the item that you tested?

Q: How was the item packaged?

Q: Describe its condition [*e.g., it was in a sealed envelope*].

Q: Did you record or photograph the package and its contents?

Consider the following questions that complete the foundation and address the reliability of the methodology:

Q: Briefly, what are the procedures of the test?

Q: Are those the correct procedures?

Q: Are those procedures generally accepted among experts in this field?

Q: Did you follow those procedures when you tested this item?

Q: Are you familiar with the procedures used by other forensic laboratories?

Q: Are the procedures that you used in this case essentially the same standard operating procedures used by other forensic laboratories?

Q: Are the same procedures used regardless of whether it is law enforcement or defense work?

Q: If some other qualified scientist or expert used the same procedure, would that person get the same result?

Consider the following questions to lay the ground for later cross-examination of an opposing expert who did not issue a report (see chap 4 for sample cross-examination questions):

Q: Did you publish your findings in a report?

Q: Why did you produce a report?

Q: Is it part of generally accepted scientific procedures to publish these findings in a report? Why?

Consider the following questions to help create juror confidence in the test results and the analyst and to minimize the impact of cross-examination, because the questions imply that if there was a true dispute about test results, that dispute would be resolved by retesting:

Q: Did you consume all of the evidence?

Q: Is there sufficient evidence for retesting if someone disputed the test results?

Q: In science, what is the purpose of retesting?

NOTE: By this point in the direct examination, the jury should be able to clearly follow the logical progression of the testimony and conclude that the expert's conclusion is "Y," and this conclusion is logical, supported by the evidence and, therefore, is credible and persuasive. Note that the sample questions above are not exhaustive and are by necessity general. Trial counsel must adapt the sample questions to the specifics of the case at issue.

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V. ASKING HYPOTHETICAL QUESTIONS

§3.34 A. Importance of Hypotheticals

Hypothetical questions should come at the end of the direct examination because they are the culmination of the reason the expert is testifying—to answer a critical question for the jury. Although drafting hypothetical questions is difficult, their use is important. When drafting and using hypothetical questions in court, counsel should consider the following approach that provides a method to question your expert witness in an organized, concise, and persuasive format.

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§3.35 B. Limit to Five Hypothetical Questions

Counsel should ask the expert no more than five hypothetical questions: one to three hypothetical questions that support your theory of the case, and one or two hypothetical questions to rebut your opponent's expert testimony. Research on how people learn and retain information suggests that anything over five main subject areas is difficult for people to understand and remember.

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§3.36 C. Rationale for Asking Hypothetical Questions

The rationale for asking one or two hypotheticals of your expert on direct examination to rebut your opponent's expert opinion is "to steal the thunder" from your opponent. If done as suggested here, the theme conveyed is that your expert's theory is more believable than your opponent's—and that is the key to persuasion. Moreover, counsel loses credibility if jurors perceive that counsel is "hiding the ball" with the evidence. Have your expert confront, via the hypothetical, the other expert's theory and debunk it concisely and credibly. In short, this approach maximizes the persuasive impact of your expert witness. This approach also conveys to the jury that your expert employed scientific objectivity because he or she considered the report and opinion from the viewpoint of the opposing expert.

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§3.37 D. Suggested Approach

The following is a suggested approach for asking hypothetical questions of counsel's own expert witness:

1. Write out the hypothetical questions in advance, make them extremely fact-specific based on the evidence at trial, and give all the hypothetical questions to your expert in advance so that your expert is fully prepared. In addition, ask the expert how to rewrite hypothetical questions to make them better. Often, your expert can edit a question so that the ultimate question and answer become more persuasive with the jury.

2. Use the facts and reasonable inferences based on the evidence received at trial, and do not be afraid to use facts that are not favorable. Addressing the nonfavorable facts fosters credibility with the jury.

3. Use the most important facts in the hypothetical questions; otherwise, your questions will be too long, and the jury will not be able to follow them.

4. Watch the jury. Ask the hypotheticals slowly. If jurors are writing down the question, give them enough time to do so. Do not rush them. If the jurors are giving your client the respect and attention to actually write the questions down, then by all means, do not disrespect them by rushing through the process. When a juror has finished writing, he or she will look up. Make eye contact with the juror and nod your head forward ever so slightly to communicate respect and thanks. Doing so bolsters counsel's own credibility. Counsel, therefore, is helping his or her client.

5. Pause again. Look at the jurors. Have them look at you. Then move from the podium, stop, and turn and face your expert. Then ask:

> Q: Dr. Doe, did you review the January 2, 2006, 11-page report authored by Dr. Frank Smith?
>
> A: Yes.

6. Ask your expert one or two hypothetical questions, drawing from opposing counsel's theory of the case, and ask whether your expert agrees with your opponent's expert. Your expert will not agree with the other side's expert assertions, and then your expert will cogently explain why their expert is wrong.

7. Then say, "Thank you, Dr. Doe, nothing further," and sit down.

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§3.38 VI. REDIRECT AND REBUTTAL

Experience has taught that most attempts at redirect are a waste of time. Counsel should, instead, get it right the first time. When counsel does decide to do a redirect, counsel should keep the redirect short and tightly focused, consisting of no more than five questions.

Counsel should watch the jury react to the cross-examination of his or her expert. If it appears that the opposing attorney "scored some points" in any particular area, then address those points on redirect. Again, try not to exceed five questions.

One "catch-all" question that counsel may ask the expert is, "Based on all of the questions asked by opposing counsel, are you prepared to change any of your expert opinions?" The expert will answer "No," and counsel should then ask, "Why not?" The expert then will give a brief answer that sums up the main points of the direct examination. Counsel's response is to thank the expert, indicate that there are no further questions, and sit down.

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VII. PREPARING AND PRESENTING EXPERT MENTAL HEALTH TESTIMONY

§3.39 A. Introduction

Mental health testimony is very common in criminal cases, particularly in felony prosecutions. Similarly, a host of mental health-related issues can arise during civil litigation. Consequently, trial counsel needs to have a fundamental understanding of how to prepare and present expert mental health testimony.

In 1952, the American Psychiatric Association published the first edition of the Diagnostic and Statistical Manual of Mental Disorders (DSM-I), commonly referred to as the "Bible" in terms of its psychiatric and forensic importance. We now use the DSM-IV-TR, and it contains over 300 mental disorders. Trial counsel must be familiar with this monumental work in order to prepare and present direct and cross-examinations of mental health experts.

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§3.40 B. Schizophrenia

Schizophrenia, from this author's experience, is often the most useful psychodiagnostic impression for a criminal defendant arguing that he or she is insane and/or incompetent. Included below is basic information about schizophrenia derived from the *DSM-IV-TR* that trial counsel must understand.

Schizophrenia (from the Greek, meaning "split mind") is a psychiatric diagnosis that describes a mental illness characterized by impairments in the perception or expression of reality, most commonly manifested as auditory hallucinations, paranoid or bizarre delusions, or disorganized speech and thinking in the context of significant social or occupational dysfunction. See DSM-IV-TR.

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1. DSM Diagnostic Criteria

§3.41 a. Symptoms

The DSM diagnostic criteria for schizophrenia include two or more of the following symptoms, exhibited for a significant amount of time over a 1-month period:

- Delusions;
- Hallucinations;
- Disorganized speech (*e.g.,* frequent derailment or incoherence; speaking in abstracts);
- Grossly disorganized behavior (*e.g.,* dressing inappropriately, crying frequently) or catatonic behavior;
- Negative symptoms, *i.e.,* affective flattening (lack or decline in emotional response), alogia (lack or decline in speech), or avolition (lack or decline in motivation).

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§3.42 b. Social/Occupational Dysfunction

In addition to the symptoms described above, for a significant portion of the time since the onset of the disturbance, one or more major areas of functioning such as work, interpersonal relations, or self-care are markedly below the level achieved prior to the onset of the disturbance.

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§3.43 c. Duration

Continuous signs of the disturbance persist for at least 6 months. This 6-month period must include at least 1 month of symptoms (or less, if successfully treated).

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2. Causes

§3.44 a. Genetics

The degree to which schizophrenia is genetic is difficult to ascertain owing to the difficulty of separating the effects of genetics and the environment. It is likely that schizophrenia is a condition of complex inheritance, with several genes possibly interacting to generate a risk of schizophrenia or contributing to the separate components that can occur simultaneously leading to a diagnosis.

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§3.45 b. Environment

Living in an urban environment is one of the strongest environmental risk factors for schizophrenia. Being a first or second generation immigrant is also a strong risk factor for schizophrenia, for which social adversity, racial discrimination, family dysfunction, unemployment, and poor housing conditions have been proposed as contributing factors. Childhood experiences of abuse or trauma have also been implicated as risk factors for a diagnosis of schizophrenia later in life.

There is now evidence that prenatal exposure to infections increases the risk for developing schizophrenia later in life.

The relationship between schizophrenia and drug use is complex, meaning that a clear causal connection between drug use and schizophrenia has been difficult to establish. There is strong evidence that using certain drugs can trigger either the onset or relapse of schizophrenia in some people.

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§3.46 3. Treatment

Psychotherapy may be beneficial in the treatment of schizophrenia. It has been reported that, despite the evidence and recommendations to the contrary, treatment is often confined to pharmacotherapy alone because of reimbursement problems or lack of training. Therapy that addresses the whole family system of an individual diagnosed with schizophrenia and that includes psychological education has also been found to have significant benefits. Cognitive behavioral therapy may focus on the direct reduction of the symptoms, or on related aspects, such as issues of self-esteem, social functioning, and insight. Another approach is cognitive remediation therapy, a technique aimed at remediating the neurocognitive deficits sometimes present in schizophrenia.

With a rudimentary understanding of how the DSM-IV-TR works, counsel can launch the preparation of a mental health case.

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C. Attorney Preparation

§3.47 1. Client Interview

At the earliest opportunity, trial counsel should commence development of the client's biosocial history. This frequently takes multiple interviews, and if counsel is developing traditional mitigation evidence for a capital case, this process literally can take months.

You must get your client to sign a confidential release form so that you can develop the biosocial data. Assuming you have a murder case or other high-profile matter, explain to your client that you will retain both a psychologist and psychiatrist to conduct a confidential evaluation, and that, depending on the findings, additional mental health experts and/or medical tests may be requested. Explain that biosocial information is extremely important to psychologists and/or psychiatrists who will be conducting evaluations.

Explain to your client that his or her friends, family members, drug rehabilitation contacts, and others will be contacted to verify key events in your client's life story. Educate the client that some or all of those witnesses will also be asked to sign confidential releases so that medical, school, and other records can be obtained confidentially.

Explain the discovery rules, attorney-client, doctor-patient privileges, and attorney work product law. Advise your client to tell the full and complete truth to defense-retained experts, and explain that trying to "psych out the psychologist" in the testing process is likely to backfire. Explain that a finding of malingering is very damaging. Lastly, reassure your client that the prosecution does not get to see any of the test results and/or any written report from the mental health expert unless the expert will be called as a witness for trial. In other words, an unfavorable report goes in the file, and the other side never finds out about it.

In sum, multiple interviews with the client can result in a "life story" that can be buttressed by subsequent interviews with friends and family and supported by corroborating documents. These interviews and documents will typically be supplied to some or all of the mental health experts that confidentially evaluate your client. The following topical areas and questions, although not exhaustive, can be covered during client interviews in order to develop the biosocial history.

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§3.48 a. Birth and Infancy History

Ask your client what he or she knows about his or her birth and infancy. What was the client told about these things from his or her parents, siblings, and/or others? Does the client remember any of this part of his or her life? What medical records or other documents relating to his or her birth and/or infancy does the client have, or where can he or she tell you to go to get these "family" records?

Pay careful attention to any reference to hospitalizations and/or any trauma experienced during birth or infancy. A forceps delivery or lack of oxygen at birth can result in brain damage.

What kind of parenting did your client experience? New research suggests that the first 2 years of life are key to the development of the brain and the psychological development of the individual. Being held, nurtured, fed, psychologically stimulated, and otherwise loved results in a child having synaptical transmissions that essentially give his or her brain a cushion from the psychological harm that will come later in life during the natural process of development. A history of physical, emotional, and/or sexual abuse can be toxic to a child's development, which can be elaborated on by the mental health expert.

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§3.49 b. Childhood History

Ask your client about his or her memories during grammar and elementary school. Try to get information grade-by-grade, and always ask for any friends that you might be able to contact to corroborate the information. What were your client's grades? Was he or she in special education classes and/or have any type of disabilities? Any history of seizure disorders? Was your client in a criminal street gang? What were your client's best and worst memories of childhood?

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§3.50 c. Teenage History

Was your client involved in any sports and/or extra-curricular activities? How were his or her grades? A drop in grades in high school often corresponds with a spike in drug and alcohol misuse and/or criminal activity. These factors are important for the mental health expert to consider when diagnosing your client. You must also ask about client's first sexual experience and talk about relationships and sexual history. This is very important for the mental health experts particularly if the crime(s) involve a sexual and/or violent component.

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§3.51 d. Adult History

The focus of the adult history should be on work, education, and marital-relationship histories. Criminal history and/or gang history is also very important. Trying to get your client to examine his or her motivations and to answer the question "why" when discussing his or her criminal history is a useful exercise providing important insights before psychological-psychiatric assessments occur. A substance abuse history should be developed so that client behavior resulting from drug misuse can be identified and analyzed.

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2. Investigation

§3.52 a. Records

Your investigators will need to have a number of confidential release forms available to give to key witnesses in order to obtain documents to corroborate your client's biosocial history. Although not an exhaustive list, the following records are typically helpful in a mental health case:

- **Medical records.** This includes your client's entire medical chart. The prenatal and birth records from your client's biological mother are often helpful, as well. Evidence of head injury or any loss of consciousness is very important as it may have resulted in traumatic brain injury (TBI). Subsequent, mild head injuries exacerbate TBI and can cause permanent brain damage. Fighting, car accidents, sports injuries, and falls typically contribute to TBI in clients. Medical records of family members are also very helpful, since drug abuse and mental illness both have a genetic link.
- **School records.** Your client's school records can contain the results of psychological and developmental testing, an IEP plan, and/or other evidence of developmental delay and/or disability.
- **Military records.** In one murder case, the author's client's military records revealed that he could not do simple tasks such as fold his clothing or shine his shoes.
- **Mental health records.** Psychiatric hospitalizations, consultations, medications, and diagnoses are all very helpful for your expert in making a current psychodiagnostic impression. It is also useful to get the mental health records of family members, since mental illness often runs in families.
- **Substance abuse records.** Any record of alcohol and drug use, misuse or abuse, rehabilitation stays, and/or hospitalizations and/or ER visits are helpful to document substance abuse, which affects behavior and can result in permanent brain damage. The author has found that taking the confidential records release form to rehabilitation facilities where his client stayed frequently resulted in excellent mitigation witnesses, and oftentimes the rehab counselors had wonderfully detailed records to show the client's impairment.
- **Criminal records.** The investigator should obtain court, probation, and/or juvenile records relating to the entire criminal history of your client. A criminal history can be indicative of anti-social personality disorder. Though you start with an informal discovery request to the prosecutor, ultimately in a capital case, your investigation team is responsible for getting these records—sometimes from all over California and/or other states.

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§3.53 b. Interviews

The following interviews result in a wealth of information concerning your client:

- **Family and friends.** These are important because the interviews of those close to your client can corroborate what the medical and psychiatric records reveal. Further evidence of a dysfunctional family is very valuable in mitigation These interviews should include people with whom the client has interacted from birth to his or her current incarceration, and sometimes, you will need to go to the state mental hospital and/or jails and prisons to interview them.

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§3.54 c. Photographs and Video

The author prefers to get video and digital photos of the schools and houses where clients were raised. The investigation team photographs most of the witnesses they interview, and if there is a situation in which a witness may expire before trial, short video interviews of that person are made. It is important to show the jury, *e.g.*, what it was like for your client to grow up, where he or she went to school, and the activities he or she was engaged in. One client with capital exposure was a record-setting athlete in high school, and the author was able to obtain a photo of a plaque in the school's gymnasium showing his football prowess.

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3. Forms and Checklist for Capital or Serious Cases

§3.54A a. Client Background Form

In order to develop mitigation evidence for a capital case or other serious case, counsel may wish to consider using three tools: 1) a client background form, 2) a HIPPA release form for clients and witness information, and 3) a checklist of guilt and mitigation evidence.

PRELIMINARY DATA:

1. NAME:_____

2. DATE OF BIRTH:_____ PLACE OF BIRTH:_____

3. PRESENT PLACE OF CONFINEMENT:_____

DATE OF ARREST:_____

CURRENT SUICIDAL IDEATION?_____

PAST ATTEMPTED SUICIDES?_____

NEED TO CONTACT WATCH COMMANDER AND/OR MEDICAL STAFF?
_____

BIRTH, GROWTH, AND DEVELOPMENT:
_____
_____

Any known complications with mother's pregnancy (*e.g.*, bleeding, maternal illness or disease, toxemia, etc.):
_____

Any complications at birth (*e.g.*, full term or premature, respiratory difficulties, jaundice, known defects, etc.):
_____
_____
_____

Any perceived difficulty in achieving early developmental tasks:
_____

Approximate age at which each of the following was first accomplished:
_____

(a) responsive smile:_____

(b) rolling over:_____

(c) crawling:_____

(d) pulling to stand:_____

(e) walking:_____

ENVIRONMENTAL FACTORS:

Provide the name, age, and address (where available) of every member of the client's family or household, including all those with whom the client lived prior to leaving home; include relation to client:_____
_____
_____

Obtain criminal records, mental health records, social service records, dependency records, and/or other historical records of client's biological and/or step-parents and biological and step-siblings.
_____
_____

Describe the physical conditions in which the family lived, including any change in conditions, over this period of time:
_____
_____
_____

With reference to item 9, describe how these conditions compared to the conditions under which neighbors and/or nearby relatives lived:_____
_____
_____
_____

Describe the kind of medical attention the client and his or her family received:_____
_____
_____

Was there adequate food in the house? Who provided it?
_____
_____

Describe the jobs held by the client's parents or other caretakers:_____
_____
_____

Describe any moves made by the client's family (household) from one locale to another during the period of time referred to in item 8, including the reason(s) why such moves were made:
_____
_____
_____

Describe fully the relations between the client and his/her parents or parental figures, with reference to:_____
_____
_____

(a) emotional support and nurturing, expressions and feelings of love:_____

(b) praise for positive accomplishments or behavior:_____

(c) discipline (techniques, whether use seemed excessive or appropriate to the "offense," whether administered fairly as between siblings):_____

(d) the infliction of physical harm or pain (by burning, beating, cutting, whipping, etc.) that was apparently not associated with culture-appropriate discipline, including patterns of behavior as well as specific incidents:_____

(e) sexual abuse (whether or not associated with discipline) or harassment, or aberrant sexual modeling:_____

(f) any other factor not already covered:_____

(g) use of drugs and/or alcohol in the home:_____

Describe any major disruptions of or trauma to any member of the household:_____

Describe fully the relationships between the client's siblings and his or her parents or parental figures, with reference to the seven specific areas detailed in item 16:_____

Describe fully the relationship between the client and his siblings, with particular attention to sexual relations (voluntary or coerced), the infliction of physical harm, and the manipulation of parental authority to the benefit or detriment of other siblings:

Describe the client's relationships (in general) within the household in which he or she grew up, with:_____

(a) non-parent adults:_____

(b) age-group peers:_____

(c) older children:_____

(d) younger children:_____

20. Is the client married? Name spouse(s) or partner and briefly describe the relationship:

21. Give name, age, and address of each of client's children:

22. Give names and addresses of any people other than family members with whom client has lived as an adult, *e.g.*, develop the "Relationship History";_____

23. Give names and addresses of significant friends or mentors in childhood or adulthood (excluding family members, teachers, or employers):_____

INSTITUTIONAL DATA:

24. With respect to school:

(a) How old was the client when he or she began school?

(b) Did the client progress from one grade to the next without being held back? If not, explain:_____

(c) Did the client demonstrate unusual academic, vocational, or vocational strengths or weaknesses? Detail:_____

(d) Did the client demonstrate any behavioral difficulties? Detail:_____

(e) Were parents consulted on any regular basis concerning the client's behavior or performance?

_____

(f) What was the highest level of school completed successfully?_____

(g) Provide details of all schools attended (elementary, junior high, high, and post-high), including addresses and year of attendance:_____
_____
_____

(h) Provide names and addresses of any school personnel who knew the client well:_____
_____

25. With respect to juvenile agencies:

(a) Was the client ever charged as a juvenile? If so, for what?
_____

(b) What were the dispositions of such charges (*e.g.*, probation, commitment)? Include length of time actually served:
_____

(c) What was the character of the acts or circumstances underlying the charges or adjudications?_____
_____

26. With respect to the client's involvement with the criminal justice system as an adult:_____
_____

(a) Was the client ever previously charged? If so, for what?
_____

(b) What were the dispositions of such charges (*e.g.,* probation, commitment)? Include length of time actually served:
_____

(c) What was the character of the acts and circumstances underlying the charges or convictions?_____
_____

(d)__ Describe the disposition ordered for each conviction (*e.g.,*
probation, incarceration, etc.) and what the client's behavior was like during the disposition period:
_____

NOTE: The investigator(s) should obtain every Probation Officer's Report for each criminal conviction and/or true finding.

27. With respect to the military:

(a) was the client rejected from service? If so, state why.
_____

(b) if the client served, name branch and dates of service:
_____

(c) state the type of discharge:_____

(d) describe any significant experiences while in the military:
_____

(e) describe any post-military trauma related to service:
_____

MEDICAL AND MENTAL HEALTH HISTORY:

28. Describe generally the client's prior access to medical and mental health care: _____
_____
_____

29. Has the client suffered serious medical problems (disease, trauma related) for which he or she has received treatment? If so, describe:_____
_____
_____

30. Describe in as much detail as possible any head trauma suffered by the client, including severe blows to the head (any part, including nose), car accidents, falls, and any occasions of loss of consciousness:_____
_____
_____
_____

31. Describe any childhood illnesses:_____
_____

32. Has the client suffered mental illness or disorder that has been:_____
_____

(a) recognized by others? If so, list diagnoses and describe symptoms:_____
_____
_____

(b) evaluated by mental health professionals? If so, describe illness and name professional who diagnosed it: _____
_____
_____

(c) treated? If so, describe:_____
_____
_____
_____

33. Has the client ever received medication for a mental illness or disorder? If so, list medications and disorders as well as prescribing physicians:_____
_____
_____

34. Has the client ever been committed (voluntarily or involuntarily) to a mental health facility? If so, describe the circumstances; if not, but commitment was considered or proceedings were instituted, describe the circumstances:
_____

35. Has the client undergone mental health evaluations in connection with any prior offenses? If so, explain._____
_____

36. List the results of any mental health exams performed on the client (*e.g.*, I.Q. test, MMPI):_____
_____

37. Describe the results of any test for neuropsychological or organic brain damage (*e.g.*, X-ray, CAT scan, MRI [Magnetic Resonance Imagery]):_____
_____

38. Has the client ever been deemed incompetent (*e.g.*, in prior court proceedings, by mental health officials, by military)? If so, explain:_____
_____

VOCATIONAL AND AVOCATIONAL PURSUITS:

39. Detail the client's entire employment record, including employers' names and addresses where available._____
_____
_____
_____
_____

40. Was the client underemployed? Explain:_____
_____

41. If the client sustained lengthy period of unemployment, explain why:_____
_____

42. Prior to her or his arrest, did the client have vocational pursuits? What were they?_____
_____
_____

43. Did the client attend a church and/or attend any other place of worship as a child or an adult? If so, list church-institution name(s), church-institution personnel, and client's religious interests or activities:_____
_____
_____
_____

SUBSTANCE ABUSE:

44. Has the client ingested quantities of alcohol or drugs in such a way as to suggest substance abuse? If so, describe:_____
_____
_____

45. Was the client ever treated for alcohol or drug abuse? If so, when, where, and for how long?
_____
_____
_____

46. What were the circumstances of the client's initiation into alcohol or drug use?_____
_____
_____

47. Whether a substance abuser or not, was the client under the influence of alcohol or drugs at the time of this offense? If so, describe:_____
_____
_____

PERCEPTUAL EXPERIENCES AND SELF-PERCEPTIONS:

48. Has the client ever experienced any of the following? If so, explain when, how often, and describe the experiences:
_____
_____
_____

(a) hallucinations (auditory, visual, olfactory):_____

(b) déjà vu (feeling he or she has experienced something before):_____
_____

(c) opposite of déjà vu (having an experience that he or she has had before but feeling as if he or she has never had the experience before):_____
_____

(d) macropsia (seeing objects become larger):_____

(e) micropsia (seeing objects become smaller):_____

(f) tics or repetitive "nervous" moments:_____

(g) feelings of persecution:_____

(h) feelings about self or others that clearly have no basis in reality (*e.g.*, delusions that are grandiose or paranoid):_____
_____

49. Ask the client to describe him or herself as completely as possible (record here):_____
_____

PRISON RECORD/TIME:

50. Has the client incurred any disciplinary problems since arrest?_____

1. Since the client's arrest:

(a) How has the client spent his or her time (*e.g.*, does he or she read, write letters, draw, watch television, and attend religious services)?_____
_____

(b) Has the client had any serious health problems? Describe:_____
_____

(c) Has the client been evaluated and/or "treated" by the jail's mental health staff? Describe:_____
_____

(d) Has that treatment included medication? Describe medications and dosages:_____
_____
_____

52. Since the client's arrest, who are the people who have maintained contact with him the best? Give addresses and telephone numbers:_____
_____
_____

53. Does the client have noteworthy relationships with jail officials or other inmates?_____
_____

54. With respect to any prior incarcerations:

(a) Did the client incur any disciplinary punishment or attempt escape? If so, explain:_____
_____

(b) Was the client given any special privileges? If so, explain:
_____
_____

(c) Did the client form relationships with guards or other inmates?_____
_____

(d) Was the client on medication or treated for any physical or mental disorder?_____
_____

FAMILY HISTORY

55. Have any family members ever been diagnosed or treated for mental illness or disorder (including epilepsy)? If so, provide all known details (illness or disorder, treating physician or agency, address, course of treatment):

(a) mother:_____

(b) father:_____

(c) siblings:_____

(d) grandparents:_____

(e) aunts or uncles:_____

(f) spouse or children:_____

56. Have any family members even been suspected of having mental illness, disorder, or dysfunction (*e.g.*, uncontrolled temper or rages of anger, periods of significant memory loss, seizures, "crazy" behavior, signs of retardation or other limited mental capacity)? If so, describe as fully as possible:_____
_____
_____
_____
_____

57. Describe the criminal records of any other family members (among those listed in item 56) as fully as possible:___
_____
_____
_____

58. Is there any evidence that members of the client's family have used alcohol or drugs? If so, explain:_____
_____
_____
_____

OTHER RELEVANT INFORMATION

59. Describe any other significant experiences, relationships, or characteristics of the client not detailed above._____
_____
_____

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§3.54B b. Authorization to Release Confidential Information: HIPPA Form

Client's Name:_____

Client's DOB:_____

Client's SSN#:_____

Client's Medical Record#:_____

I hereby designate the Law Office of _____ as my agent to request and receive on my behalf documents or information relating in any manner to me for the purpose of legal representation, including but not limited to records protected pursuant to the Health Insurance Portability and Accountability Act of 1996 (HIPAA).

I release custodians and possessors of such information from any and all liability for its disclosure to my agent. This authority includes, but is not limited to, the inspection, copying, and receipt of documents, photographs, written or recorded information and the receipt of oral information. I hereby request that all persons cooperate fully in providing the requested information.

The authority herein granted applies, but is not limited to: all medical reports of physical and/or mental disorders, specifically including reports relating to the following (client to check and initial if the following specific information is to be released):

[ ]_____ (initials) Alcohol and/or Drug treatment records

[ ]_____ (initials) HIV/AIDS records

[ ]_____ (initials) Mental Health/Psychiatric treatment records

The authority herein granted includes, but is not limited to, medical records for the following period of time:

From_____To_____or

[ ] All Records

The authority here granted includes, but is not limited to, information requested from the following: Atascadero State Hospital, Coalinga State Hospital, Patton State Hospital, California Department of Corrections and Rehabilitation, Children's Hospital, California Department of Public Social Services, Department of Health and Human Services, Department of Mental Health Services, Selective Service, United States Department of Veterans Affairs, United States Bureau of Citizenship and Immigration Services, Internal Revenue Service, Social Security Administration, branches of military, regional centers for the developmentally disabled, law enforcement and penal correction facilities, medical facilities and treatment programs, doctors, psychiatrists, attorneys, financial institutions and all schools, or _____. I further state that this consent is valid, absent my express revocation thereof, for twenty-four (24) months, from the date of my signature. A photocopy or facsimile will serve as an original.

I may revoke this authorization at any time prior to its expiration by notifying the Office of the Public Defender in writing, but the revocation will not be effective to the extent that we or others have acted in reliance upon this authorization.

I am not required to sign this form to receive health care services (or for enrollment in a health plan, treatment, payment or eligibility for benefits).

I will receive a copy of this form if I request it. (A copy must be issued to client for mental health record releases).

The information that is used or disclosed pursuant to this authorization may be redisclosed and may no longer be protected by federal privacy regulations. However, any information disclosed to health care providers, insurance companies, and health plans will continue to be protected and not to be reused or redisclosed other than as authorized by you or permitted by law.

I have read this authorization for release of information with my attorney and fully understand its contents and my rights pursuant to HIPAA.

Client's Signature:_____ Date:_____

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§3.54C c. Checklist of Guilt and Mitigation Evidence

A capital or potential capital case will likely require two or more investigators who need to work as a team to contemporaneously investigate guilt and mitigation evidence. This is an introductory checklist to assist with the development of a form-checklist for counsel to give to the investigators in order to commence the investigation. Thus, counsel is respectfully advised that this checklist is not exhaustive and counsel should investigate other areas relating to both guilt and mitigation. Finally, a "mantra" for mitigation investigation is "Dig, dig, dig." One witness will lead to one document that will lead to another witness, and another document, etc., so that the entire picture (witnesses, documents, records, etc.) is available to present to a jury.

I. GUILT EVIDENCE INVESTIGATION

- 1. Crime scene viewing with photo and digital video.
- 2. Neighborhood canvas.
- 3. Interview of key witnesses from discovery. (The initial discovery will contain homicide detective narratives of key witnesses. Thus, these persons could be contacted immediately.)
- 4. Explore any potential defense guilt-phase witnesses by interviewing them. (Your client may tell you, during the first or subsequent interviews, some guilt-related witnesses that might support a defense.)

II. DEVELOPMENT OF MITIGATION INVESTIGATION

A. Initial Interviews

- 1. Interview all immediate family members, if available.
- 2. Interview witnesses that were with client at or near to the time of the alleged crime.
- 3. Interview prosecution percipient witnesses to the crime at this early stage—if it reasonably appears that they can give statements and/or observations of mental illness and/or intoxication at the time of the crime.

B. Initial Records Investigation

- 1. Jail records
- 2. Prison records
- 3. Mental health hospital and other treatment records
- 4. CMH records
- 5. Drug rehab records
- 6. All school records
- 7. Social Service records (SSI, AFDC, CPS, DSS, etc.)
- 8. Probation reports
- 9. Employment records
- 10. Military records
- 11. All criminal and juvenile prior records
- 12. Criminal and juvenile records of immediate family members
- 13. All medical records of client (from birth to current. You will often have accidents where there are head injuries and/or other surgeries, diseases, and illness that can adversely affect mental functioning.)
- 14. Mother's pre-natal records
- 15. Medical records of immediate family members
- 16. ICE records
- 17. Other civil records (divorce, probate, adoption, dependency, bankruptcy, etc.)
- 18. Client's social networking websites

C. Other Interviews (to be developed in subsequent ASR's)

- 1. Interviews of religious officials
- 2. Interviews of cultural-clubs-sports groups client belonged to
- 3. Interviews of other family members and neighbors where client grew up
- 4. Interviews of witnesses based on record review, *e.g.*, staff member at Patton State Hospital who would testify that the client heard voices and didn't respond to medication.

D. Obtaining Mitigation Physical Evidence

- 1. Physical evidence (trophies, medals, military medals and awards, other awards, newspaper articles, photograph of plaque in gym of client's high school showing his school record, school photos and videos, family photos, videos, etc.)
- 2. Other items of physical evidence that can humanize the client.

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§3.55 D. Presentation

Once counsel has received information from the client, conducted interviews with key witnesses, and obtained corroborating documents, the data must be presented through the expert witness. Counsel should explore and develop the client's biosocial history with the expert, including those indications (schizophrenia, depression, low intelligence, learning disabilities, substance abuse) of inherited, genetic mental illness, the birth mother's behavior during pregnancy (drug or alcohol use), any birth or infant trauma or history of head injury, toxic parenting or history of physical, mental or sexual abuse, the client's criminal history, and/or further evidence of mental disorders.

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§3.56 E. Direct Examination of Mental Health Expert

The following is an examination of a mental health expert during competency proceedings in the hypothetical case *People v X*. During the development of Mr. X's biosocial history it was discovered that Mr. X's biological mother drank and smoked heavily during pregnancy. Mr. X' birth and early development records are consistent with a diagnosis of Fetal Alcohol Syndrome. There was substantial evidence that Mr. X suffered from birth trauma. In addition, Mr. X was not fed at birth. Social Service records revealed that Mr. X was placed into foster care as an infant because the biological mother would buy alcohol and cigarettes instead of food. The children lived in a filthy house, lacking food and infested with rat droppings. Within weeks of Mr. X's birth, Mr. X's mother was convicted for a second time of felony child abuse and neglect and was sentenced to state prison.

In foster care, Mr. X was told things from his foster parents like, "The only thing you're good for is nothing." He was kept in a basement and not allowed to play upstairs with the rest of the family. Mr. X's IQ was barely above mentally retarded. He had learning disabilities and low grades. According to school records, Mr. X was not socially adjusted. Mr. X's biological brother also had a low IQ and was diagnosed with schizophrenia.

The examination of Dr. A is organized to suggest how you can develop the biosocial information and support the diagnosis of schizophrenia and a finding of incompetence. Periodically, hypothetical answers to the questions posed below are provided to illustrate the information counsel wished to elicit under the specific fact pattern of *People v X* and/or to demonstrate how to follow up expert testimony.

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1. Introduction

§3.57 a. Preliminary Questions and Answers

Q: Dr. A, why are you here today?

A: To render an expert opinion that Mr. X is not presently competent to stand trial, and to focus on the three main reasons why.

Q: What are the three main reasons why Mr. X is not presently competent to stand trial?

A: Mr. X cannot assist counsel in his defense owing to severe memory deficits revealed through neuropsychological testing. I also base this conclusion on the other mental health expert reports in this case, my clinical interview, and data from John Doe who interviewed Mr. X.

Secondly, Mr. X suffers from source memory errors & confabulation.

Thirdly, Mr. X suffers from organic brain damage affecting memory and his present competency owing to prolonged alcohol and drug abuse. I will explain how Korsakoff's syndrome and Hepatitis C combine to compromise Mr. X's memory and contribute to his present lack of competency.

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§3.58 b. Expert Reports Foundation

Identify reports and exhibits that Dr. A reviewed, *e.g.*:

- Neuropsychological report.
- Dr. A's report (ask him to review it on the witness stand, and sign it).
- Psychiatric report finding the client competent.
- Exhibit relating to neuropsychological testing results.
- Exhibit relating to John Doe's interviews with Mr. X that illustrate he cannot assist counsel with his defense.

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§3.59 c. CV Foundational Questions

Q: What is your business or occupation?

Q: What are your current duties?

Q: What professional licenses do you currently hold?

Q: What education do you have that qualifies you to be a board certified psychiatrist?

Undergraduate?

Medical school?

Internship and residency?

Fellowship?

Q: Did you go to law school?

Q: Where?

Q: When did you get your J.D.?

Q: Are you a member of the California Bar?

Q: When were you admitted?

Q: Please summarize your work experience relating to psychiatry since you were awarded your MD.

Q: Describe consultant work that you have done for the County Probation Department.

Q: Describe consultant work that you have done for the County DA's Office.

Q: Have you written or contributed to publications relating to competency or other publications?

Q: Have you had teaching experience?

Q: What is your hourly rate in this case?

Q: Is your rate the same whether you are testifying or reviewing medical records?

Q: How many forensic psychiatric evaluations have you performed?

Q: How many times have you testified as an expert witness relating to psychiatry?

Q: What percentage of time have you testified for the defense in criminal cases?

Q: What percentage of time have you testified for the prosecution?

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§3.60 d. Testimony Concerning Contact with Defendant

Q: Did you evaluate Mr. X?

A: Yes. Mr. X was evaluated at the Central Detention Facility for three hours on March 1, 2009. I saw him again in jail earlier this week.

Q: Do you see Mr. X in court today?

Q: Can you point to him and identify and article of clothing he may be wearing?

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2. Data Reviewed

§3.61 a. Initial

Q: Please summarize the data you reviewed in this case that I submitted to you before you wrote your report.

The expert should begin with a summary of police reports, medical records, mitigation records, the Preliminary Hearing Transcript, and other key elements of discovery. The expert should use his or her report to refresh memory and/or refer to his or her report to make an adequate record. Counsel may wish to mark the report as an exhibit, and if this is a bench trial, the report should be moved into evidence.

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§3.62 b. Supplemental

Q: Were there records or documents that became available for your review after you wrote your report?

Q: Did these contribute to the basis of your expert opinion?

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§3.63 3. Current Psychodiagnostic Impression

Note that this is an introduction, so to speak, into the reasons why the client is not competent to stand trial. More detail is given later in the direct examination, but counsel must begin with an overview. The expert should give noncomplicated, two- to three-sentence descriptions for each part of the findings below. Note that the parenthetical numbers correlate to sections/diagnoses appearing in the DSM_IV-TR.

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§3.64 a. Axis I: Clinical Disorders and Other Conditions

Q: What is you current diagnosis for Mr. X?

A: I would diagnose Mr. X with the following clinical, or Axis I disorders:

A psychotic disorder, not otherwise specified (NOS); likely polysubstance induced (298.9). I base my opinion on the fact that Mr. X reported having visions in which he sees people from his past saying negative things to him. He also reports seeing shadows. Mr. X reported hearing his name being called when no one else was present. At other times he hears voices saying negative things to him, or telling him to kill himself. Mr. X reported feeling that he is being watched, but doesn't know by whom. Mr. X feels that psychiatric medications are helpful to him. Also, ample mental health records reveal multiple prior diagnoses of schizophrenia.

Alcohol Induced Persisting Amnestic Disorder (291.1);

Alcohol Induced Persisting Dementia (291.2);

Dysthymic Disorder (300.4);

Alcohol dependence, in remission in a controlled environment (303.90);

Cocaine abuse, in remission in a controlled environment (305.60);

Opioid abuse, in remission in a controlled environment (305.50);

Other substance abuse—inhalants, methamphetamine (305.90);

Possible Neuroleptic Induced Tardive Dyskinesia (333.82);

Adult antisocial behavior (V71.01);

History of neglect as a child (V61.21);

Acculturation problem —severe prison institutionalization (V62.4); Mr. X reported that he prefers living in custody to living in civilian society. He stated, "I like prison… What my foster parents didn't provide, prison does—the prison clothes me, feeds me, I have friends." Mr. X offered his preference for custody as the reason for his extensive record of violations. Mr. X sees himself as institutionalized. "It's just like normal life, except for being with a woman."

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§3.65 b. Axis II: Personality Disorders

A: Among the Axis II personality disorders, I would diagnose Mr. X with Borderline Intellectual Functioning (V62.89) and Personality Disorder NOS with markedly Dependent and Cluster B features (301.9).

Q: Does Dr. Y's report support your opinion of borderline intellectual functioning?

A: Yes, it does.

Q: Why?

A: Dr. Y testified that she has completed 200 comprehensive neuropsychological evaluations, and Mr. X, when compared to this group, is easily among the five lowest functioning individuals she has assessed.

Q: From *your* clinical and forensic experience, how bad is Mr. X's functioning?

A: (expert provides summary of experience, like Dr. Y's, above, and offers opinion)

Q: Did you notice, consistent with Dr. Y and other mental health experts, anything from your mental status examination consistent with borderline intellectual functioning in Mr. X?

A: Yes. His speech was of a slower than normal rate, in a monotone, with much mumbling. His affect was blunted and flattened. There was a surprising lack of emotion about the events narrated or the possibility of spending the rest of his life in custody. Mr. X appeared emotionally distant. His motions were bradykinetic. On cognitive testing, Mr. X appeared of below average intelligence. He did not know the date. He did extremely poorly on testing of short term memory—it took multiple trials for him to even learn a single word from a list of four nouns, and then could not recall any of the words 3 minutes later. Mr. X reported that "my memory doesn't work very well. I don't try to remember things."

Q: Is it important that Mr. X had trouble with the date for you, Dr. Y., Dr. Z, and John Doe?

A: Yes.

Q: What does this mean?

A: He has severe neuropsychological deficits, Korsakoff's syndrome, Hepatitis C, and the low IQ of 71 which all combine to make him have poor memory and not be able to understand even relatively simple concepts.

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§3.66 c. Axis III: General Medical Conditions

Here counsel would explore with Dr. A Fetal Alcohol Syndrome, Korsakoff's Syndrome, Mr. X's history of cholecystectomy and Hepatitis C.

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§3.67 d. Axis IV: Psychosocial and Environmental Problems

Here counsel would have the expert describe the significance of Mr. X's criminal history and social isolation.

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§3.68 e. Axis V: Global Assessment of Functioning (GAF)

Counsel should discuss the definition of GAF, Mr. X's current score, the highest score he has ever received, and the significance of this.

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4. Competency Analysis

§3.69 a. CALCRIM 3451

Counsel should ask the Doctor whether he is familiar with the legal standard.

Q: Dr. A, is it your understanding under CALCRIM 3451, that "the defendant is mentally competent to stand trial if he can do all of the following:

1. Understand the nature and purpose of the criminal proceedings against him;

2. Assist, in a rational manner, his attorney in presenting his defense; and

3. Understand his own status and condition in the criminal proceedings?"

A: Yes.

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§3.70 b. Understand Nature and Purpose of Criminal Proceedings

Q: Why is Mr. X unable to understand the nature and purpose of the criminal proceedings against him?

Brain Damage at Birth

A: Firstly, Mr. X was part of triplets; he has a surviving twin, G. There was a triplet H who died in infancy from septicemia. The triplets were premature with low birth weight. These events are consistent with brain damage to Mr. X.

Fetal Alcohol Syndrome

A: Social Service records revealed that the biological mother was quite unconcerned for her children. She often left them alone without enough food. The house and children were dirty. Mother spent her A.D.C. check on wine and the support of her boyfriends. The children were removed for neglect. Bio-mother had two felony convictions for child neglect. These facts suggest Mr. X likely suffered from Fetal Alcohol Syndrome (FAS).Q: Please define FAS.

Q: What does FAS do to fetal brain development?

Q: How does FAS correlate to neurological deficits, poor cognitive functioning and lack of memory in Mr. X ?

Q: Is smoking hazardous to the fetus?

Q: Why?

Concussion in 5th Grade

A: The data about Mr. X revealed that he suffered a concussion while playing football in the 5th or 6th grade. He reportedly cut his head and was unsure if he had a loss of consciousness. He was treated at the ER and released. He was unsure of any lasting sequelae.

Q: Please explain how concussions and/or mild traumatic brain injury can cause brain damage and make the victim more likely to suffer dementia as they grow older?

Mental Illness in Mr. X's Biological Family

Q: Dr. A, does mental illness run in families?

A: Yes, there is a strong genetic component from the research and from my clinical and forensic experience.

Q: Does schizophrenia run in families?

A. Yes, there appears to be a strong genetic correlation with the diagnosis of schizophrenia in multiple family members, based on published studies and my clinical and forensic experience. In this case, Mr. X and his biological mother have manifested symptoms consistent with a diagnosis of schizophrenia.

Q: What did your review of the supplied data reveal?

A: He had two younger siblings that were mentally retarded. The maternal grandfather was reportedly psychotic. Mr. X's biological father apparently spent several months in a psychiatric hospital.

Schizophrenia

Q: What information lead you to conclude that Mr. X has symptoms consistent with schizophrenia?

A: Mr. X reported that when he learned he was adopted, he started hearing voices and having nightmares. He reported that he despised his adoptive parents. He said that he did not like how they treated him. He reported running away frequently. He reported an extensive psychiatric history which is amply documented in the data reviewed. He reported multiple suicide attempts that are clearly documented in jail and prison records.

Low IQ

Q: Do you agree with Dr. Y that Mr. X's full-scale IQ is 71?

Q: Please explain how much better a person with an IQ of 71 would function when compared to a mentally retarded person?

Q: Would we expect a person with an IQ of 71 to have difficulties working in simple jobs and in the military?

A: Yes, we would and that is exactly what happened to Mr. X. Mr. X's performance in the Army was generally unsatisfactory. Records revealed that he could not do simple tasks like clean his room. Mr. X received an other than honorable discharge from Fort XXX in New York.

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§3.71 c. Assist Attorney in a Rational Manner

Here, counsel would go over the same information as in prong one, above and discuss how each factor impacts Mr. X's ability to assist his attorney. Counsel would also address issues related to memory, amnesia and any mental impairment that might lead to false confessions.

Source Memory and Confabulation

Q: Please define source memory.

Q: Please define confabulation

Q: Please define perseveration

Q: Does Mr. X have frontal lobe dysfunction?

A: Yes.

Q: What does the frontal lobe do for the brain?

Q: Do people with frontal lobe dysfunction have source memory and confabulation problems?

A: Yes.

Q: Please explain why.

Q: What neuropsychological evidence exists to support your opinion of frontal lobe damage for Mr. X?

A: Dr. Y's extensive neuropsychological testing (refer to the court exhibit), reports from other mental health experts, and my clinical evaluation of Mr. X.

Q: Please explain how source memory deficits exist in this case.

Q: Why do they exist?

Q: Does this finding help to support your opinion that Mr. X is not competent to stand trial?

Q: Why?

Q: Why do you hold the opinion that Mr. X is subject to confabulation?

A: There are many details that the investigators ask about that Mr. X cannot recall, despite many leading hints. His wife observed, "Mr. X forgets what he says and then lies because he doesn't remember his original story."

Q: What is the significance of confabulation?

A: Confabulation does not reflect that Mr. X has no ability to report past events accurately, but that when there is a gap in his memory, he will construct an explanation to bridge that gap, which he then holds as a real memory."

Q: Does confabulation on the part of Mr. X support your opinion he is not competent to stand trial?

Q: Why?

False Confessions

Q: What is your opinion regarding Mr. X's confession?

A: Mr. X's "bragging" about committing the murders in order to be taken back and to be taken care of by his ex-wife was likely the result of impaired memory, previously suggested information provided by the police, with embellishment and confabulation.

Q: Why do you hold that opinion?

A: Mr. X reported that he prefers living in custody to living in civilian society. He states, "I like prison.… What my foster parents didn't provide, prison does—the prison clothes me, feeds me, I have friends." In a probation interview in 1989, Mr. X reported that he committed crimes, "to get attention and to get put in a facility where there was somebody to look over me." Also, the mentally impaired are more likely to give false confessions when compared with normal functioning people.

Q: Do you think that Mr. X falsely confessed to killing Jane Doe?

A: Yes. Mr. X's inability to distinguish reality and fantasy, as well as his low IQ (and the psychological traits that tend to be associated with a low IQ such as compliance and suggestibility) left Mr. X vulnerable to confabulating a false confession in response to the psychological pressures of the successive interrogations by his ex-wife and police investigators.

Q: Please explain how the evidence consistent with false confession ties into your opinion that Mr. X is not presently competent to stand trial.

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§3.72 d. Understand His Own Status and Condition

Here counsel would explore the answers given in prongs one and two above and how they are germane to the question posed by prong three. Counsel would want to go on to explore brain damage in this discussion.

Organic Brain Damage and Korsakoff's Syndrome

Q: What is organic brain damage?

Q: Does Mr. X have organic brain damage?

Q: Why?

Q: Is part of the reason for the organic brain damage his decades-long misuse of alcohol and drugs?

Q: Please explain how the misuse of alcohol and drugs can cause neurological impairment.

Q: What is Korsakoff's Syndrome? What are its symptoms?

A: The essential defect in Korsakoff's Syndrome is an inability to form new memories, resulting in significant impairment of short-term memory. Long-term memory is also frequently affected, although to a lesser extent. Other cognitive functions (particularly the capacity for concentration, spatial organization, and visual and verbal abstraction), which depend little or not at all on memory, are usually impaired as well, but to a much lesser degree than memory function. In the late phase of Korsakoff's, alertness, attentiveness, behavior, and working memory (retention less than 30 seconds) are relatively preserved, but there is a lasting and often severe amnesia, both anterograde, with inability to retain new information, and retrograde, with lost recall for events months or years old.

Q: What are the causes of Korsakoff's Syndrome?

Q: Does Mr. X have it?

Q: Please explain why you think so.

A: Mr. X's severe current problems with memory are predominantly the result of his chronic alcohol dependence and abuse. Though generally referred to as Korsakoff's syndrome in neurology, the DSM-IV-TR labels this memory disorder as Alcohol Induced Persisting Amnestic Disorder. Mr. X reported an extensive history of substance abuse including extensive use of alcohol, which he estimated consisted of drinking 12 beers per day, and use of cocaine and marijuana on a frequent basis. Mr. X reported that he used solvents as a teenager. He reported some use of heroin, including intravenously, PCP, LSD, amphetamines and barbiturates. Mr. X reported that he would use any drug he could, and characterized his life as "eat, sleep and get high."

Q: Please discuss Dr. Y's neuropsychological tests and findings.

Q: Does Mr. X's organic brain damage relate to your opinion that he is presently not competent to stand trial?

Q: Please explain why.

Q: Is organic brain damage curable?

A: No, it is not.

Q: Is Korsakoff's Syndrome curable?

A: No, it is not.

Hepatitis C

Q: Please define

Q: How do you get it?

Q: What are the symptoms?

Q: Describe the course of the disease if untreated.

A: Patient's liver will scar and he will die unless he gets a liver transplant.

Q: Does advanced Hepatitis C cause brain damage?

A: Yes, it does.

Q: Please explain.

A: The liver doesn't function properly owing to the scarring. It doesn't filter out the neurotoxic chemicals that end up killing the patient's brain cells, and this process results in memory impairment.

Q: Did you review records from the California Department of Corrections that were subpoenaed respecting Mr. X?

A: Yes, I did.

Q: Did you find anything of interest respecting a seropositive test for Hepatitis C for Mr. X?

A: Yes. Mr. X was reportedly diagnosed with this disorder while incarcerated in the early 1980's. He has not received any treatment or further medical monitoring, however.

Q: What can be the effects of no treatment on Mr. X's brain functioning and memory impairment?

A: Medical literature indicates this disorder can remain asymptomatic for 20 years. Without treatment, chronic Hepatitis C usually leads to hepatic encephalopathy. At that stage it reduces cognitive functioning. Research shows approximately one third of chronic hepatitis patients present with cognitive dysfunction. Attention, verbal memory, visuospatial construction, and processing speed become more impaired as encephalopathy approaches.

Q: From everything you know about Mr. X's case, do you have an opinion whether his untreated Hepatitis C from the 1980's is a contributing factor to his memory impairment and brain damage?

A: Yes, the neuropsychological findings, clinical interviews with Mr. X, the source memory errors and confabulation, the organic brain damage and Korsakoff's syndrome being present, all combine with the Hepatitis C diagnosis to explain why he is not presently competent to stand trial. In essence, the untreated Hepatitis C exacerbates the preexisting memory impairment and brain damage.

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§3.73 5. Expert Conclusion

Q: Based on the above, what is your prognosis in terms of Mr. X ever being restored to competency?

A: Very poor because his medical conditions are chronic, cannot be cured, and working together, they will accelerate the death of his brain cells. Thus, his level of mental functioning will only decrease with time, not increase.

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Source: Criminal Law/Scientific Evidence in California Criminal Cases/4 Challenging Expert Testimony on Scientific Evidence/Chapter Outline

4

Challenging Expert Testimony on Scientific Evidence

Elliot S. Beckelman
Judge Darrell S. Mavis, Los Angeles Superior Court

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I. CHALLENGING EXPERT TESTIMONY ON SCIENTIFIC EVIDENCE

§4.1 A. Proper Subjects of Testimony

Expert testimony on scientific evidence is generally presented through a properly qualified witness who has observed an aspect of the case and then, based on comparison or experience or both, testifies to findings or inferences about that aspect of the case. On qualifying expert witnesses, see chap 3. Expert opinion testimony is generally called for when the subject on which testimony is desired is beyond the experience of ordinary witnesses, and the testimony of the expert will help the trier of fact. Evid C §801(a). The expert witness must be qualified as an expert on that subject due to "special knowledge, skill, experience, training, or education" (Evid C §720(a)), and the subject matter and basis of the testimony must meet the test for reliability set forth in Evid C §801(b).

However, a witness who qualifies as an expert does not have carte blanche to express any opinion within the area of expertise. See, *e.g.*, *Summers v A.L. Gilbert Co.* (1999) 69 CA4th 1155, 1178, 82 CR2d 162 (expert may not testify about question of law). Further, even if the subject of the proffered testimony survives a *Kelly* challenge, or if *Kelly* is inapplicable to the proffered evidence, opponents of the evidence still have many other avenues of challenge. On *Kelly* challenges, see chap 2.

PRACTICE TIP: In criminal cases, a prosecutor or a defense attorney may be a proponent of expert testimony on scientific evidence, an opponent of the testimony, or both. For example, in a so-called "battle of the experts" featuring a prosecution expert and a defense expert called to testify on the same issue, each attorney will be required to present his or her own expert and also challenge the opposition's expert. Therefore, attorneys on both sides of the aisle should be well versed on proper techniques for presenting and challenging expert testimony on scientific evidence, and should also be prepared to defend the evidence after challenges.

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§4.2 B. Bases of Expert Testimony

Expert opinion testimony must conform to Evid C §801(b), which restricts the expert's testimony to matter "of a type that reasonably may be relied upon by an expert in forming an opinion." The expert does not need to have personal knowledge of the facts of the case; by the nature of the expert's work, the facts of which an expert bases his or her conclusions may have been "made known" to the expert before he or she forms an opinion. Evid C §801(b). See also Evid C §702(a); *U.S. v Cohen* (9th Cir 2007) 510 F3d 1114, 1123. For further discussion, see California Expert Witness Guide, chap 4 (2d ed Cal CEB 1991).

NOTE: Even though Evid C §801 is similar to former Fed R Evid 702 (on which the U.S. Supreme Court based its decision in *Daubert v Merrell Dow Pharms., Inc*. (1993) 509 US 579, 125 L Ed 2d 469, 113 S Ct 2786), California courts tend to defer more to the expert witness's decisions about what matter can appropriately be relied on in forming an opinion (see, *e.g., People v Stoll* (1989) 49 C3d 1136, 1154, 265 CR 111) than federal courts do under *Daubert*.

The *Kelly* rule does not apply to expert testimony in general. *People v McDonald* (1984) 37 C3d 351, 372, 208 CR 236, overruled on other grounds in *People v Mendoza* (2000) 23 C4th 896, 914, 98 CR2d 431. Therefore, general acceptance in the relevant scientific community need not be proven as a threshold matter for expert testimony in general. However, evidence relating to new scientific tests or techniques may be subject to the *Kelly* rule. For more information on the elements of the *Kelly* test and its applicability, see chap 2.

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II. USE OF IN LIMINE MOTION TO CHALLENGE EXPERT TESTIMONY

§4.3 A. When Appropriate

An in limine motion is used to exclude or restrict all or some aspect of the evidence. The party opposing the evidence may make the motion any time after the case is assigned to a trial judge. Although usually filed and heard before trial, it is also available during the trial. *People v Morris* (1991) 53 C3d 152, 188, 279 CR 720, disapproved on other grounds in *People v Stansbury* (1995) 9 C4th 824, 830 n1, 38 CR2d 394; *People v Vanbuskirk* (1976) 61 CA3d 395, 401, 132 CR 30. A trial court is not bound by its initial ruling on the in limine motion and may reconsider its ruling and change its position at the time the evidence is offered. See *People v Kaiser* (1988) 46 C3d 612, 634 n16, 250 CR 659.

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§4.4 B. Challenging Expert's Qualifications

When an expert's qualifications are challenged, the burden of proof is on the proponent of the evidence to establish the witness's qualifications by a preponderance of the evidence; the judge, not the jury, ultimately determines whether a witness is qualified to testify as an expert. See Comment to Evid C §405. See also *Fairbank v Hughson* (1881) 58 C 314 (error for judge to submit the qualifications of the expert to the jury). The witness's qualifications may be demonstrated by any otherwise admissible evidence, including the witness's own testimony. Evid C §720(b).

Even if the court decides that the witness is qualified to testify as an expert, the trier of fact is permitted to consider the witness's qualifications in determining the weight to give his or her expert testimony. *Pfingsten v Westenhaver* (1952) 39 C2d 12, 20, 244 P2d 395. See also Evid C §406. Therefore, the adverse attorney may cross-examine the expert about his or her qualifications before the jury, and argue that the lack of qualifications makes the expert a less credible witness. See CALCRIM 332 (jurors not bound by opinion testimony but may give it weight they find it deserves).

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C. Challenging Existence of Preliminary Fact

§4.5 1. Authority to Challenge Preliminary Fact

The attorney opposing the expert testimony can seek exclusion of the evidence by challenging the existence of a preliminary fact on which the proffered evidence is based. The proponent of the evidence has the burden of establishing all preliminary facts pertinent to determining the relevancy of the evidence. Evid C §403(a)(1). See also *People v Kaurish* (1990) 52 C3d 648, 693, 276 CR 788. When the existence of a preliminary fact is disputed, Evid C §§400-405 generally govern.

Because Evid C §402 sets forth the procedures for determining whether a preliminary fact necessary to the admission of the evidence exists, these preliminary fact motions are colloquially known as Evid C §402 motions, or more simply as "402 motions." Unless the motion involves the admissibility of an admission or confession, whether to hold a preliminary fact hearing outside the presence of the jury is a matter within the trial court's discretion. Evid C §402(b). As a practical matter, however, in most criminal cases, Evid C §402 hearings are held outside the presence of the jury.

PRACTICE TIP: The existence or nonexistence of a preliminary fact is often an appropriate subject for an in limine motion. Though an in limine motion on this topic can be made during the trial, it may be advantageous for the opponent to make the motion before the trial begins. When the opponent makes the motion in the midst of trial, the trial judge may feel more pressure to permit the expert's testimony, especially if the party presenting the expert argues that the court's decision to exclude the expert would act as a directed verdict because the proponent's case depends on the expert's testimony.

Evidence Code §404 applies only when the preliminary fact is whether the proffered evidence violates the privilege against self-incrimination. Most preliminary fact motions are decided under Evid C §403 or §405.

Under Evid C §403, the trial court determines only whether there is substantial evidence for the existence of the preliminary fact. If the court finds sufficient evidence that the trier of fact could reasonably conclude, by a preponderance of the evidence, that the disputed preliminary fact exists, then the judge must permit the jury to consider the evidence. See, *e.g.*, *People v Marshall* (1996) 13 C4th 799, 832, 55 CR2d 347. Evidence Code §403 applies only to the situations enumerated in the statute:

- When the relevancy of the proffered evidence depends on the existence of the preliminary fact;
- When the preliminary fact concerns the personal knowledge of a witness concerning the subject matter of his or her testimony;
- When the preliminary fact concerns the authenticity of a writing; or
- When the proffered evidence is that an individual made a statement or engaged in particular conduct, and the preliminary fact is whether a person made the statement or engaged in the conduct.

Evidence Code §405 covers all preliminary fact situations not specifically listed in Evid C §§403-404. In these situations, the court itself makes the determination of whether the preliminary fact exists and admits or excludes the evidence accordingly. See also Comment to Evid C §405. For discussion, see Jefferson's California Evidence Benchbook, chap 25 (4th ed CJA-CEB 2009).

Whether a witness is qualified to testify as an expert witness is considered under Evid C §405. The burden of proof is on the proponent to establish the witness's qualifications by a preponderance of the evidence, and the judge, not the jury, determines whether a witness is qualified to testify as an expert. See Comment to Evid C §405. See also *Fairbank v Hughson* (1881) 58 C 314 (error for judge to submit qualifications of expert to jury). For further discussion of Evid C §405, see Jefferson's Evidence Benchbook, chap 26.

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§4.6 2. Procedure for Motion to Challenge Preliminary Fact

An Evid C §402 motion is made by the opponent of the proffered evidence. Such a motion is well suited for scientific expert opinion evidence because the trial court must make three separate findings before allowing a witness to testify as an expert. The court must find that:

- The expert is properly qualified by "special knowledge, skill, experience, training or education" in the subject matter about which the expert will testify (Evid C §§720(a), 801(a));
- The subject matter of the expert's testimony is "sufficiently beyond common experience" that the testimony "would assist the trier of fact" (Evid C §801(a)); and
- If the opinion is based on hearsay, it is the type of hearsay that other experts in field could reasonably rely on (Evid C §801(b)).

Tactically, the opponent of the expert testimony must decide whether to challenge the expert's qualifications before or during the trial. Although many attorneys elect to voir dire the expert in the presence of the jury, there are substantial advantages to challenging the qualifications of an expert in limine. If the expert's qualifications are challenged before the jury unsuccessfully, it may bolster the expert's credibility, because the jury may view the court's ruling that the expert is qualified as a significant defeat to the opponent's case.

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§4.7 3. Motion Also May Challenge Subject Matter of Expert's Opinion

A motion to exclude evidence based on the lack of a preliminary fact may also challenge the subject matter of the expert's opinion. Although experts are permitted to testify about a wide variety of subjects, Evid C §801(a) places some limits on the scope of the testimony. For example, it has been held that "the veracity of those who report crimes to the police" is not "a matter sufficiently beyond common experience to require the testimony of an expert." *People v Sergill* (1982) 138 CA3d 34, 39, 187 CR 497. See *People v Johnson* (1993) 19 CA4th 778, 786, 23 CR2d 703 (possibility that prison inmate would lie not sufficiently beyond common experience to require expert testimony).

A witness who qualifies as an expert does not have carte blanche to express any opinion within the area of expertise. See, *e.g., Summers v A.L. Gilbert Co.* (1999) 69 CA4th 1155, 1178, 82 CR2d 162 (expert may not testify about question of law). Expert opinions are not necessarily excludable simply because they embrace an ultimate issue in the case. However, in some situations, such opinions may be subject to exclusion "because they are not helpful (or are perhaps too helpful)." 69 CA4th at 1183. In a criminal case, an expert may be precluded from expressing an opinion on the defendant's guilt if the expert's opinion would not assist the jury. *People v Brown* (1981) 116 CA3d 820, 827, 172 CR 221. See also *People v Killebrew* (2002) 103 CA4th 644, 658, 126 CR2d 876 (opinion does nothing more than tell jury how expert believed case should be decided).

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D. Challenging Basis of Expert's Opinion and Limiting Hearsay on Direct Examination

§4.8 1. Challenging Basis of Opinion

An expert may base an opinion on "matter (including … special knowledge, skill, experience, training, and education) … whether or not admissible, that is of a type that reasonably may be relied upon by an expert in forming an opinion upon the subject to which his testimony relates." Evid C §801(b). This provision is the basis of many challenges to expert opinion.

Much of the "matter" on which an expert typically relies is hearsay and experts are given "considerable leeway as to the material on which they may rely." *Korsak v Atlas Hotels, Inc.* (1992) 2 CA4th 1516, 1524, 3 CR2d 833. Test results, experimental data, treatises, and the opinions of other experts are just a few examples of the kind of information experts typically rely on. See, *e.g., People v Wilson* (1944) 25 C2d 341, 348, 153 P2d 720 (physician may rely on history provided by patient in making diagnosis). The expert's reliance must, however, be reasonable. Although Evid C §801(b) is not always easy to apply, "[t]he factors of *necessity, reliability,* and *speculation* or *conjecture* at least provide some guideposts for the judge in determining whether a proffered expert opinion satisfies the requirements of Evid C §801." Jefferson's California Evidence Benchbook §30.49 (4th ed CJA-CEB 2009), quoted at *Korsak,* 2 CA4th at 1524. See *People v McWhorter* (2009) 47 C4th 318, 361, 97 CR3d 412 (proper to exclude expert testimony that was unduly speculative, based on unreliable hearsay and without adequate foundation); *People v Richardson* (2008) 43 C4th 959, 1008, 77 CR3d 163 (expert may not base opinion on assumptions of fact lacking evidentiary support or on speculative or conjectural factors); *Lockheed Martin Corp. v Superior Court* (2003) 29 C4th 1096, 1110, 131 CR2d 1 (expert cannot give opinion based on guess, surmise, or conjecture); *Dee v PCS Property Mgmt., Inc.* (2009) 174 CA4th 390, 404, 94 CR3d 456 (expert opinion based on speculative or conjectural factors may be excluded).

NOTE: For discussion of the scope of the trial court's role in examining the matter on which an expert has relied to determine whether that reliance is reasonable, see chap 3.

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§4.9 2. Limiting Hearsay

Even if a challenge to the basis of the expert's testimony fails, the opponent of the evidence may move to limit the use of hearsay on direct examination. The expert should not become a substitute for the nontestifying witnesses. *People v Killebrew* (2002) 103 CA4th 644, 659, 126 CR2d 876. The expert may be allowed to identify the hearsay basis for an opinion; however, on direct examination the expert is not permitted to testify to its details. *People v Price* (1991) 1 C4th 324, 416, 3 CR2d 106, disapproved on other grounds in *People v Hinks* (1997) 58 CA4th 1157, 1161, 68 CR2d 440 (witness cannot state incompetent hearsay under guise of stating opinion). An expert may not rely on the out-of-court statements of another as "independent proof" of the facts stated. *Korsak v Atlas Hotels, Inc.* (1992) 2 CA4th 1516, 1524, 3 CR2d 833.

PRACTICE TIP: If an expert witness testifies that his or her opinion is based wholly or partially on hearsay, opposing counsel is entitled to call the hearsay declarant and question him or her as if he or she is under cross-examination. Evid C §804(a). However, nothing in Evid C §804 makes an otherwise admissible expert opinion inadmissible simply because the hearsay declarant is unavailable to testify. Evid C §804(c).

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III. PREPARATION FOR CROSS-EXAMINATION

§4.10 A. Importance of Preparation

Preparation is vital to any effective cross-examination. Only by being fully prepared will the attorney be able to execute the "ABCs" of cross-examination:

- *Corroborate* the cross-examiner's case;
- *Attack* the expert's opinion; and
- Interweave *bias*.

Preparation for cross-examination should include researching the expert's background, licensing (if applicable), field work, case reports, and testimony in other cases and thoroughly examining the expert's work in the case at hand. Because expert testimony, by definition, involves information that is not common knowledge, preparing to cross-examine an expert witness will likely be more extensive than preparing to cross-examine a lay witness. The following sections discuss some useful techniques for preparing to cross-examine an expert witness. See §§4.11-4.16.

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§4.11 B. Talk to Other Attorneys

Any expert testifying for the opposition has likely testified in prior cases. Other attorneys may have already cross-examined the expert in question and may have materials and strategies to share. Additionally, other attorneys may have successfully used their own expert to counter or debunk the conclusions drawn by the opposition's expert. If possible, speaking to other attorneys about their experience with an expert should always be an attorney's first step in preparing to cross-examine an expert. It will be more efficient to build on work already done than to redo that same work.

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§4.12 C. Learn About Subject Matter of Testimony

Reading books, journal articles, studies, and other publications related to the expert's field of expertise is an invaluable step toward an effective cross-examination of the expert. To effectively counter an expert's opinion, the attorney cross-examining the expert should be as well versed as possible in the subject matter of the expert's testimony.

Reading articles *about the expert's field* will give the opposing attorney the background necessary for an effective cross-examination and will reveal whether the field itself is novel or controversial. Reading pieces *written by the expert* will reveal whether an expert is biased toward the prosecution or defense and whether the expert has been published in questionable publications. Reading articles *written about the expert* will reveal whether the expert is respected in the field and whether the expert's work and conclusions are controversial. Articles of this type may also provide a list of potential experts for your side.

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§4.13 D. File Discovery Motions

If the attorney preparing to cross-examine the expert has not received the expert's report and any discoverable notes, he or she should be sure to file a discovery motion early in the process. If the materials received seem incomplete (if, for example, it is unclear what underlying information and sources the expert relied on in coming to any conclusions drawn in the report), then the opposing attorney should file additional discovery motions. Effective cross-examination of an expert is virtually impossible without understanding what conclusions the expert came to and what information was considered (and not considered) prior to forming the conclusion. As such, the attorney must make sure he or she receives all discoverable information and *reads* the expert's report and all the underlying materials. These materials include police reports, probation reports, training manuals, ballistic reports, and other documentation relied on by the expert in preparing his or her opinion.

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§4.14 E. Obtain Transcripts From Prior Trials

Learning what the expert testified about in prior cases and how the expert responded during cross-examination and redirect can help the opposing attorney prepare to cross-examine the witness. The attorney should analyze previous direct examinations of the expert to determine what objections were successful and whether opportunities to object were not taken. The attorney should also analyze the cross-examination to determine whether other opposing attorneys were effective in introducing doubts about the reliability or trustworthiness of the expert's testimony and conclusions. It is important to assess whether the expert remained cool under pressure, became argumentative, or seemed condescending or pompous. After determining which areas and questions were particularly damaging to the expert, the opposing attorney should then analyze the redirect to determine whether and how the expert was able to neutralize any damage done during the cross-examination.

If the expert testified at the preliminary hearing, the opposing attorney should carefully review the transcript of that testimony, because any statements made during the hearing may be used for impeachment if the expert's testimony at trial deviates from his or her testimony at the preliminary hearing.

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§4.15 F. Obtain Background Information on Expert

The attorney preparing to cross-examine an expert should get the expert's résumé and check the expert's credentials and degrees for accuracy. Occasionally, preparation may reveal that the expert exaggerated or even misrepresented his or her qualifications. Such a discovery can prove to be a powerful tool in cross-examination. However, the attorney should proceed with care before cross-examining an expert in this area. The attorney should check and double-check any inconsistencies in the expert's background as well as cross-examine and impeach the witness only if an exaggeration or falsehood is significant enough to make an impact on the jury. Questioning an otherwise qualified expert on a minor point of puffery may backfire on the cross-examining attorney and his or her case.

The cross-examining attorney should also make an effort to obtain any relevant information pertaining to the licensing and daily practice of the expert in his or her profession, especially if the expert is still practicing as well as testifying. License suspensions, complaints to the state board, pending lawsuits including medical malpractice complaints, and other matters of record are all relevant and should be researched prior to cross-examination. Depending on the expert, various Internet search engines can be valuable tools in obtaining this information. At the very least, the cross-examining attorney should Google the expert's name. This area of inquiry should also be raised carefully before a jury. While a certain number of complaints and even lawsuits may be expected of certain types of experts (including medical doctors and psychiatrists), an unusual number of complaints or a particularly relevant complaint may be useful and relevant in cross-examination to impeach the witness.

Many expert witnesses advertise in trade journals, bar publications, and mailings. Many experts also have their own web pages. The web pages and advertisements published and distributed by the expert may provide useful information for cross-examination. The expert's advertisements will likely indicate in which fields he or she purports to have expertise. They may also contain information about the expert's background, education, and prior experience as a witness, and may indicate whether the expert tends to work only with the prosecution or defense. The attorney should use this information to determine whether the expert's advertisements demonstrate a bias toward prosecution or defense (*e.g.,* past testimony listed only for one side or group associations suggests bias). Showing the ads or web pages to the jury can demonstrate visually the witness's bias.

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§4.16 G. Talk to Both Side's Experts

Counsel should talk to the opposition's expert if possible. The attorney should ask the expert about the data gathered, provided, and considered as well as how and why the expert came to the conclusions written in his or her report. The attorney should also discuss hypotheticals introducing slightly different facts to explore the contours of the expert's opinion. This discussion may reveal that the expert did not gather all the relevant data or was not provided all the relevant data; did not consider some of the relevant data; used questionable methods in gathering, evaluating, testing, or quantifying the data; is operating under a misunderstanding; or is heavily biased toward the opposition. Additionally, the attorney may get a sense of what the expert will be like on the witness stand and what hypothetical facts would have to exist (if any) before the opposing expert would have an opinion more favorable to the attorney's case.

Attorneys should also talk to their own experts about the opposing expert's opinion. Before trial, attorneys and their own experts should discuss the data being used by the opposition's expert and whether any additional data is needed in order to provide an accurate opinion. Attorneys should learn from their own experts what methods may be used to gather, evaluate, test, and quantify relevant data as well as discuss which methods are most reliable. The attorney's own expert should help the attorney determine whether the opposing expert's field or area of expertise is controversial, novel, or not widely accepted by the scientific community.

PRACTICE TIP: If the opposing party's expert is hesitant or unwilling to meet with the adverse attorney, the attorney can send a certified letter requesting a meeting. This letter can later be used in trial to show reluctance to discuss the case or potential bias.

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IV. COURTROOM STRATEGIES FOR CROSS-EXAMINATION

§4.17 A. The ABCs of Cross-Examination: Corroborate Case, Attack Opinion, Interweave Bias

The attorney's goals in cross-examining an expert are to *corroborate* his or her case, *attack* the expert's opinion, and interweave *bias* ("ABCs"). The key to achieving these goals is to control the cross-examination. Generally, it is best to begin by asking questions with answers that will corroborate the attorney's case. This brings the jury back to the proponent's view of the evidence. After corroborating his or her own case, the cross-examining attorney should attack the expert's opinion. Finally, the attorney should ask questions that will show any bias on the part of the expert.

Though these principles are important, and often useful when performed in this order, the attorney should never rigidly rely on a predetermined order of questions chosen while preparing for cross-examination. As with the cross-examination of any other witness, an attorney questioning an expert must always be ready to think on his or her feet and adjust as necessary. Opportunities to attack may arise as the attorney is corroborating the case, and opportunities to show bias may arise while attacking the expert's opinion. See, *e.g.*, *People v Wallace* (2008) 44 C4th 1032, 1063, 81 CR3d 651. Controlling the cross-examination does not mean asking questions in the order in which the cross-examination was prepared. Controlling the cross-examination means that, no matter what question is asked, the attorney knows why he or she is asking it, what the answer will be, and how that answer factors into his or her overall goal. The attorney should always know where he or she wants the expert to go before asking a question and ensure that the question is phrased in such a way that the expert can only go there.

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§4.18 B. Corroborate the Case

One of the main purposes of cross-examining an expert witness is to corroborate some point or issue in one's own case. Using the opposition's expert to corroborate one's own case not only powerfully and persuasively reinforces one's position to the jury, it also limits the points that are in dispute and allows the attorney to focus his or her efforts on those limited points. The following is a sample line of questioning:

Q: If the defendant had bloodshot and watery eyes, those symptoms are consistent with being under the influence of alcohol, correct?

Q: If the defendant slurred his speech, that symptom is consistent with being under the influence of alcohol, correct?

Q: If the defendant had an odor of alcohol on his breath, that symptom is consistent with being under the influence of alcohol, correct?

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§4.19 1. Restate Favorable Evidence

Repetition is a powerful method of persuasion. When evidence is presented more than once, it may seem more credible to the jury and will more likely remain at the forefront of the jury's thoughts than evidence presented only once. Restating favorable evidence from the direct examination is a powerful approach.

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§4.20 2. Reinforce Lay Witness's Testimony

Another way for an attorney to corroborate his or her own case is to elicit testimony from the opposition's expert witness that is in agreement with or is not contrary to the testimony of the attorney's own lay witness or witnesses. For example, if the proponent's lay witness testified the defendant appeared to be drunk when police officers arrested her in a first-degree murder case, the attorney should attempt to reinforce the lay witness's testimony during cross-examination of the opposition's toxicology expert witness. If the blood alcohol concentration (BAC) the expert testified about is barely on the legal side of the limit, a carefully constructed cross-examination may lead to the expert admitting that some people with a BAC under the legal limit may be severely impaired.

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§4.21 3. Reinforce Own Expert's Opinions or Isolate Differences

During cross-examination, the attorney should emphasize any similarities between his or her own expert's opinions and those of the opposition's expert. These similarities are best reinforced during cross-examination through closed, controlled questions that demonstrate for the jury that both opinions are in agreement:

Q: A driver is considered to be under the influence of alcohol for the purposes of the statute if he or she has a blood alcohol concentration of.08 percent or greater, correct?

Q: When a person drinks alcohol, mental impairment occurs before physical impairment, right?

Additionally, the cross-examiner should chip away at the differences between the opinions by asking broad questions that reveal no difference and then carefully ask increasingly narrower questions until the specific and limited differences between the opinions are revealed.

For example, the proponent's psychological expert may have testified that the defendant's childhood did not cause his later psychotic episode. The opposition's expert may testify that the defendant's childhood did cause the psychosis and, therefore, the crime. A carefully constructed cross-examination utilizing increasingly narrower questions may reveal that the opposition's expert did not mean the defendant's entire childhood was at the root of his future psychotic episode but that his early teenage years were the relevant childhood years. Limiting the difference narrows the dispute between the opinions and narrows the portion of the opinion counsel seeks to attack.

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§4.22 C. Attack Opposing Opinion

Attacking the opposing expert's opinion during cross-examination is as important as corroborating the proponent's case through the cross-examination. If an attorney is able to convince the jury that the expert or the expert's opinion is untrustworthy or questionable, the jury will be more likely to trust that attorney's own expert's opinion or position.

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§4.23 1. Move to Prevent Testimony

The first preemptive strike an attorney can make in attacking the opinion of the opposing party's expert is to prevent the expert from testifying at all or to limit his or her testimony. This decision should be made after reviewing and analyzing the discovery materials relating to the expert's opinion.

If the attorney is moving to exclude the testimony as a whole, it may be advisable to argue in the alternative that if the court permits the expert to testify, certain portions of the testimony should be excluded. However, if the judge seems more likely to grant the motion only in part if given that express option, then the attorney should consider filing only a motion to exclude the testimony as a whole. In addition to the grounds for exclusion of expert testimony discussed in §§4.3-4.9, potential grounds for exclusion include the following:

- Relevance (Evid C §350); and
- Undue consumption of time, prejudice, confusion of issues, or misleading the jury (Evid C §352; see *People v Daniels* (2009) 176 CA4th 304, 320, 97 CR3d 659). Usually, this motion is brought at the time of trial, ideally in writing, and it may be raised again repeatedly if necessary.

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§4.24 2. Attack Expert's Qualifications on Voir Dire

When the proponent of expert opinion testimony first puts an expert witness on the stand, that attorney must establish that the witness qualifies as an expert in the area on which he or she will be called to give an opinion. This is generally done through a series of foundational questions. For sample foundational questions to establish a witness's qualifications, see chap 3.

The attorney opposing the expert should pay close attention to the answers to the foundational questions and consider whether they are sufficient to qualify the witness as an expert. If an argument can be made that the witness's qualifications are not sufficient, the attorney should object that the witness does not qualify as an expert in the fields or areas about which he or she will be testifying and request the opportunity to question the expert witness on voir dire. The goal of questioning a witness proffered as an expert on voir dire is to establish deficiencies in the witness's qualifications or prevent them from testifying.

The attorney should anticipate the possibility of challenging the expert's qualifications before trial and consider an Evid C §402 motion to exclude the witness's testimony when this argument is tenable. On Evid C §402 motions, see §4.5. Generally, an opposing attorney should probably not voir dire the expert in front of the jury unless the attorney is confident that he or she can preclude the witness from testifying or issuing certain opinions. If the attorney is unsuccessful in precluding the opinion or testimony after voir dire, the attorney has only served to reinforce the expert's qualifications in front of the jury. If the judge rules, in front of the jury, that the witness is qualified, then the expert's qualifications are bolstered.

It is important to keep in mind that having education, training, or experience in a particular subject matter does not necessarily qualify an individual as an expert in every aspect of that field. Thus, for example, a psychologist may need specific experience in working with or treating battered women to be qualified to testify as an expert on battered women's syndrome. Similarly, it can be argued that not every physician is qualified to testify about a very narrow medical subject, such as fetal genetic engineering. In such a situation, the opposing attorney may want to take the expert on voir dire, explore these deficiencies in training, and object to the expert's testimony on the ground that he or she isn't qualified to give an opinion. Even if the trial court overrules the objection and permits the expert to testify, the facts established on voir dire may permit counsel to argue that the jury should not give the expert's opinion much weight.

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§4.25 3. Expose Limits in Expert's Knowledge of Facts

The attorney opposing the expert should constrain the expert by forcing the expert to affirm his or her opinion in regard to all the specific facts of the case rather than a broad summary of the case or only some of the facts. Using the specific facts of the case in the form of hypotheticals can illustrate the unreasonableness of the expert's opinion. What may seem like a reasonable opinion during the opponent's direct examination may seem entirely unreasonable when the expert is forced to consider all the specific facts in combination rather than considering only certain facts. Additionally, because an adverse expert will likely not know the facts of the case as well as counsel does, the attorney may be able to establish that the expert was unaware of certain facts or failed to consider certain facts when formulating his or her opinion. When cross-examining the expert, the attorney should assess whether the expert is ill-prepared and, if so, should exploit his or her lack of preparation.

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§4.26 4. Show Opinion Based on Invalid Factual Assumptions

Before an expert formulates his or her opinion, he or she will consider some or all of the information provided. A particularly useful means of attacking the expert's opinion is to demonstrate to the jury some insufficiency or unreliability in the information or sources provided to the expert or taken into consideration by the expert.

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§4.27 a. Opinion Based on Insufficient Information

When reviewing discovery and considering the direct examination of the expert, the attorney should ascertain what information the expert considered in formulating his or her opinion and whether that information provided a sufficient basis for the opinion. Additionally, counsel should determine whether other information was available or in existence that was not considered. Specifically, the attorney should assess what information a reasonable and competent expert would have considered before coming to a conclusion.

PRACTICE TIP: Counsel's own expert can provide valuable assistance in making this assessment.

Q: What information did you review to conclude that the defendant has an IQ below 70?

Q: You did not review his IQ tests from elementary school, correct?

Q. You did not consult with any of his teachers from elementary school, correct?

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§4.28 b. Opinion Based on Unreliable Information

When reviewing discovery and considering the direct examination of the expert, the attorney should determine what information the expert considered when formulating his or her opinion and whether that information was reliable. If there are reliability issues, counsel should bring that out on cross-examination by first asking about the sources of the information that the expert relied on. Once the attorney has isolated all sources of information, the attorney should attempt to get the expert to agree that each source is not reliable or to appear unreasonable to the jury.

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§4.29 (1) Opinion Based on Sources From Only One Side

An expert's opinion may be based only on information provided by the party that retained the expert. Cross-examination should demonstrate for the jury the one-sided information underlying the expert's opinion and the existence of information from the other side that was not considered by the "neutral" expert:

Q: Your opinion is only based on talking with the defendant, right?

Q: You did not talk with other doctors who have also treated the defendant, right?

Q: You did not review medical reports by other doctors who have treated the defendant, correct?

Q: You would agree that discussing your opinion regarding the defendant's mental condition with other experts who have treated the defendant would assist you in forming an accurate diagnosis of the mental condition, right?

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§4.30 (2) Preformed Opinion

Communication by the opposition's attorney providing information to the expert and seeking an opinion may state what conclusion or opinion the attorney drew from the information being provided to the expert. Asking the opposing expert ahead of time for all information he or she relied on can be helpful. Obtaining the opposing expert's reports can show what information was provided to the expert prior to forming opinions. Establishing during cross-examination that this occurred makes it possible to argue that the expert was primed to come to that conclusion before he or she even considered the information provided.

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§4.31 (3) Opinion Ratifies Opponent's Version of Facts

Some experts merely provide the opposition's version of the facts with "expert credentials." Such experts perform no independent testing and analysis but simply ratify the opposition's account of what happened. On cross-examination, an attorney needs to show the jury that the expert has not performed any independent testing. A series of questions illustrating what the expert did *not* do will make the point.

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§4.32 (4) Opinion Based on Disputed Facts

An expert's opinion may be based on one interpretation of facts that are in dispute. If this is the case, the attorney should be sure to elicit from the expert how his or her opinion would change if the disputed facts were interpreted differently. That way, it can be argued that if the jury resolves the dispute in your favor, it should disregard the expert's opinion.

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§4.33 5. Change Hypothetical Circumstances

Testing the expert's opinion by presenting hypothetical circumstances or actual information the expert did not consider provides the cross-examining attorney with an opportunity to persuade the jury that the expert is unreasonably attached to his or her opinion, *i.e.,* that an unbiased expert would have come to a different and more favorable conclusion.

Expert rigidly attached to original opinion. Ordinarily, an opponent's expert will have stated an opinion on direct examination that is not favorable to the cross-examiner's position. An effective cross-examination technique in some situations is to ask the opposing expert what hypothetical circumstances would have to exist to persuade the expert to change his or her opinion to one that is favorable to the cross-examiner. Some experts may refuse to change their opinions regardless of any change in the circumstances. During cross-examination, the questioning attorney should slowly change the hypothetical circumstances until the expert's rigid attachment to his or her original opinion appears ridiculous and unreasonable to the jury. This technique is very effective to show an expert's bias. On the other hand, if the expert has reasonable answers, the questions could reinforce the expert's opinion.

Expert's opinion is not based on all existing circumstances. This technique is particularly effective when the cross-examiner is aware that the expert was not provided with certain information or chose not to consider certain information when formulating his or her opinion. If there are several pieces of information the expert did not consider, the cross-examining attorney should be sure to ask separate questions about each piece of information. This method of questioning will reinforce to the jury that the expert did not consider multiple pieces of information. It also gives the expert a number of opportunities to change his or her opinion. This technique may cause the jury to question both the opinion itself and the expert, if the expert's opinion would in no way change despite consideration of this information.

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§4.34 6. Show Minimal Basis for Opinion

One means of attacking the expert's opinion is to demonstrate for the jury that the underlying basis for the expert's opinion is inadequate and, therefore, the expert's opinion is untrustworthy. For example:

Q: You did not go to the scene of the accident, right?

Q: You did not interview the eyewitness to the accident, right?

Q: You did not review any other expert's report on the cause of the accident, right?

Q. You are only basing your opinion on what the plaintiff told you, correct?

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§4.35 a. Expert Spent Little Time in Arriving at Opinion

The cross-examining attorney should ask the adverse expert how much time he or she spent reviewing the information provided, gathering data, performing tests, analyzing the data, and formulating his or her opinion. It is important to ask how much time was spent on *each* discrete task because, while the total time spent may seem adequate, the expert may have not spent much time performing one or more of the separate and relevant tasks.

PRACTICE TIP: The attorney should only ask these questions if there is an obvious gap. Otherwise, the attorney risks reinforcing the reliability of the opposing expert's opinion.

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§4.36 b. Opinion Based on Speculation

An expert's opinion may be based on speculation rather than on scientific conclusions or principles. Counsel should be sure to highlight these speculative answers on cross-examination so that the jury understands the expert's opinion is not entirely based on a scientific community's school of thought but is merely one individual's speculation.

EXAMPLE: The defendant is arrested for murder and a metal pipe is confiscated from her at the scene of the crime. Several other people are arrested but no one else is charged. Other objects recovered at the scene include loose bricks and a baseball bat. Upon examining an X-ray, a medical expert testifies the victim's jaw was shattered by blunt force trauma applied with a hard, smooth object. The expert then speculates the victim's jaw was shattered by a pipe. In this factual situation, the cross-examining attorney should highlight the speculation by asking how the X-ray reveals the type of object used, and what other hard, smooth objects could cause such an injury.

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§4.37 c. Insufficient Testing

Before cross-examining an expert on an opinion that is based on testing or analysis of any type, the attorney should be sure he or she understands:

- The method of testing used by the expert;
- Any alternate reliable tests used by other experts;
- The conditions that must be present in the testing process to yield accurate and reliable results; and
- The shortcomings and reliability of each type of test.

Specifically, the attorney should look for opportunities to call into question the type of test used and the means by which the expert executed the test.

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§4.38 d. Opinion Is Completely Subjective and Lacks Scientific Precision

In reviewing discovery and considering what was elicited on the opposing expert's direct testimony, the opposing attorney should determine whether the expert's opinion, in part or in whole, is subjective rather than objective. The expert may be a scientific expert, yet his or her opinion in the case at hand may not be based on precise measurements or principles. The cross-examining attorney should identify areas of the opinion or parts of the underlying foundation that are subjective and highlight them for the jury so that, as with speculation, the jury understands that the expert's opinion is not entirely based on a scientific community's school of thought but is merely one individual's thoughts.

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§4.39 e. Expert Lacks Firsthand Knowledge

The cross-examining attorney should find out whether the expert personally performed the tests about which he or she is testifying, or if the expert is basing the opinion on an examination of the data, tests, conclusions, or opinions of others. It can be argued that an expert who lacks firsthand knowledge cannot verify the accuracy of the underlying data, tests, conclusions, or opinions because he or she did not perform those tasks. Simple analogies can reinforce this point. For example, most physicians will agree that a medical doctor who examined a patient would be in a better position to diagnose an illness than a medical doctor who learned about the symptoms over the telephone.

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§4.40 f. Aberrations Only Occur in Laboratories

Whenever possible, the cross-examining attorney should highlight scenarios in which an expert's conflicting opinion occurred in controlled environments like laboratories, not real-world scenarios.

EXAMPLE: The prosecution's expert testifies that the white substance confiscated from the defendant and tested by a professional testing company was cocaine. The defense expert testifies other substances tested may be identified as cocaine. On cross-examination, the prosecutor should ask the defense expert for examples of *actual cases* the expert knows about in which a substance other than cocaine was identified as cocaine by a professional testing company. The prosecutor should elicit from the expert that he or she is not referring to actual cases of substance testing but theoretical testing done by a professor at a local university.

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§4.41 7. Conflict Among Experts

Establishing the existence of conflict among experts within a field through cross-examination of the opposition's expert requires thorough preparation. For example, an expert may, in certain limited circumstances, be cross-examined with scientific or technical texts or treatises. See Evid C §721(b); see also §4.66. The attorney preparing to cross-examine the adverse expert must become familiar with the area of expertise and the different schools of thought within that area.

A qualified expert in a field is most likely aware of conflicting opinions. With careful guidance on cross-examination, the adverse expert can often be brought to admit that conflicts exist and that important and highly respected members of that field do not agree with the expert's opinion, methods, or conclusions. If the expert is unaware of conflicts that the attorney is aware of, all the better. On cross, the attorney can exploit the expert's ignorance and make him or her aware of the conflicting ideas. In some circumstances, the attorney can even read the conflicting ideas into evidence if an admissible, reliable publication exists. See Evid C §721(b); §4.70.

Additionally, as part of the preparation process, the attorney should determine whether certain experts within the relevant field do not believe the opinion expressed by the opposition's expert is a proper opinion to express in court.

EXAMPLE: Some experts within the eyewitness identification field do not believe an expert should be able to testify regarding the reliability of an eyewitness identification. If the opposition's expert testified that, in his or her opinion, an eyewitness's identification is not reliable, then the attorney should question him or her regarding the controversy of his or her testimony among experts in his or her field.

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§4.42 D. Interweave Bias

Executing the cross-examination to interweave bias is perhaps the most subtle of the cross-examination "ABCs" (attack, interweave bias, corroborate). See §4.17. Subtly interweaving bias throughout a cross-examination can be more effective and persuasive than directly asking a series of questions obviously attempting to establish bias. A direct approach may seem like an attack on the person, whereas peppering the cross-examination with small jabs may persuade the jury that the expert is biased toward a certain opinion or toward a certain side, is not neutral, and should not be trusted.

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§4.43 1. Expert Is Advocate for Opposing Side and Not Neutral

Some experts are "true believers" in that they consistently and exclusively support one side (either the prosecution or defense) despite the circumstances of the case. While cross-examining the witness regarding the specifics of the case and hypothetical circumstances and conditions, the attorney should look for opportunities to show the expert is a one-sided advocate. Evidence of one-sided advocacy can often be found in the expert's résumé, website, history of testimony, and publication history.

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§4.44 2. Expert's Compensation Reveals Bias

Most experts are compensated for their work and their testimony. If used subtly, this piece of information can be used to show bias. Receiving compensation for work performed is not unreasonable. Therefore, an attorney should not overemphasize the fact that the expert is being compensated. However, there are certain aspects of compensation that may demonstrate bias to the jury:

- **Deferred payment for testimony.** Some experts are paid their entire fee before they testify. Other experts receive a second portion of their fee after producing the report or testifying at trial. When this is the case, the attorney should show the jury that the jury is then free to conclude that the expert is being paid to produce a favorable report or give favorable testimony, especially if the cross-examination shows that the unpaid portion is not a fixed amount (but rather an amount that increases or decreases in direct relation to the preferred outcome of the trial).

- **Expert earns substantial portion of income from testifying.** Some witnesses derive a substantial portion of their income from testifying. These are truly "professional" expert witnesses. If the jury learns that a witness earns a significant portion of his or her living from testifying, it may be less likely to view the expert as neutral or reliable.

- **Marginal benefits.** In additional to monetary gain, there are other benefits derived from testifying as an expert. An expert may be perceived as an important member of the professional community by testifying as an expert. The expert may write articles or books regarding testifying. On cross-examination, counsel should emphasize these marginal benefits if the expert has a history of exploiting them.

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§4.45 3. Expert Usually Testifies for Particular Side

One of the best ways to interweave bias is to show the jury that the expert only or usually testifies for one side (the prosecution or defense). The attorney is then free to argue that a truly neutral expert would be willing to testify for either side and a competent expert would be as likely to be retained by one side as the other. The attorney can also argue that the biased expert was predisposed to a particular conclusion before even beginning to undertake the research or analysis in the case.

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§4.46 4. Expert Wants to Be Retained in the Future

Attorneys frequently use the same expert for their cases and recommend experts to their colleagues and associates. An argument can be made that an expert who wishes to be retained for future cases will testify in a specific manner in order to be retained in the future or recommended for future cases, whether that testimony is entirely correct or not.

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§4.47 5. Expert Did Not Give Opposition Copy of Report

A cross-examining attorney may also weave in bias by showing the jury that the expert refused to provide opposing counsel with a copy of the expert's report. This can be done subtly when discussing the expert's report on cross-examination or in a direct, confrontational manner if the attorney has the expert "on the ropes" and the expert is being protective, elusive, or combative.

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§4.48 6. Expert Refused to Consult With Opposition

Some experts for the opposition will not consult with the other side. While this may make preparation for trial more difficult, this situation can be exploited to show the jury that the expert is biased toward the opposition because a neutral expert would be willing to consult with both sides.

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§4.49 7. Expert Advertises as Professional Witness

The attorney should evaluate the expert's advertising and demonstrate for the jury that the expert is not merely a neutral community member with specialized knowledge but is a professional witness. The cross-examining attorney should always research the opposing expert's websites, endorsements, and professional advertisements.

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§4.50 8. Expert's Practice Falls Below Standards Reasonably Expected to Improve Quality of Profession

The attorney should find out whether the expert's area of expertise is a new, emerging area or if it has been subject to ongoing skepticism and criticism. In making this determination, the attorney should research and consider whether professionals within the community comprising that expert's area of focus are attempting to improve the reputation or quality of that profession. The cross-examining attorney may be able to demonstrate for the jury that the opposition's expert is not a part of that effort to legitimize the profession. For example:

Q: Although you indicated that the preliminary alcohol screening device is not a reliable testing device, you have not relayed your opinion to any government agency, right?

Q. You have not proposed any legislation banning the device, correct?

Q. You have not published your opinion in any journal article, right?

Q. You have not expressed your opinion to any professional organizations, right?

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§4.51 9. Expert May Have Given Speeches to Particular Side's Bar Associations or Conferences

Before cross-examining an expert, counsel should analyze the expert's résumé and research the expert's experience and associations. An expert may have a long history of speeches to only the defense bar or only law enforcement officials, for example. Or the expert may have repeatedly participated in symposia or presented remarks to audiences on merely one side of the relevant subject. This history may help the adverse attorney develop a persuasive argument of bias. If possible, a well-prepared attorney should obtain a copy of the speech given or handouts that contain the content of the expert's prior speeches before cross-examination.

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§4.52 10. Expert Unhesitatingly Accepts Opposing Side's Statements and Assumptions and Dismisses Contrary Views

The attorney should demonstrate for the jury that the expert assumed the statement and assumptions provided by the opposition were true, did not test or inquire into that "truthfulness," and brushed off contrary statements and assumptions. Next, the attorney should highlight for the jury each instance where the expert speculated, or will speculate, in such a way that supports the opposition and is contrary to the attorney's position. The cross-examining attorney should carefully review the materials the opposing expert relied on to determine the extent to which the expert considered contrary facts or views. The cross-examining attorney should also carefully listen to the basis for the opposing expert's opinion on direct examination to see which facts or views were considered.

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V. FINE-TUNING CROSS EXAMINATION

§4.53 A. Structuring Questions to Control Examination

The most reliable method for maintaining control during cross-examination is to ask "closed" questions—*i.e.,* leading questions that call for either a "yes" or "no" answer.

PRACTICE TIP: The cross-examining attorney should never ask an open question during cross-examination unless the cross-examiner knows *exactly* what the expert will say *or* is sure that *nothing* the expert could say in response to the question would be more damaging to the cross-examiner's case than to the opposition.

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§4.54 1. Ask Closed Questions

Statement of fact, correct? The simplest form of a closed question is to state a fact and then ask the witness to agree. The following example illustrates a closed or controlled line of questioning:

EXAMPLE (controlled question):

Q: Mr. Garcia, you are a psychologist, correct?

A: Yes.

Q: You are not a psychiatrist, correct?

A: Yes.

The following illustrates a less effective open question:

EXAMPLE (open question):

Q: Mr. Garcia, are you a psychologist?

A: I am a psychologist of 15 years with a doctorate in psychology and sociology as well as advanced degrees in biology and communication.

Q: Are you a psychologist?

A: I wanted to start helping people as soon as possible, so I focused my efforts on becoming a psychologist, and I have been helping people for 15 years now.

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§4.55 2. Keep Questions Short

Five to seven words. Questions should be kept simple and straightforward. The more words there are in a question, the more likely it is that the witness can find room to change a simple "yes" or "no" answer into a narrative explanation without appearing to be avoiding your question. Complex questions with more than one element can be broken up into two separate questions with two answers for heightened effectiveness.

EXAMPLE (complex question):

Q: Mr. Garcia, you don't have a medical degree because you are a psychologist, not a psychiatrist, isn't that correct?"

A: Sir, I don't have a medical degree because I have a doctorate in psychology and sociology as well as advanced degrees in biology and communication.

The following example illustrates a more effective simplified question:

EXAMPLE (simplified question):

Q: Mr. Garcia, you do not have a medical degree, correct?

A: Yes.

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§4.56 3. No Conjunctions; Avoid Compound Questions

The cross-examiner should not ask compound questions. Compound questions can often be identified by conjunctions such as "and," "but," and "or." Combining questions with conjunctions potentially allows the witness to embark on a narrative to explain how he or she could not possibly answer "yes" or "no" to that question and why. The attorney will then be left with three choices: (1) to control the witness by asking the questions separately, as he or she should have done in the first place; (2) to let the answer stand and move on so as not to draw negative attention to the momentary lack of control; or (3) to object that the witness is being nonresponsive or embarking on a narrative. If the attorney points out the witness's nonresponsiveness, the judge may reply that the question itself required a narrative response. No matter which option the attorney chooses, he or she has potentially damaged his or her case and his or her relationship with the jury.

The following example illustrates a compound question and a damaging answer:

EXAMPLE (compound question):

Q: Mr. Garcia, your examination of the defendant revealed that he does not currently suffer from schizophrenia, depression, or paranoia, correct?

A: I'm sorry, sir, that is not correct. Daniel presented himself as a young man with a troubled past fraught with physical and sexual abuse. He suffers from bouts of depression, including an extended period following his mother's suicide. He also, at times, hears voices which is one symptom of schizophrenia and paranoia.

The following example illustrates more effective controlling questions:

EXAMPLE (controlling questions):

Q: Mr. Garcia, after you examined the defendant, you concluded that he does not currently suffer from schizophrenia, correct?

A: Yes.

Q: And after you examined the defendant, you concluded that he does not currently suffer from depression, correct?

A: Yes.

Q: And the defendant does not currently suffer from paranoia, correct?

A: Yes.

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§4.57 4. Minimize Conditions: Ask Narrow Questions

When asking questions on cross-examination, the attorney should narrow the question as much as possible to prevent the witness from "interpreting" the question and finding a way to turn a "yes" or "no" answer into a narrative. In addition, narrow questions create a better opportunity to impeach a witness than broad questions do. When a witness answers "yes" or "no" to a broad question, and the attorney attempts to impeach the witness with a prior inconsistent statement, the witness has room to argue that his or her answer assumed a certain condition; however, the witness's answer would be the opposite and consistent with his or her prior statement assuming a different condition.

The following is an example of a less effective broad question:

EXAMPLE (question too broad):

Q: The plaintiff has never suffered from any psychiatric problems, right?

The following are examples of narrower, more effective questions:

EXAMPLE (narrower question):

Q: Prior to the date of the accident, the plaintiff had never suffered a major depressive episode, correct?

Q: Prior to the date of the accident, the plaintiff had never suffered from post-traumatic stress disorder, correct?

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§4.58 5. Exception: Use Open-Ended Questions to Show Hostility, Overstatement, Bias

One exception to asking only controlled closed questions on cross-examination is purposely asking an open question to allow the witness to show evasiveness, hostility, bias, conceit, irrationality, or any other quality that would be distasteful or suspect to the jury.

When cross-examining an adverse expert, the attorney should pay close attention to how the expert witness answers or does not answer questions. If the attorney has been careful to ask narrow leading questions requiring a "yes" or "no" answer and the witness either refuses to answer "yes" or "no" at all or answers "yes" or "no" but only with qualifications, then the witness may be being evasive, manipulative, disingenuous, or untruthful.

If the witness has not answered a question that was posed but seems, instead, to be answering some question that was not asked, then the cross-examiner should ask the question again in as narrow and closed a manner as possible. An objection that the question has been "asked and answered" should fail because the witness did not answer the question actually posed. The attorney should consider repeating the narrow question again if the witness continues to evade it. The attorney should do what is necessary to show the jury that he or she has asked a simple, straightforward question, yet the "neutral" expert witness has refused to answer. It is important to ask the question enough to make the point clear, but without appearing to the jury to be harassing the witness or "beating a dead horse."

If it seems that the adverse witness will continue to be evasive or less than truthful, the remaining closed leading questions may be asked only once. This technique suggests to the jury that the witness cannot be relied on to answer a straightforward question. The witness may also be asked occasional open-ended questions when it seems that the answer will reveal the witness's "slippery" qualities.

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§4.59 B. Use Common Sense

The attorney should watch the jury during the opposition's direct examination of the expert witness to assess the jury's response to the expert and the testimony. The attorney should always use common sense before beginning cross-examination to determine what tone to take with the witness, and to decide whether certain questions should be eliminated or expanded to show the jury they should not believe the opinion of the expert. The attorney should use common sense during cross-examination to determine the best way to make adjustments and exploit the unexpected. The attorney should keep in mind that juries are not composed of accident reconstruction experts. If the attorney can demonstrate, using common-sense illustrations, that the accident happened another way, a jury will likely disregard the expert's opinion.

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§4.60 C. Focus on Closing Argument

The attorney should keep in mind that answers elicited on cross-examination are pieces of the puzzle to be used in your closing argument to paint a picture for the jury—a picture that clearly leads the jury to only one conclusion, and a favorable verdict. It is not necessary to "break" the opposition's expert witness or elicit dramatic and damning statements from the expert. A skillful attorney needs only to elicit the pieces necessary to allow the jury to draw favorable inferences and come to the desired conclusion. The drama can be interjected in the closing argument.

Before beginning cross-examination, opposing counsel should take a moment to consider what pieces of evidence are needed from that expert for closing argument. The attorney should make sure that questions on cross-examination generate these pieces and weaken or destroy the pieces the opposing attorney generated on direct.

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Source: Criminal Law/Scientific Evidence in California Criminal Cases/4 Challenging Expert Testimony on Scientific Evidence/§4.61 D. Impeachment (Lock, Load, and Fire)

§4.61 D. Impeachment (Lock, Load, and Fire)

The "lock, load, and fire" method is a simple method to ensure that impeachment is both proper and effective. However, before you begin the process, always consider whether impeachment will further your trial goals. Whether or not to impeach a witness is as much a question of trial strategy as any other decision you make in trying your case.

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§4.62 1. Safety Check: Double-Check Prior Statement and Inconsistency

Before impeaching an expert witness, the attorney must be sure he or she is clear on *exactly* what the witness said in the current court proceeding and in the prior statement, and that an advantageous discrepancy exists between the two statements that is worth exploiting. Keep in mind that an ineffectual impeachment could damage the impeaching attorney's *case* and *credibility* before the jury.

PRACTICE TIP: If an attorney intends to impeach based on prior testimony, transcripts should be ordered and reviewed to ensure accuracy.

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§4.63 2. "Lock" Present Testimony

The first step in the effective impeachment of any witness's courtroom statement ("X") with an inconsistent statement ("Y") is to have the witness unequivocally confirm the he or she made statement "X" in the current court proceeding. Failure to do so will provide opposing counsel with an opportunity to object on the ground of improper impeachment, and it may also provide the witness with a way to reconcile or minimize the discrepancy when the impeaching attorney attempts to contrast the witness's current testimony with the prior statement.

If the witness gives an equivocal answer, *e.g.,* "I didn't exactly say 'X,'" when it is clear that the witness did say "X," the attorney should use it as an opportunity to show the expert witness is being "slippery." The attorney should illustrate these inconsistent answers in closing arguments by enlarging transcript pages from the direct and the cross-examination.

In either case, the attorney must ensure that the jury understands that the witness said in the current proceeding (and that the witness him- or herself has confirmed) that he or she stated "X." The attorney should ask narrow and direct questions to emphasize this for the jury. For example:

Q: You testified on direct examination that the defendant does not have the physical strength to choke the victim, right?

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§4.64 3. "Load" Prior Statement

Next, the attorney opposing the expert should establish the existence of the expert's prior statement by having the witness confirm the circumstances of the prior statement, *e.g.*, that he or she testified in a prior proceeding or that he or she prepared a written report. Counsel can establish the accuracy of the statement by having the witness acknowledge that the prior statement was made nearer in time to the matter in question and that he or she believed the statement was accurate when it was made.

EXAMPLE OF PRIOR TESTIMONY "LOADING":

Q: Dr. Howard, you testified 6 months ago at the defendant's preliminary hearing on January 15, 2008, correct?

A: Yes.

Q: You swore to tell the truth at the hearing, correct?

A: Yes.

Q: And this was the same oath as the one given today, correct?

A: Yes.

Q: Dr. Howard, you were being as truthful at the defendant's preliminary hearing as you are today, correct?

A: Yes.

Q: And you told the truth at the preliminary hearing, correct?

A: Yes.

Q: Now, you testified at the preliminary hearing only 4 weeks after you had examined the witness and police reports, is that correct?

Q: Yes.

Q: Does this appear to be a copy of your preliminary hearing transcript?

A: Yes.

EXAMPLE OF PRIOR WRITTEN STATEMENT "LOADING":

Q: Dr. Howard, you prepared a written, 10-page report stating your expert opinion regarding the defendant's lack of physical ability to commit the crime in question, is that correct?

A: Yes.

Q: You prepared this report after examining the defendant and reviewing the police reports, is that correct?

A: Yes.

Q: You prepared this report on December 15, 2007, four weeks after examining the defendant and the police reports, correct?

A: Yes.

Q: Dr. Howard, you provided the report to the defendant's attorney, is that correct?

A: Yes.

Q: This report accurately reflected your opinion based on your examination of the defendant and review of the police reports, correct?

A: Yes.

Q: And if you later discovered an error in your report, you could have submitted a revised report to the defendant's attorney, is that correct?

A: Yes.

Q: I am going to show you what appears to be a copy of your report to the defendant's attorney. Does this appear to be a copy of your report?

A: Yes.

Q: Is this your signature at the bottom of the report?

A: Yes.

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§4.65 4. "Fire" Prior Statement

Finally, the attorney should introduce the prior inconsistent statement into evidence to demonstrate to the jury that the expert and his or her testimony are questionable. The questioner should be very precise when quoting the witness's prior statement; otherwise, the effect of the impeachment may be weakened and may provide an escape for the witness. The best case scenario is where the attorney leads the witness to confirm that he or she said "X" at the current proceeding, but said "Y" in his or her prior statement.

EXAMPLE:

Q: Dr. Howard, at the preliminary hearing or in your written report, you stated, "it is possible the defendant could have had the strength to choke the victim, but only if he had taken PCP or was filled with rage-induced adrenaline," true?

Q: So the defendant has the strength to choke the victim, right?

Q: And it is not impossible for the defendant to have committed the charged crime, right?

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E. Refer to Treatises or Other Publications in Certain Cases

§4.66 1. Expert Relied on, Referred to, or Considered Publications

In preparing to cross-examine an expert witness, the attorney may want to question the witness regarding treatises or publications that the expert either did or did not rely on in forming an opinion. Evidence Code §721(b) provides three circumstances in which an attorney may cross-examine the expert regarding a publication (Evid C §721(b)(1)-(3)):

- When the witness referred to, considered, or relied on the publication in forming his or her opinion;
- When the publication has been admitted into evidence; and
- When the publication has been established as a reliable authority by testimony, admission, or judicial notice.

It has been held that if none of these circumstances apply to a specific publication, the attorney generally may not cross-examine the expert about that publication. See *Lewis v Johnson* (1939) 12 C2d 558, 86 P2d 99.

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2. Permissible Circumstances

§4.67 a. On Cross-Examination

When counsel receives discovery regarding the expert's opinion and the publications the expert relied on, referred to, or considered, the attorney should familiarize him- or herself with the publications. The attorney should analyze the publications to determine whether any of them are out-of-date, controversial, or suspect, or whether any of them contain information that supports the attorney's own case, and whether any of them contain information or conclusions that conflict with information or conclusions in other publications. The attorney should formulate cross-examination questions regarding the publications relied on by the opposing expert that will corroborate his or her own case, attack the expert's opinion, or interweave bias (the ABCs). See §4.17.

During the opposition's direct examination of the expert witness, counsel should pay close attention to the actual testimony relating to the publications in question and should modify the prepared cross-examination questions as needed in response to the direct examination. Counsel should add new questions or modify prepared questions in response to the direct examination. Counsel should never exclusively rely on a prepared script of cross-examination as he or she may miss opportunities that arise only during the direct and cross-examination.

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§4.68 b. Publication Admitted Into Evidence

A publication may be admitted into evidence by the cross-examiner even though the expert did not rely on, refer to, or consider it in formulating an opinion. Once admitted, the attorney may question the expert regarding the publication. See Evid C §721(b)(2). But first, the attorney should analyze the admitted publication and formulate cross-examination questions regarding the publication that will corroborate the attorney's own case, attack the expert's opinion, or interweave bias (the ABCs). See §4.17.

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§4.69 c. Publication Is Reliable Authority

Counsel may cross-examine the expert regarding any authority determined to be "reliable" even if the publication was not relied on, referred to, or considered by the expert and even if the publication was not admitted into evidence by the proponent of the expert. Evidence Code §721(b)(3) describes the circumstances by which a publication may be deemed "reliable." A publication is "reliable" if it has been established as reliable by the testimony or admission of the witness, by other expert testimony, or by judicial notice. Evid C §721(b)(3).

This exception is particularly useful for publications that counsel believes the expert should have considered in formulating his or her opinion or publications with which the expert should be—but may not be—familiar. Again, the attorney should look for opportunities to execute the ABCs of cross-examination by formulating questions that will corroborate the cross-examiner's case, attack the expert's opinion, or interweave bias. For discussion of the ABCs, see §4.17.

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§4.70 3. Read Conflicting Opinion Into Evidence

Finally, Evid C §721 provides that, if a publication is admitted into evidence, relevant portions may be read into evidence but may not be submitted as exhibits. The proponent of the expert will likely read into the record portions of admitted publications that are helpful to the party's case. But whether or not this occurs, the cross-examining attorney should not forget to read into evidence portions of any publication that are helpful to his or her case. As always, the cross-examining attorney should look for portions of the publication that conflict with the expert's opinion or corroborate points of the examining attorney's case.

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VI. PROPONENT'S DEFENSE OF EXPERT TESTIMONY

A. Proponent's In Limine Motions in Support of Expert

§4.71 1. Motion to Prevent Cross-Examination Based on General Acceptance

The proponent of the expert testimony should always anticipate challenges to the expert through cross-examination and in limine motions. The proponent may also wish to make an in limine motion designed to ward off attacks like the ones detailed above. For example, if the proponent's expert plans to testify at trial about a scientific technique, process, or test that has already been ruled as generally accepted under *Kelly,* then either by a previously published appellate decision or by the trial court in the case at issue, the attorney may want to file an in limine motion to prevent cross-examination at trial that purports to show that the technique used by the expert is not generally accepted in the relevant scientific community.

NOTE: The proponent should also anticipate that the opponents of the scientific evidence and related expert testimony may attempt to improperly use hearsay evidence related to the general acceptance of the technique that is allowed during in limine admissibility litigation again during the trial itself. During the admissibility phase of the trial, when the challenge is to the general acceptance of a subject matter or forensic science, the cross-examiner may use authoritative hearsay publications to challenge its reliability. However, once the trial judge has ruled that the evidence is admissible under *People v Kelly* (1976) 17 C3d 24, 130 CR 144, similar cross-examination that attacks the reliability of a science or methodology in order to disprove that science or methodology is arguably impermissible.

The proponent may argue that reliability has different meanings. In expert law, it means general acceptance and the actual test itself. Under the theory of general acceptance, it means once a test is approved or found to be generally accepted by published appellate decision, then it is not relevant that the opponent of the test results may question its general acceptance. The proponent may argue, as discussed more fully below, that allowing such an attack at trial will necessitate referring to hearsay or the use of oppositionist experts who will refer to the opinions and publications of out-of-court experts. The proponent may also argue that the role of the jury is to resolve the historical facts of a dispute, not to sit in judgment on the threshold reliability of a particular test. The latter is the court's role.

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§4.72 2. Motion to Prevent Inadmissible Hearsay on Cross-Examination

The proponent of the evidence may also seek to make a motion similar to the opponent's motion to limit the use of hearsay on direct examination discussed in §4.9. The proponent can make this motion in conjunction with the motion in §4.71 seeking to limit the cross-examination of the expert based on general acceptance grounds, or the proponent can make this motion separately.

Evidence Code §721(b) specifically limits the basis on which an expert may be questioned. The expert may only be questioned on authorities on which the expert relied, or if the authority has achieved the status of a learned treatise. If a published authority has achieved the status of learned treatise, then the particular theory (and technique which utilizes it) has achieved general acceptance. Evid C §721(b).

The proponent's argument is that it is legally irrelevant to the fact-finder what nontestifying hearsay declarants think (or write) about general acceptance or that there may be other or more precise methods of collection, processing, or testing of the evidence. For example, in *People v Kaurish* (1990) 52 C3d 648, 692, 276 CR 788, the defense offered testimony regarding a technique other than the one used in the prosecution's case to attack the reliability of the work done by the lab. The proponent can argue that this type of evidence is legally irrelevant to the technique used in the current case.

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§4.73 3. Proponent's Response to Opponent's In Limine Motions

When challenging the basis of an expert's opinion, the proponent of the evidence should be prepared to prove that the basis of the expert's opinion "is of the type that reasonably may be relied upon by an expert" in the field of the witness's expertise. Evid C §801(a).

In opposing a challenge to the qualifications of the expert witness, the burden of proof is on the proponent of the evidence to establish the witness's qualifications by a preponderance of the evidence; the judge, not the jury, ultimately determines whether a witness is qualified to testify as an expert. See Comment to Evid C §405. See also *Fairbank v Hughson* (1881) 58 C 314 (error for judge to submit qualifications of expert to the jury).

In responding to a challenge to the subject matter or hearsay basis of the expert's opinion, the proponent may wish to emphasize that much of the "matter" on which an expert typically relies is hearsay and experts are given "considerable leeway as to the material on which they may rely." *Korsak v Atlas Hotels, Inc.* (1992) 2 CA4th 1516, 1524, 3 CR2d 833.

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Source: Criminal Law/Scientific Evidence in California Criminal Cases/4 Challenging Expert Testimony on Scientific Evidence/ B. Redirect and Rebuttal/§4.74 1. Choosing Redirect or Rebuttal

B. Redirect and Rebuttal

§4.74 1. Choosing Redirect or Rebuttal

After the opponent's cross-examination of the expert, the proponent will need to decide whether to redirect the witness or put on a rebuttal case. *Redirect* means using the same witness who had just been cross-examined to re-state or further explain subject matters that may need clarification or reemphasis. Sometimes the redirect can be pithy. For example:

Q: So, Expert Smith, after the 2-day cross-examination by defense counsel, is it still your opinion that…

Or, if it appears that the jury requires more, then the proponent can identify the subject to the expert by a leading question, and can then spend as much time as necessary to make certain the point is made. *Rebuttal* means that the proponent must wait until the other side has finished its case, including its experts. So long as it is a true rebuttal (*i.e.,* a prosecutor rebutting a matter that was raised in the defense case), then the proponent can have your expert who testified during his or her case return to rebut the evidence. Alternatively, the proponent can put another expert on the stand if the original expert is unavailable or if the proponent thinks (and costs permit) that a different expert would do a better job.

Both redirect and rebuttal remind the jury of the evidence set forth in the opening statement and direct examination and reassure the jury that the evidence retains its probative value. Redirect and rebuttal can also rehabilitate an expert witness after attacks by the opponent on cross-examination. A common theme of cross-examination of a scientific or expert witness is the implication that there is "more" to the evidence than the proponent is revealing.

For example, the cross-examination may suggest that the evidence was initially tainted by contamination during the collection phase when multiple hands touched the evidence, and the analyst cannot account for all the different DNA found on the evidence. The cross-examiner might emphasize that the test result is an opinion based on the examiner's training and experience and suggest that the opinion is biased and imply that a more qualified examiner or an examiner not associated with a law enforcement lab may have a different opinion that is just as reasonable as the one being offered by the proponent. The cross-examiner may point to other evidence that was not tested and suggest that it would be more definitive about the question of guilt or innocence. The purpose of this type of cross-examination is to cast doubt on the importance or credibility of the scientific evidence. If the jury does not feel confident about the scientific evidence (evidence that may be the only objective evidence in the case), then the jury must rely on witness testimony with all its problems of recollection, perception, expression, and bias.

Similar arguments on cross-examination may include claims that there exists other evidence that the prosecution is not showing that indicates contamination, the true guilty party, the exclusion of the evidence, that the analyst is biased, that the test is unreliable, or that the test result is inadequate or too vague to support an opinion.

The proponent's task is to decide whether to counter this argument on redirect or rebuttal. In making this determination, the proponent of the evidence should first analyze the argument by breaking it down into its various components. For example, if the opponent claims contamination in a DNA case, the proponent can rebut a contamination argument by breaking apart the argument and asking where and when the alleged contamination could possibly have occurred—at the crime scene, during evidence collection, when the evidence was transported, or at the laboratory? Depending on the opponent's argument and what the evidence shows, the attorney can reassure the jury about the security, quality control, and professionalism of key persons who handled the item at the disputed time and location by addressing additional questions on redirect to the expert to emphasize these factors. In addition, the proponent attorney can ask the expert to explain what an argument raised on cross-examination means and how it would affect the results of any tests. For example, in the same DNA case, the proponent can have the expert explain that contamination would often result in a mixture of DNA, but that it would never transform one person's DNA into someone else's DNA. Similar points can be reemphasized in closing argument if they are properly drawn out through the expert on redirect.

If the opponent of the evidence claims that evidence was planted or switched, the attorney putting forth the evidence can rebut by establishing a detailed timeline from crime through collection to impounding and testing. Does the opponent specifically argue how, when, by whom, and why the evidence was planted? If there is no logical explanation for each of these factors, or if no attempt to explain these factors has ever been advanced, then this weakness can be exploited in closing argument. The proponent can interject the defense argument into the timeline to show who would have to be involved in the alleged conspiracy.

NOTE: Because the chain of custody becomes important to the argument in the DNA example and in many similar situations, the chain of custody should always be clearly documented and established during the proponent's case-in-chief.

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§4.75 2. Rebutting Opponent's Expert

If the opponent of the evidence calls an expert, the proponent must decide whether or not to call an expert to rebut. The attorney must decide what to do by looking at the opposing expert's credentials, assessing the sophistication of the expert's arguments, and considering the other evidence in the case as well as the importance of the case to the community. It is important for the proponent to make an accurate assessment of the strength of the opponent's attack on the expert's conclusions.

If the attack has not seriously undermined the credentials or the methodology of the expert who did the original testing, it can usually be dealt with on redirect, especially since the expert who conducted the original tests will know the specifics of the testing better than the party who attacks it or an independent expert called to bolster the original expert's conclusions.

If the attorney presenting the expert testimony appears to be unclear or confused about exactly what his or her opponent is challenging, then chances are good that the jury will be confused too. The proponent of the expert testimony should use the expert to guide the jury toward a clearer understanding of the disputed issues. For example, the proponent can ask the expert questions such as the following:

Q: You heard the defense attorney raise the issue of "X." What is the significance of "X"?

Q: How does "X" relate to the accuracy of your conclusions?

Q: Does it change the outcome at all?

Revisiting these issues on redirect will clarify the issues for the jury at the time they are raised and will also permit the proponent a broader latitude to argue key issues during closing argument.

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5

DNA Evidence

Judge Mark E. Windham, Los Angeles Superior Court

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I. SCIENTIFIC ANALYSIS OF DNA EVIDENCE AS MEANS OF IDENTIFICATION

§5.1 A. Importance of Familiarity With DNA Testing

The popularity of television shows like "CSI: Crime Scene Investigation" demonstrates the public's increasing fascination with the collection and analysis of scientific evidence. In particular, jurors tend to give enormous credence to deoxyribonucleic acid (DNA) evidence, which heightens the danger of its misuse unless courts, prosecutors, and defense attorneys understand it and scrutinize it in each case.

It is critically important for the attorneys for both parties to understand the evidence they are presenting or refuting. Excellent references include the following:

- Principles of DNA for Officers of the Court (visited June 3, 2010), online training or CD-ROM available at http://www.DNA.gov;
- Butler, Forensic DNA Typing: Biology, Technology, and Genetics of STR Markers (2d ed 2005);
- National Research Council, The Evaluation of Forensic DNA Evidence (NRC II) (1996);
- The National Institute of Standards and Technology's (NIST's) Short Tandem Repeat (STR) DNA Internet Database website, available at http://www.cstl.nist.gov/div831/strbase/;
- The FBI's DNA Advisory Board (DAB), *Quality Assurance Standards for Forensic DNA Testing Laboratories,* 2(3) Forensic Sci Comm (July 2000); available at http://www.fbi.gov/hq/lab/fsc/backissu/july2000/codis2b.htm#Corrective%20Action;
- The American Bar Association's ABA Standards for Criminal Justice: DNA Evidence (3d ed 2007), available at http://www.abanet.org/crimjust/standards/dnaevidence.pdf. The DNA Evidence Standards are also shown on the ABA website at http://www.abanet.org/crimjust/standards/dnaevidence.html; and
- The Denver District Attorney's resource site (visited June 3, 2010), with current case law as well as links to scientific resources: http://www.denverda.org/DNA/DNA_INDEX.htm.

While the prosecutor is traditionally the proponent of DNA evidence when DNA analysis is performed on evidence collected at the crime scene, a criminal defense attorney may also opt to call a DNA expert, either to rebut the prosecution's analysis of the DNA evidence or to present DNA evidence or analysis proffered by the defense. A defense attorney may also be in a position to offer DNA evidence to prove a client's innocence. This chapter refers to the "proponent" and the "opponent" of the evidence; however, in a particular case, an attorney may find himself or herself as both proponent and opponent of DNA evidence.

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§5.2 B. Forensic DNA Analysis Defined

DNA analysis is a process by which characteristics of a suspect's genetic structure are identified, compared with samples taken from a crime scene, and, if there is a match, subjected to statistical analysis to determine the frequency with which the characteristics occur in the general population. *People v Wilson* (2006) 38 C4th 1237, 1242, 45 CR3d 73, quoting *People v Barney* (1992) 8 CA4th 798, 805, 10 CR2d 731. Once analysis and comparison result in the declaration of a match, the DNA profile of the matched samples is compared with DNA profiles of other available DNA samples in a relevant population database or databases in order to determine the statistical probability of finding the matched DNA profile in a person selected at random from the population or populations to which the perpetrator of the crime might have belonged. *People v Wilson, supra,* quoting *People v Soto* (1999) 21 C4th 512, 518, 88 CR2d 34.

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C. DNA Terminology and Definitions

§5.3 1. Double Helix; Base Pairs

With the exception of red blood cells, every cell in the human body has a nucleus containing the person's genetic code in the form of DNA. DNA consists of two parallel spiral sides, a double helix, composed of repeated sequences of phosphate and sugar. The sides are connected by a series of rungs, with each rung consisting of a pair of chemical components called bases. There are four types of bases: adenine (A), cytosine (C), guanine (G), and thymine (T). The A will pair only with T, and C will pair only with G. There are over 3 billion base pairs in a person's DNA. Except for identical twins, no two persons have identical DNA. This makes DNA valuable for forensic purposes. *People v Nelson* (2008) 43 C4th 1242, 1257, 78 CR3d 69.

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Source: Criminal Law/Scientific Evidence in California Criminal Cases/5 DNA Evidence/§5.4 2. Loci; Polymorphic; Allele; Junk DNA

§5.4 2. Loci; Polymorphic; Allele; Junk DNA

There is no practical way of sequencing all 3-billion base pairs. Accordingly, forensic scientists test particular regions called loci that are known to be polymorphic, *i.e.,* variable from person to person. Scientists have identified loci where a particular pattern of base pairs is repeated successively for numbers of times that vary from person to person. These repetitions are referred to as alleles. These alleles can be measured and compared to determine whether a suspect sample matches an evidentiary biological sample at each of the loci tested. *People v Nelson* (2008) 43 C4th 1242, 1257, 78 CR3d 69.

Forensic scientists look at polymorphic genes (or "loci"), known as "junk DNA," which are stretches of segments that are not presently recognized as being responsible for trait coding and that are not associated with any known physical or medical characteristics. *U.S. v Kriesel* (9th Cir 2007) 508 F3d 941, 947. Because this DNA has no known function, it is assumed to be far removed from breeding and inheritance; thus, multiple junk DNA loci are likely to be independent from one another and maintain an equilibrium, which is essential for ascertaining its rarity in a given population (an essential step in the process of giving evidentiary weight to a DNA match). See *People v Venegas* (1998) 18 C4th 47, 59, 74 CR2d 262.

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§5.5 3. Heterozygous; Homozygous; Genotype; DNA Profile

Regardless of whether a locus is occupied by a functional gene or by noncoding junk DNA, the alleles are determined by inheritance from the parents. Each person has two alleles at every locus, that person must obtain one allele from the father and one allele from the mother. If the alleles are different, the person is "heterozygous" at that locus; if the person received exactly the same allele from both parents, he or she is "homozygous" at that locus. See *People v Venegas* (1998) 18 C4th 47, 59, 74 CR2d 262. See also §5.15. The combination of alleles identified by the test of a locus is called the "genotype." The combination of results from multiple loci is called the "DNA profile." *People v Smith* (2003) 107 CA4th 646, 653, 132 CR2d 230. See also the DNA Initiative *Glossary* (visited June 3, 2010), available at http://www.DNA.gov/glossary.

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§5.6 4. Combined DNA Index System (CODIS)

California has an offender database that is a source for over 1 million convicted felons, all registered sex offenders and arsonists (including misdemeanants), and generally those persons arrested or charged with a homicide or sex offense under the DNA and Forensic Identification Data Base and Data Bank Act of 1998 (Pen C §§295-303.3). Pen C §296; *Good v Superior Court* (2008) 158 CA4th 1494, 71 CR3d 125. See also Government Technology's *News Report, California Attorney General Expands DNA Search Policy to Relatives of Suspects* (Apr. 25, 2008), available at http://www.govtech.com/gt/articles/301780. Since January 1, 2009, any adult arrested for or charged with any felony must provide a DNA sample. Pen C §296(a)(2)(C); *Good,* 158 CA4th 1494, 1503. For discussion of this database, see §5.86.

There is also a national database called CODIS (Combined DNA Index System); the FBI, in conjunction with state and local forensic laboratories, has created this computerized database of DNA profiles of known, convicted offenders and unknown forensic DNA samples. CODIS allows law enforcement at all levels to compare DNA profiles electronically. *People v Johnson* (2006) 139 CA4th 1135, 1150 n14, 43 CR3d 587. By January 2008, CODIS contained over 5 million short tandem repeat (STR) offender profiles, over 190,000 crime-scene profiles, and had linked all 50 states with the capability to search DNA profiles. Song, Patil, Murphy & Slatkin, *Average Probability that a "Cold Hit" in a DNA Database Search Results in an Erroneous Attribution,* 54(1) J Forensic Sci 22. See also Butler, Forensic DNA Typing: Biology, Technology, and Genetics of STR Markers, chap 18 (2d ed 2005).

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§5.7 5. RFLP

Restriction fragment length polymorphism (RFLP) is an obsolete method of DNA testing. *People v Nelson* (2008) 43 CA4th 1242, 1258, 78 CR3d 69. See discussion at §5.25.

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§5.8 6. PCR-STR

"Polymerase chain reaction" testing using "short tandem repeats" (PCR-STR testing) is the current standard for DNA testing (see *People v Nelson* (2008) 43 C4th 1242, 1258, 78 CR3d 69) and is discussed in §5.14.

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§5.9 7. Product Rule

Once a match of multiple loci has been made, the next step is to determine its statistical significance. Experts use the "product rule" to calculate the rarity of the sample in the relevant population. *People v Nelson* (2008) 43 C4th 1242, 1258, 78 CR3d 69. See discussion of the product rule at §5.32. A match places the suspect within a class of persons from whom the sample could have originated. In determining guilt, the fact-finder's determination may turn on the degree of probability that the suspect was the source of the sample. See *People v Venegas* (1998) 18 C4th 47, 63, 74 CR2d 262.

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§5.10 D. Theoretical Basis for DNA Testing

Forensic scientists long have dreamed of solving crimes with "genetic fingerprints." This is conceivable because each individual, except for identical twins, has unique DNA. *People v Nelson* (2008) 43 C4th 1242, 1257, 78 CR3d 69. An individual's unique DNA is found in the nucleus of every cell, including those left behind at crime scenes in the form of blood, semen, skin, or other testable biological matter. Even so, the human genome is too enormous for comparison. Experts test only small fragments, and many persons can match coincidentally. Although the first DNA tests were not powerful enough to identify a person conclusively, short tandem repeat (STR) tests have this potential.

As we described earlier, DNA is composed of four chemical bases: adenine (A), thymine (T), guanine (G), and cytosine (C). These bases attach to each other in pairs the same way in every instance: the A bonds to the T, and the G bonds to the C. Pairing in this way, and held in place by a sugar superstructure, they form a sort of ladder that gently twists in a long spiral known as the double helix. This long double helix bundles into 23 pairs of chromosomes. The entirety of this strand is the genome, which is 3 billion base pairs in length. The nucleus of every cell has a copy of the same genome, which is more than 99 percent identical in every human, but also completely unique in every person, except identical twins, due to the significant variation in the remainder. *People v Nelson* (2008) 43 C4th 1242, 1257, 78 CR3d 69.

The genome contains tens of thousands of discrete locations, which are called "loci" or "markers." Many of these loci are sites of our genes. Each gene or group of genes governs a particular physical characteristic or function. Genes are the means by which the DNA in this genome can act as a blueprint. When the particular arrangement or sequence of bases varies between people, this difference is known as polymorphism. See the DNA Initiative *Glossary* (visited June 3, 2010), available at http://www.DNA.gov/glossary. These multiple gene forms may determine physical characteristics that we can observe such as blonde or brown hair and blue or hazel eyes. Each of the possible variations of a gene or marker is called an "allele." Forensic scientists prefer to look at polymorphic genes (or "loci"), which have no known function and are known as "junk DNA." Because this DNA has no known function, it is assumed to be far removed from breeding and inheritance. *U.S. v Kriesel* (9th Cir 2007) 508 F3d 941, 947. See also the *Glossary* (visited June 3, 2010), available at http://www.DNA.gov/glossary. Thus, multiple junk DNA loci are likely to be independent from one another and maintain an equilibrium that is essential for ascertaining its rarity in a given population (an essential step in the process of giving evidentiary weight to a DNA match). See *People v Venegas* (1998) 18 C4th 47, 58, 74 CR2d 262.

Regardless of whether a locus is occupied by a functional gene or by noncoding junk DNA, the alleles are determined by inheritance from the parents. Each person has two alleles at every locus; that person must obtain one allele from the father and one allele from the mother. If the alleles are different, the person is "heterozygous" at that locus; if the person received exactly the same allele from both parents, he or she is "homozygous" at that locus. See the DNA glossary in *The Evaluation of Forensic DNA Evidence; Excerpt From the Executive Summary of the National Research Council Report,* 94(11) Proceedings Nat'l Acad Sci USA 5498, 5500 (May 27, 1997); for an online version of this summary, see http://www.pnas.org/content/94/11/5498.full. The combination of alleles identified by the test of a locus is called the "genotype." The combination of results from multiple loci is called the "DNA profile." *People v Smith* (2003) 107 CA4th 646, 653, 132 CR2d 230. See also the *Glossary* (visited June 3, 2010) at http://www.DNA.gov/glossary.

Many genes differ in variation of the sequence of bases, for example ATGC versus GTCA, GATT, or CCGT. Others vary in their length. The current standard in DNA testing, STR testing, involves a length variation wherein the base pair patterns are repeated in varying numbers in different people. STR stands for "short tandem repeats," which means short sequences, three, four, or five base pairs, lined up in tandem, repeat a certain number of times. The 13 loci now utilized in this country, and standardized for use in the CODIS (or NDIS—National Database Index System) database, are four base pair repeats, which at any of the loci might repeat any number of times, typically between 5 and 30 times. *Young v State* (Md 2005) 879 A2d 44, 50. Each pair of alleles found at each locus is designated simply by the number of repeats, for example "9,13" or "8,11." All 13 loci can be tested simultaneously in a multiplex test along with a test for gender (X, X being female and X, Y being male). See *People v Johnson* (2006) 139 CA4th 1135, 1144, 43 CR3d 587 (a match of 13 loci is unique, except in twins). This technology compares quite favorably with its predecessor tests: RFLP and PCR reverse dot blot. See Saferstein, Criminalistics: An Introduction to Forensic Science, chap 12 (9th ed 2007). For discussion of these tests, see §§5.14-5.27.

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E. Collection of DNA Evidence

§5.11 1. Sources of DNA Evidence

All biological material is composed of cells, which contain DNA. Every person has trillions of cells, each containing his or her unique DNA. The DNA in every cell is identical; it comprises a genetic blueprint for that individual. *People v Smith* (2003) 107 CA4th 646, 653, 132 CR2d 230. We constantly shed these cells in the form of skin, saliva, perspiration, and so forth. Crime scene investigators collect samples of semen, blood, or other biological materials they encounter. Analysis of DNA extracted from these samples may reveal evidence of their source. Although red blood cells actually do not have a nucleus and, thus, do not carry this unique DNA, other blood components do; and blood is an excellent source for forensic identification of the donor. See *People v Venegas* (1998) 18 C4th 47, 58, 74 CR2d 262.

Sperm cells actually contain just one half of a person's DNA, with 23 chromosomes that will combine with 23 chromosomes in an egg in order to form a new person. *People v Soto* (1999) 21 C4th 512, 520 n8, 88 CR2d 34. It takes just a few sperm cells, however, to reveal the entire genetic component of an individual. Sperm cells have tough cell walls that protect them during the reproductive process. It is this hardiness that makes sperm cells excellent sources of DNA evidence as they tend to last longer than other cells. They may last 72 hours in a living person and much longer when the victim is deceased or when they are deposited on fabric or some other material. *People v Robinson* (2000) 85 CA4th 434, 441 n4, 102 CR2d 179.

While semen, saliva, or other organic material that will yield DNA may not be visible to the naked eye, forensic scientists have techniques for locating these materials on fabric, skin, or other backgrounds so that the DNA may be revealed and then sampled for testing. See *U.S. v Kincade* (9th Cir 2004) 379 F3d 813, 838 n37 (New York crime laboratory expected to be able to create DNA profiles from as little as six cells' worth of genetic material). For example, ultraviolet light or an alternative light source can be used to visualize stains; a chemical presumptive test in the crime laboratory with luminol can reveal otherwise invisible blood; and an acid phosphatase test for the p30 protein may reveal the presence of semen. *People v Panah* (2005) 35 C4th 395, 413, 25 CR3d 672 (possibility of semen revealed by acid phosphatase).

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§5.12 2. Evidence Collection

Responding law enforcement officers must take great care with any object associated with a crime that may have biological evidence deposited on it. A police officer can contaminate this evidence by touching it or even by breathing on it, spreading microscopic DNA from one object to another, or by packaging evidence together with the same result. Officers should follow the suggestions in the Department of Justice publication, *First Responding Officers: What Every Law Enforcement Officer Should Know About DNA Evidence* (visited June 3, 2010), available at http://www.DNA.gov, when collecting, packaging, and transporting evidence, or else the results may be compromised. See also the President's DNA Initiative, *Evidence Collection and Preservation* (visited June 3, 2010), available at http://www.DNA.gov/audiences/investigators/know/collection. Because the defense may develop a cross-examination based on these recommendations, the proponent of DNA evidence may wish to head off such attacks by establishing requisite care at the outset.

Examples of crime scene objects that may yield DNA evidence would include discarded condoms or cigarettes, weapons, soda cans, and clothing (such as hats or scarves). See Bieber, *Turning Base Hits Into Earned Runs: Improving the Effectiveness of Forensic DNA Data Bank Programs,* 34(2) J Law Med Ethics 222, 226 (Summer 2006) (discarded cigarette butt leads to successful DNA match). Urine or fecal matter may be found in some cases as well. A victim's undergarments, sheets, or pillowcases often will be tested. Police may seize a suspect's clothing and test his or her shoes or other garments if blood stains are observed. Postage stamps can be removed from letters and tested to determine the genetic profile of the person who licked them. If a suspect touched a physical object such as part of an automobile or a door handle or window, then swabbing the point of contact for DNA left by a sweaty palm may be productive. See Butler, Forensic DNA Typing: Biology, Technology, and Genetics of STR Markers, chap 3 (2d ed 2005).

Investigators may collect an entire object, or a cutting or scraping from that object, or may blot liquid samples with cotton swabs or gauze. Items should be packed separately in porous paper. A moist item should be air dried and then packed with paper within a plastic bag. A very wet item should be placed in a plastic container and air dried at the laboratory, although there may be a danger of mold forming. Saferstein, Criminalistics: An Introduction to Forensic Science, chap 2 (9th ed 2007). All items should be stored in a temperature- and humidity-controlled environment. If these precautions are not taken, the DNA may degrade and not yield a complete genetic profile. Degradation will not *change* DNA from one type to another, however. Another grave risk during collection, transportation, and packaging is contamination. The consequences of contamination are described in §5.65. See relevant courses and publications for law enforcement officers and investigators (visited June 3, 2010) at http://www.DNA.gov.

In the case of a sexual assault, a nurse, or in case of homicide, a pathologist, will collect DNA evidence by swabbing areas of possible contact and then placing the swab into a protective container for preservation until the time of testing. The swab will collect cells from the skin of the victim that also will obtain saliva or semen (if any) of the perpetrator thus providing a rich source for DNA testing. In the laboratory, sperm cells can be separated from the female skin cells (epithelial cells) by using a centrifuge. The sperm cells form a "pellet" that an analyst can carefully remove from the test tube with a pipette. Using this "differential extraction" method, the analyst can develop separate test profiles of the offender and victim. See *People v Pizarro* (2003) 110 CA4th 530, 583, 3 CR3d 21 (discussing differential extraction), disapproved by *People v Wilson* (2006) 38 C4th 1237, 45 CR3d 73 (on population frequencies). If this separation fails, the analyst must deduce the perpetrator's DNA type by subtracting the victim's type, obtained from a reference sample. See §5.13.

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§5.13 3. Reference Samples

Reference samples must be taken from known or suspected contributors, such as a victim or a suspect. In addition, known consensual sex partners should be tested for reference so it can be determined if there is an innocent source for an unknown DNA profile. See *People v Johnson* (2006) 139 CA4th 1135, 1143, 43 CR3d 587. Reference samples are typically taken by means of an (oral) buccal swab, which collects skin cells from the inside of the mouth in a fairly nonintrusive manner. Once the swabbing is completed, the swab is preserved until the time of testing, and then it can be preserved or discarded. At one time it was standard practice for phlebotomists to take blood samples for DNA reference tests, but modern short tandem repeat (STR) testing utilizes such a small amount of DNA that this invasive process is usually no longer necessary. An exception exists when an inmate refuses to comply with a DNA sampling order; in such a case, the inmate is restrained and a blood sample drawn, because the buccal swab procedure is considered to be too dangerous for the custodial employees. See Pen C §298.1(b)(1).

When a reference sample has been taken, or a stain thought to contain DNA is selected, the next step is to extract the DNA. Additional preliminary tests are undertaken in the case of a "forensic unknown" crime scene sample. The selected area may be examined microscopically to determine the existence of sperm after the application of the p30 test to screen for the proteins characteristic of semen, or there may be luminol tests for blood. *People v Panah* (2005) 35 C4th 395, 413, 25 CR3d 672 (possibility of semen revealed by acid phosphatase). Extraction of DNA from a swab taken as a reference sample or from whatever material hosts the forensic unknown sample proceeds by way of an organic or chemical process, such as the Chelex method. When DNA is extracted, the analyst then performs a quantitative test to determine whether there is sufficient DNA for testing. This may be accomplished using gel electrophoresis or with a digital instrument. At this point, the DNA is ready for testing. See Butler, Forensic DNA Typing: Biology, Technology, and Genetics of STR Markers, chap 3 (2d ed 2005).

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II. DNA PROCESSING: DESCRIPTION OF DNA TESTING METHODS AND TECHNIQUES

A. The Current Standard: Short Tandem Repeat (STR) Loci Testing

§5.14 1. Introduction to STR Testing

Automated DNA testing of short tandem repeat (STR) loci is the latest technological development—the third generation of DNA testing technology. The original RFLP (restriction fragment length polymorphism) test required a relatively large quantity of biological material. It was slow, cumbersome, and time consuming (see *People v Nelson* (2008) 43 C4th 1242, 1258, 78 CR3d 69), but the results did offer powerful evidence in criminal trials and exonerated innocent persons. The near-definitive nature of this testing heralded a new era in criminal justice. The second generation of DNA testing utilized polymerase chain reaction (PCR) amplification to quickly get results from tiny quantities of biological material. The PCR process could be analogized to photocopying; millions of exact copies of target DNA regions allowed visualization of allelic patterns that revealed identifying profiles. The results, revealed on strips of paper known as dot blots (particular dots turning blue depending on the presence of the requisite pattern), still were not especially discriminating, as millions of people might share the profile shown by the test; but as corroborating evidence, however, these PCR results were effective.

In the late 1990s, the third generation of DNA tests appeared. These new tests examined STRs and revolutionized forensic DNA practice. Utilizing capillary electrophoresis and robotic processes, the speed of analysis accelerated. Because PCR is a preliminary step in an STR test, this test maintains the efficiency of the dot blot tests with their ability to get results from a small number of cells. The test generates electronic results that can be digitized and entered into a database. This resulted in a paradigm shift in law enforcement: rather than a DNA test being mere corroboration for other evidence, a search of genetic profiles in a law enforcement database is now an initial tool for identifying a suspect. Many cases refer to the current test as "polymerase chain reaction" testing using "short tandem repeats" (PCR-STR). *People v Nelson* (2008) 43 C4th 1242, 1258, 78 CR3d 69; *People v Johnson* (2006) 139 CA4th 1135, 1144, 43 CR3d 587. PCR and STR methods of DNA analysis have been held to be generally accepted in the relevant scientific community for some time now. See 139 CA4th at 1149. For a thorough discussion of DNA testing methods, see Saferstein, Criminalistics: An Introduction to Forensic Science, chap 13 (9th ed 2007).

NOTE: Law enforcement agencies now rely on STR tests in homicides, rapes, assaults, or any case in which semen, blood, saliva, urine, or perspiration is present. Because of the power of STR tests, they have become the national standard for DNA testing, and they have replaced the PCR dot blot and RFLP systems. At the time of this printing, these new tests have exonerated 254 people through postconviction DNA testing, with nine exonerations in California alone. The Innocence Project at http://www.innocenceproject.org; Garrett, *Judging Innocence,* 108 Colum L Rev 55, 57 (Jan. 2008) (208 exonerees cited as of November 2007).

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§5.15 2. Theoretical Basis of STR Testing

Short tandem repeat (STR) testing utilizes the concept of length polymorphism to discern the variance between different individuals' DNA. Some DNA patterns vary in the *sequence* of their four component bases (adenine (A), thymine (T), guanine (G), and cytosine (C)). This is known as *sequence polymorphism*. For example, at one locus, one person might have the pattern ATGCTAG, while another person's allele at the same locus may have the pattern ATG*A*TAG. In contrast, STR testing looks at variances in length because of the number of repeats, for example, ATGCTAG, ATGCTAG, ATGCTAG instead of ATGCTAG, ATGCTAG. This is known as *length polymorphism.* These variations are designated by the number of these short consecutive repeats, hence the name: short tandem repeats or STRs. *People v Nelson* (2008) 43 C4th 1242, 1258, 78 CR3d 69.

Any person's DNA can be categorized at each location by the number of tandem repeats. At each location a person will have, ordinarily, two results, with one allele inherited from the mother and one from the father. For example, if an expert tested three of an individual's loci, the person might have a (10,12), a (7,10), and a (6,9) designating the different number of repeats at each locus. If at any locus there were only one allele indicated, instead of two, for example (8,8), that would indicate that at this locus the individual received the same allele from both the mother and father. In other words, the individual would be *homozygous* rather than *heterozygous* at that locus. See *People v Venegas* (1998) 18 C4th 47, 62, 74 CR2d 262.

The next essential step is the comparison of the DNA typing result taken from a forensic unknown to the genetic profile developed of a known individual ("the reference sample"). If any allele type differs at any locus, the person whose type is the reference is *excluded* as the source of the unknown DNA. Occasionally "missing" alleles rather than *differing* alleles can be explained by test conditions. If there is no difference, then the reference source is included among those who may be included as potential donors.

The frequency of the occurrence of the results at each location can be determined by reference to a population database. Because there is no connection between any of the loci, the result at each locus is independent of the others, and the frequency determination at each locus can be multiplied by the frequency at every other tested location. This is known as the *product rule,* approved by the California Supreme Court in a case that used restriction fragment length polymorphism (RFLP) testing (*People v Soto* (1999) 21 C4th 512, 541, 88 CR2d 34) and by a court of appeal in a case using PCR testing (*People v Reeves* (2001) 91 CA4th 14, 41, 109 CR2d 728). The results of applying the product rule to STR testing are expressed in terms of the probability of a random match. Because of the large number of STR loci, this calculation generates immense ratios, such as one in 10 quintillion—powerful circumstantial evidence of guilt. *People v Jackson* (2008) 163 CA4th 313, 318, 77 CR3d 474 (random occurrence of unrelated persons' DNA among African-American population calculated to be 1 in 400 quintillion).

To be clear, it would be a misconception of forensic DNA analysis to say that "the defendant has a rare type." Every person has a rare type, indeed a unique type. The chance of someone having the genetic profile found on crime scene evidence is not one in trillions, it is one in one—someone definitely has it! What is significant is the chance of a coincidental match: the chance that an innocent person selected at random might match the profile found on the evidentiary sample. If the "random match probability" is one in five or six, this might not be very significant. If it is one in hundreds or thousands it may be very probative, depending on the other evidence. If it is one in hundreds of trillions, quadrillions, or even quintillions, then this is powerful evidence of the identity of the donor. Depending on the nature and circumstances of the test, the random match probability could be anywhere in this range. Improvements in the technology are moving the discriminatory power in the direction of unique identification of donors, but there is always a risk that case-specific factors can confound the test, rendering it less probative.

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3. Laboratory Application of STR Testing Method

§5.16 a. Use of Genetic Analyzer Device and Related Software

The most commonly used short tandem repeat (STR) genetic analyzer device is Applied Biosystems' ABI Prism 310 Genetic Analyzer (ABI 310). By the year 2000, this device had come to dominate the market and has become the most widely used capillary electrophoresis instrument in the United States. See Butler, Forensic DNA Typing: Biology, Technology, and Genetics of STR Markers, p 345 (2d ed 2005). Presently, most crime laboratories use this ABI 310. Therefore, counsel for both sides should be familiar with the protocols for using this device to best anticipate, advance, or counter arguments about the testing procedures related to this device. The use of the ABI 310, in conjunction with the Profiler Plus and COfiler amplification kits, was held to be generally accepted under *People v Kelly* (1976) 17 C3d 24, 130 CR 144. *People v Henderson* (2003) 107 CA4th 769, 132 CR2d 255. See also *People v Jackson* (2008) 163 CA4th 313, 77 CR3d 474 (general acceptance of PCR-STR method using Identifiler amplification test kit). The ABI 310 can be used with ABI's Identifiler and Promega's PowerPlex 16 STR kits as well as their predecessors, ABI's Profiler Plus and COfiler. Earlier Promega products were used in conjunction with Hitachi FM-BIO systems exclusively.

NOTE: Newer instruments for "capillary array electrophoresis" include, for example, the ABI Prism 3100, 3130, 3700, and 3730. These instruments feature arrays of capillaries that enable the user to analyze multiple samples at the same time. This is particularly useful for analysis of samples for inclusion in offender databases. Utilization of batch processing is critical to elimination of the chronic backlogs in completing such testing. The technology behind these instruments is essentially the same technology used in the ABI 310. For the most recent models listed from ABI, go to http://www.appliedbiosystems.com and choose the "Products" tab, then select the "Human Identification & Forensic DNA" product webpage link.

The process for using the ABI 310 and related devices is explained in §§5.17-5.21.

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§5.17 (1) Step 1: Extraction and Amplification

First, the technician extracts DNA from the sample and then amplifies, or chemically "photocopies," the segments needed for testing using the PCR (polymerase chain reaction) method. In a test tube, the technician inserts (1) a reaction mix, which includes the DNA sample that is the template for copying; (2) primers consisting of artificial DNA designed to identify and attach to each of the target loci, thus priming them for copying; (3) a buffer; (4) trillions of each of the four DNA component bases (A, T, G, and C), which are chemically manufactured; (5) and an enzyme, TAQ polymerase, taken from the bacterium thermus aquaticus, which survives high temperatures. See Butler, Forensic DNA Typing: Biology, Technology, and Genetics of STR Markers, chap 4 (2d ed 2005). See also Saferstein, Criminalistics: An Introduction to Forensic Science, chap 12 (9th ed 2007).

Common STR primer kits available from various manufacturers include Profiler Plus, COfiler, and Identifiler. Fluorescent tags in the primers color code groups of loci for later identification. A thermocycler machine heats the test tube to split apart the DNA, and during a subsequent cooling cycle, template DNA joins with specific primers. The TAQ polymerase directs the addition of the bases to the joined primers and templates, extending the primers according to the template's pattern. Only DNA at the target loci amplify, and this portion soon drowns out the remainder of the tiny crime sample DNA. Double-stranded DNA synthesizes from single strands, only to be separated again during succeeding amplification cycles. The process repeats, extending the primers again, increasing the number of copies of the template DNA geometrically, in the PCR. The total number of copies doubles during each heating and cooling cycle, which repeats until there is sufficient DNA for testing. See Butler, Forensic DNA Typing, chaps 4-5.

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§5.18 (2) Step 2: Dye and Insertion Into Analyzer

After amplification, the technician places a portion of the amplified product into a test tube then into a tray alongside other test tubes that contain other samples to be tested seriatim during a single machine run. The technician combines each sample with internal molecular weight markers labeled with a red dye, called ROX, which is injected along with the amplified short tandem repeats (STRs). These markers are used as a standard for comparison, to determine the sizes of the STRs. The technician inserts the tray into the ABI Prism 310 Genetic Analyzer, which automatically samples each test tube, drawing the DNA molecules into a transparent capillary tube. See Butler, Forensic DNA Typing: Biology, Technology, and Genetics of STR Markers, chap 14 (2d ed 2005).

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§5.19 (3) Step 3: Electrophoresis

Electrophoresis is the migration of particles through a gel or plasma medium after the application of electricity. In the ABI Prism 310 Genetic Analyzer, this takes place in a capillary tube. The device applies a positive charge at one end of the tube (the anode) and a negative charge at the other end (the cathode), which causes the DNA fragments to move. During electrophoresis, DNA fragments separate by size because the shorter fragments move faster than the longer ones. When the sample reaches a certain point in the capillary tube, the machine scans it with a laser. The laser activates fluorescent tags that attached to the DNA fragments and color-coded groups of loci earlier in the process. The resulting light passes through a prism. The machine measures the intensity and color of the light as well as the exact time that the molecules pass through the capillary. See Butler, Forensic DNA Typing: Biology, Technology, and Genetics of STR Markers, chap 14 (2d ed 2005).

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§5.20 (4) Step 4: Sizing With GeneScan

Software, such as GeneScan, or its recent upgrade, GeneMapper, "sizes" the DNA fragments by generating a graph for each sample and for the red-tagged internal molecular weight markers, with the vertical axis showing the amount of DNA (peak height) and the horizontal axis denoting the length of the run, which indicates the molecular weight, and thus the length of the short tandem repeats (STRs). All STRs in the sample can be compared with the red dye ROX graph. Because the fragments of DNA move at a predictable rate during electrophoresis, the location of the peaks on the graph can be compared with known alleles on a standard "ladder." The results for each of the loci can be found at different points on the graph, and because there is slight overlap between the ranges of loci, they are divided into three groups, identified by the different colored fluorescent primer dyes (blue, green, and yellow) that tagged the DNA fragments. A mathematical file called "the matrix" separates the dyes, discerning DNA data from the "spectral overlap" of the four color dyes. GeneScan tabulates the peak heights and normalizes the baseline, which separates the meaningless low-level data "chatter" from valid peaks, which rise above it. See Butler, Forensic DNA Typing: Biology, Technology, and Genetics of STR Markers, chap 15 (2d ed 2005). See also the DNA Initiative *Glossary* (visited June 3, 2010), available at http://www.DNA.gov/glossary.

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§5.21 (5) Step 5: Comparison with GenoTyper or GeneMapper

After GeneScan sizes the DNA, a second program called GenoTyper compares the samples to a manufactured ladder of the most common alleles, labeling every peak that climbs above a predetermined level of relative fluorescence units (RFUs) with an allele call or designation regardless of whether the result is a real DNA peak or just an artifact. An artifact is a "non-allelic product of the amplification process" and, therefore, not a true part of the ultimate profile. See DNA Initiative *Glossary* (visited June 3, 2010), available at http://www.DNA.gov/glossary. See also Butler, Forensic DNA Typing: Biology, Technology, and Genetics of STR Markers, chap 15 (2d ed 2005). For discussion about artifacts, see §5.31.

Presumed artifacts or "off-ladder" (very rare) alleles are so designated by the program. An integrated software program, GeneMapper, can be used to perform the functions of both GeneScan and GenoTyper. GeneMapper is also compatible with the new 15-locus Identifiler PCR kits. In either case, the data is presented as an electropherogram, a long graph that looks like a series of mountain peaks separated by long plains. The horizontal axis of this graph, indicating when the peaks occurred during the test run, shows allele size. The vertical axis, showing the height of the peaks, indicates the amount of genetic material, which should be balanced among the peaks (though a homozygous result would indicate a single peak of approximately double the height). In addition, the height of the peaks on the vertical axis should reach a predetermined minimum height to indicate that, indeed, there is genetic material at the location where a particular allele would be expected to show, thus identifying the particular genotype at that location for the sample tested. See Butler, Forensic DNA Typing: Biology, Technology, and Genetics of STR Markers, chap 15 (2d ed 2005).

The technician, following particular validated criteria for discerning valid peaks from artifacts, makes these determinations as he or she manually edits the computerized results and generates the test report. Next, the technician compares the various samples from the case, such as crime scene samples and samples from suspects or victims. In most cases with unmixed samples, if a suspect's genetic profile varies from profiles found at the crime scene at any locus, he or she must be excluded. *People v Brown* (2001) 91 CA4th 623, 629, 110 CR2d 750; *People v Reeves* (2001) 91 CA4th 14, 29, 109 CR2d 728. Exclusion is required if there is no explanation for the variance. See §5.28.

If the suspect cannot be excluded, the technician then checks the database for the frequencies of occurrence of each allele at each locus and then he or she multiplies those ratios to determine the rarity of the genetic profile. *Brown,* 91 CA4th 623, 630. Because of the number of STR loci, the result can be infinitesimally small, indicating an extremely rare profile. However, even though the numbers may appear definitive, the underlying testing is not always infallible, and multiple factual issues exist for a defense attorney to investigate when a defendant is implicated by an STR test. See Butler, Forensic DNA Typing, chap 15.

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§5.22 b. Use of Other STR Testing Devices

Other DNA testing devices include the Hitachi FM-BIO, utilizing fluorescent detection of the results of polyacrylymide gel electrophoresis. Promega makes PowerPlex test kits, which are compatible with ABI instruments and others. The PowerPlex 16 BIO system is a 16-STR locus kit designed for use with the Hitachi FM-BIO instrument. Promega also manufactures the GenePrint gel electrophoresis systems with four-STR locus fluorescent testing kits, such as CTTv and FFFL, and the three-STR locus CTT silver stain system, also utilizing a gel bed rather than a capillary tube. For product updates, see http://www.promega.com/Default.asp and http://www.miraibio.com (for Hitachi software). See Butler, Forensic DNA Typing: Biology, Technology, and Genetics of STR Markers, chap 14 (2d ed 2005). Also, new miniSTR kits such as ABI's Mini-Filer use smaller, more focused probes, which obtain results from DNA that has broken down and degraded. Butler, Forensic DNA Typing, p 264.

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§5.23 4. Other Laboratory Testing Methods: Y-STR and Mitochondrial DNA

Other technologies are now employed in DNA testing in limited circumstances. Y-STR testing examines STR loci in the Y chromosome, which is possessed exclusively by males. This may assist in identification when there is very little DNA available from the male, because the test is able to focus on that limited quantity. The gene is inherited from the father and is shared by male siblings. For further discussion of Y-chromosome DNA testing, see Butler, Forensic DNA Typing: Biology, Technology, and Genetics of STR Markers, chap 9 (2d ed 2005) and Saferstein, Criminalistics: An Introduction to Forensic Science, chap 13 (9th ed 2007).

Mitochondrial DNA testing is used occasionally in criminal cases. See, *e.g., Cooper v Brown* (9th Cir 2007) 510 F3d 870. Mitochondrial DNA is inherited maternally; siblings share the type with their mother. This DNA is found outside the nucleus of the cell. It is not a factor in human genetic characteristics but it determines the genetic qualities of the mitochondrial component of the cell itself. When the cell divides after conception, the identical mitochondria are present in each of the divided cells. Mitochondrial DNA results are not particularly discriminating; many persons will match. However, because there is much more mitochondrial DNA in each cell than there is DNA in the nucleus, more mitochondrial DNA is likely to remain after cells begin to break down. It is present in teeth, nails, hair, and bones, so it can be tested after flesh is gone. Historical analyses of DNA, such as the cases of Thomas Jefferson's heirs and whether "Anastasia" was truly Anastasia Romanov, heir to the Russian throne, used Y chromosome and mitochondrial DNA tests, respectively. See Butler, Forensic DNA Typing, chap 10. See also Guyer, *Research in the News: DNA's Role—Tales From the Crypt,* available at the National Institutes of Health's Office of Science Education website at http://science-education.nih.gov (in the search field, type "Tales From the Crypt").

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§5.24 5. Emerging Technologies

Emerging technologies on today's horizon include single nucleotide polymorphism (SNP), which tests loci where there are only two possible alleles. This test is highly suitable for digital analysis (*e.g.,* on a microchip). While there is obviously very little discrimination at each locus, hundreds of loci can be tested simultaneously on a 36 mm microchip, which allows good discrimination between people. This technology would facilitate DNA testing at remote locations or by satellite transmission. SNPs may be utilized to efficiently screen out unproductive targets—for instance, when a large number of bloodstains are present at a crime scene, and only some of them may yield probative evidence For further discussion of SNP technology, see Zhong et al., *Single-Nucleotide Polymorphism Genotyping on Optical Thin-Film Biosensor Chips,* 100(20) Proceedings of the National Academy of Sciences (Sept. 30, 2003). See Butler, Forensic DNA Typing: Biology, Technology, and Genetics of STR Markers, chap 17 (2d ed 2005).

In addition, gas chromatography-mass spectrometry (GCMS) is being posed as an alternative to capillary electrophoresis. Pentanucleotide STRs, involving five base-pair repeats rather than four, are being used in Europe, and are included in several kits manufactured by Promega. Pentanucleotide STR testing enjoys reduced occurrence of confusing artifacts like stutter. See Butler, Forensic DNA Typing, p 126; see also §5.31.

Scores of additional STR loci have been identified for forensic use, and multiplex tests for these loci will facilitate familial searching and other developing protocols. The National Institute of Standards and Technology (NIST) has developed a "megaplex" testing kit that includes 23 new STR loci. See Butler et al., *New Autosomal and Y-Chromosome STR Loci: Characterization and Potential Uses,* Proceedings of the 18th Int'l Symposium on Human Identification (Oct. 4, 2007), available at http://www.promega.com/GENETICIDPROC/ussymp18proc/oralpresentations/Butler.pdf.

"Expert systems" have been validated to minimize the labor-intensive process of human analysis of STR results. Though the initial use has been in the large batch-processing of genotypes for creation of offender databases, crime labs anticipate reducing other sample testing backlogs more efficiently with such automated processes. See Butler, Forensic DNA Typing, p 424. Low copy number (LCN) (also known as low *template* or *touch DNA*) technologies allow typing with incredibly minuscule biological samples, though questions about the reliability of results mandates close scrutiny of such procedures. Butler, Forensic DNA Typing, pp 168-169. Problems include false positives due to very high stutter and allelic "drop-in" as well as false negatives due to pronounced peak imbalances and allelic "drop-out." J.M. Butler, ISHI 2009 LCN Panel, "*Scientific Issues with Low Amounts of DNA*," October 15, 2009, available at http://www.cstl.nist.gov/div831/strbase/pub_pres/Butler_Promega2009-LCNpanel-for-STRBase.pdf. A New York judge was the first in the nation to approve of this technique in the case of Hemant Megnath, a man prosecutors say slashed a young woman's throat just before she was about to testify against him in a rape case. The DNA from a trace of blood linked Megnath to a seat belt in victim Natasha Ramen's car. New York Daily News, February 11, 2010, available at http://www.nydailynews.com/news/ny_crime/2010/02/11/2010-02-11_controversial_dna_test_gets_judges_nod.html#ixzz0oxi1DuXd.

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B. Earlier DNA Testing Methods and Techniques

§5.25 1. Restriction Fragment Length Polymorphism (RFLP)

The first forensic DNA test was restriction fragment length polymorphism (RFLP). DNA extracted from a sample was combined with specialized enzymes that cut the DNA at targeted locations. After the DNA at the target locus was isolated in this manner from each sample and given a radioactive tag, the product was loaded into lanes in a gel bed to which an electrical current was applied. The DNA migrated through the gel at a predictable rate according to its length. The various lengths corresponded to the known alleles in this test of length polymorphism. For each gel testing of a single locus, alleles could be determined for a suspect, a victim, positive and negative controls, and a ladder indicating each known allele for comparison. The results were visualized on x-ray film, which reacted to the tags on each sample. See Butler, Forensic DNA Typing: Biology, Technology, and Genetics of STR Markers, p 3 (2d ed 2005) and Saferstein, Criminalistics: An Introduction to Forensic Science, chap 13 (9th ed 2007). The declaration of a match was based on a crude process of lining up the generally blurry little dashes and then comparing the suspect and known alleles with a ladder, all utilizing the naked eye. See *People v Venegas* (1998) 18 C4th 47, 57, 74 CR2d 262; *People v Reeves* (2001) 91 CA4th 14, 60, 109 CR2d 728.

Although the discriminatory power of the RFLP test was strong, the match criteria were inexact due to a lack of precision. The bands indicating particular alleles could overlap, and more than one allele might be present in the "match window," which corresponded to the potential locations of a band; therefore, it was necessary to use a "binning" process, which combined the statistics for all of the potentially overlapping adjacent alleles. See, *e.g.*, *Venegas,* 18 C4th 47, 64. Further, compared with the current standard, the RFLP process required a relatively large amount of DNA, the process was slow and cumbersome, multiple gels were needed to test multiple loci, these gels were easily contaminated, and there were potential safety issues because of the radioactive materials. *People v Nelson* (2008) 43 C4th 1242, 1258, 78 CR3d 69 (RFLP more slow and cumbersome and less able to process degraded samples). See Butler, Forensic DNA Typing, pp 80.

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§5.26 2. Polymerase Chain Reaction (PCR) Amplification

In the mid 1990s, the second generation of testing emerged. Polymerase chain reaction (PCR) amplification, which has remained a vital element in every subsequent improvement in DNA testing, is a technique for rapid duplication of DNA at the targeted loci. In PCR testing, the analyst combines extracted DNA with a ready-made cocktail of TAQ polymerase (an enzyme that thrives despite very high temperatures), free-floating bases, synthetic DNA primers (which are designed to adhere to each side of the target region by virtue of their sequence), fluorescent dye tags, and other chemicals. When the solution is heated, the double helix unzips in a chain reaction. When the solution cools, the primers and free-floating bases anneal with DNA at the targeted loci, doubling the desired DNA. In each of the multiple heating and cooling cycles, the target DNA doubles. This process takes hours rather than days, and it allows DNA typing of the tiniest amounts of biological material, sometimes just a few cells. Because so little DNA is needed to conduct the test, some of the original sample can be retained for defense testing or preservation until a more sophisticated technology can be applied in the future. See Butler, Forensic DNA Typing: Biology, Technology, and Genetics of STR Markers, chap 4 (2d ed 2005).

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§5.27 3. Reverse Dot Blot Typing

When the PCR process was first introduced, it was used in conjunction with a reverse dot blot typing method. The first such test was known as "DQA" or "DQ Alpha," which examined a single polymorphic locus by that name. A second dot blot test, called Polymarker, looked at multiple loci, and then a combined DQA-Polymarker test followed. These reverse dot blot tests were designed to type loci with sequence variations: each allele took its form from variation in the order of the bases A, T, G, and C. The test results manifested on strips of paper immersed in a solution that included the amplified DNA product. A blue dot would appear on the test strip in the printed box labeled with the corresponding allele. A second blue dot would appear in another box to indicate that the result was valid. Without the second dot, the first dot would have to be disregarded. One could have more confidence in these results than in a restriction fragment length polymorphism (RFLP) test because of the precision with which dot blots indicated the presence or absence of the possible alleles. See *State v Harvey* (NJ 1997) 699 A2d 596, 616; *People v Coy* (Mich App 2000) 620 NW2d 888, 893. Reverse dot blot typing has been replaced by short tandem repeat (STR) testing (discussed in §§5.14-5.22).

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III. DETERMINATION OF MATCH; STATISTICAL ISSUES

§5.28 A. Significance of a Match

The second step of DNA analysis is to compare the DNA patterns produced by the processing step to determine whether the suspect's DNA pattern matches the DNA pattern of material found at the crime scene. *People v Venegas* (1998) 18 C4th 47, 62, 74 CR2d 262.

Because the entire 3 billion base-pair genome cannot be efficiently tested, only selected locations are tested. The current standard involves comparing 13 loci that are highly variable (polymorphic) and have been tested to ensure both that they have no functional relationship to each other and that they are inherited completely independently from each other. Butler, Forensic DNA Typing: Biology, Technology, and Genetics of STR Markers, p 94 (2d ed 2005). These conditions of independence are known as "Hardy-Weinberg equilibrium" and "linkage equilibrium." *People v Brown* (2001) 91 CA4th 623, 631, 110 CR2d 750. Because of this independence, a match at each locus has independent significance, and the probabilities of a match at each locus can be multiplied to determine the rarity of the genetic profile. See *People v Venegas* (1998) 18 C4th 47, 66, 74 CR2d 262; *People v Brown,* 91 CA4th 623, 639 (statistical correction factors used in certain instances); *People v Reeves* (2001) 91 CA4th 14, 33, 109 CR2d 728. See also, the DNA Initiative *Glossary* (visited June 3, 2010), available at http://www.DNA.gov/glossary. For population statistical calculation issues, see §5.45.

The term "match" must be defined. No technology exists to actually match every single base pair of an unknown sample to a known individual. The premise of a DNA "match" is that the existence of any difference between an unknown sample and a known individual means that the known individual cannot be the source of the unknown sample. This is because a person's DNA remains constant and is identical in every cell; therefore, nonidentical DNA must be from two different people. Ruling out a suspect in this manner is called an "exclusion." DNA analysis involves comparing genetic profiles and ruling out suspects who have alleles that differ from the unknown crime scene samples. See Butler, Forensic DNA Typing, chap 15.

On the other hand, when there is no difference between an individual's DNA and the unknown sample, that individual cannot be excluded. While this might not be significant if the results are identical at only two or three loci, the standard 13-STR loci are highly polymorphic or variable, and the more loci at which genotypes match, the less the likelihood of a coincidental match. Because the loci are independent, it is statistically sound to multiply the probability of a match at each locus. At 13 loci, the denominator of this fraction may be hundreds of trillions or quintillions. *People v Jackson* (2008) 163 CA4th 313, 318, 77 CR3d 474 (random occurrence of unrelated persons' DNA among African-American population calculated to be 1 in 400 quintillion).

These core 13 loci were chosen to be the basis of the Combined DNA Index System (CODIS) national DNA database. See Butler, Forensic DNA Typing, p 94.

NOTE: The National Database Index System (NDIS) is the official name of the offender database. While CODIS is actually the software that law enforcement agencies use to search the offender database, CODIS has become synonymous with the database. See the DNA Initiative *Glossary* (visited June 3, 2010), available at http://www.DNA.gov/glossary; Song, Patil, Murphy, & Slatkin, *Average Probability that a "Cold Hit" in a DNA Database Search Results in an Erroneous Attribution,* 54(1) J Forensic Sci 22.

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§5.29 1. Spurious Results and Mixed Sample Cases

To some extent, the determination of a match remains problematic although it was more of a problem with the original DNA testing technologies such as RFLP or PCR dot blot testing. See §§5.25, 5.27. Despite the persistence of match criteria issues, current STR testing is leagues beyond those legacy DNA tests in the reliability of its discrimination between individuals in making a match and doing so in a way that potently demonstrates the rarity of the ascertained profile.

An analyst will say that the alleles match at any locus when the test indicates that the same types are present in a crime scene sample and reference sample. The analyst's basis for making this statement is his or her seeing a peak in an electropherogram, which is a data point in a graph generated by a computer's interpretation of a measurement of an electrical impulse captured on a camera. Due to limitations of the testing technology, the test itself cannot definitively distinguish between electrical impulses caused by DNA and those caused by the test itself (for artifacts, see §§5.21, 5.31), nor can it by itself indicate the source of this DNA—whether the donor is one person rather than another. These discernments must be made, and can be made with confidence, by a trained analyst who can recognize those conditions by which a test generates spurious results and those situations indicating a mixture of two or more persons' DNA rather than a single source. See *People v Smith* (2003) 107 CA4th 646, 671, 132 CR2d 230 (discussing allelic dropout, stutter, and artifacts; holding that, if properly analyzed, mixed samples can be accurately profiled and questions about accuracy go to weight of evidence). See also Garrett, *Judging Innocence,* 108 Colum L Rev 55, 84 n109 (Jan. 2008) (laboratory erred by not separating male and female DNA in a mixed DNA sample; defendant exonerated in postconviction DNA testing).

Because humans make the subjective choices in analyzing the data, the test result (*i.e.,* the analyst's conclusion) is inherently subject to scrutiny on cross-examination as to whether match criteria are satisfied. Further, there is no built-in statistical compensation for the degree of confidence with which a match is declared, which again provides room for argument by the opponent of the test result. However, there are techniques for "mixture deconvolution," such as the use of computer analytical software, which actually can attribute a quantitative degree of confidence to the match. Failure to use such a technique in a mixed sample case could be another aspect of the cross-examination. See Perlin & Szabady, *Linear Mixture Analysis: A Mathematical Approach to Resolving Mixed DNA Samples,* 46(6) J Forensic Sci (Nov. 2001). See also Butler, Forensic DNA Typing: Biology, Technology, and Genetics of STR Markers, chap 7 (2d ed 2005). Compliance with new FBI/SWGDAM standards for analysis of mixtures may be an important issue in assessing the reliability of test results of this nature. See http://www.fbi.gov/hq/lab/html/codis_swgdam.htm.

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§5.30 2. Partial Match Problems

Matching problems are underscored when there is only a "partial match," as distinguished from a complete 13-locus match or an exclusion. If a suspect has even one allele that differs from the sample evidence, he or she must be excluded; if a suspect matches at all 13 loci, the likelihood of a coincidental match will be infinitesimally small, although possible. See Jefferson, *Cold Hits Meet Cold Facts: Are DNA Matches Infallible?,* 40(1) Boalt Transcript 28, 30 (Spring 2008) ("cold hit" DNA profile match was 4 years old when murder committed), available at https://www.law.berkeley.edu/alumni/transcript/spring-08/Transcript.Spring08.Weblow.pdf. Sometimes, however, a partial match can result because the crime scene evidence is degraded due to the passage of time, environmental conditions, inadequate storage, problems in conducting the test, or, rarely, the suspect's reference sample is incomplete, perhaps because it was obtained surreptitiously or otherwise compromised. See Saferstein, Criminalistics: An Introduction to Forensic Science, chap 13 (9th ed 2007). For whatever reason, when a partial match results, the analyst will compute statistics for the loci where there is a match, which may show substantially higher probability of coincidence than in the case of a complete match, but, nevertheless, will show fairly strong evidence of identity.

The strength of the results is measured in relative fluorescence units (RFUs): the amount of light generated by the fluorescent-tagged DNA when it is excited by a laser as it passes through the capillary tube. The RFU cutoff might be set at 100, for example, based on the manufacturer's recommendations and the lab's validation of the testing instrument. A partial match may result when there are indications in the results of additional matching alleles, which are below the "RFU threshold" and thus too weak to be relied on. Low level DNA, *e.g.,* 50 RFU, at a particular locus might be indicated at a location on an electropherogram, which suggests the presence of a particular allele—perhaps an allele matching the suspect's type. However, it cannot be considered a match because the results at that level are not sufficiently reliable when the lab has not validated results below its preset RFU cutoff. The results at this locus may be deemed "inconclusive." See *State v Bailey* (Minn 2007) 732 NW2d 612, 622 (although peaks below 150 RFU are not admissible in state's case in chief, defendant opened door to testimony); *Cook v State* (Tex App 2003) 99 SW3d 310, 314 (peak heights below 150 RFU "*should be interpreted with caution*") (emphasis in original); see also, Butler, Forensic DNA Typing: Biology, Technology, and Genetics of STR Markers, chap 15 (2d ed 2005).

Often, in the case of a partial match, an analyst will tell the jury about these consistent DNA results at inconclusive loci, bolstering confidence in the conclusion, while also "giving the benefit of the doubt to the defendant" in not figuring this result into the final statistic. Because these results are not validated and are, in fact, used against the defendant, they might be addressed appropriately with an Evid C §402 motion to exclude them. *Inconsistent* DNA results below the RFU cutoff—possibly suggesting an exclusion—also are not counted, either to exclude or to diminish the statistical conclusion, which the defense would find fertile ground to argue reasonable doubt of guilt. Evid C §500; Pen C §1096. Also, many labs, including the FBI lab, will utilize a lower RFU threshold to exclude, which is an important safeguard for the fair administration of justice.

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§5.31 3. Anomalous Data Arising From Artifacts

A weakness of STR tests is the degree of subjectivity with which lab analysts may describe the data. The primary source of this subjectivity is the characterization of anomalous data that inevitably results from artifacts. Artifacts are spurious test results that are caused by the test itself rather than being a true indication of the DNA type, which is the subject of the test. Artifacts may appear as peaks on an electropherogram at a location where results are not expected, or they may occur at the location of a known allele, but they are correctly deemed artifacts when they do not correspond to the actual genotype tested. The size or shape (morphology) of the peak may indicate to the analyst that an artifact is present, rather than a true allele. Analysts will be tempted to refer to the suspect's genetic profile for a hint that the unexpected peak is an artifact. It is arguable whether this is good science, in that it is contrary to the blind testing norm, but certainly to the opponent of the test this would suggest an inappropriate presumption of guilt and a lack of independence of the DNA evidence from the other evidence.

"Artifacts" include, for example, results that are not within the typing region and different peak shapes from what would be expected on the electropherogram. *People v Jackson* (2008) 163 CA4th 313, 323, 77 CR3d 474. Other artifacts include "stutter," "spikes," "dye-blobs," "pull-up," "bleed through," or "noise," (*e.g.,* stutter results from a fragment of DNA that breaks off during the PCR process). In tetranucleotide systems (*i.e.,* four base pair repeats, as used in Profiler Plus and COfiler), the stutter fragments are always four base pairs or one repeat in length. Stutter always occurs at the location of a known allele, typically one repeat less than the true alleles, although in some instances one repeat greater. Thus, stutter DNA mimics the presence of another recognized allele. See Butler, Forensic DNA Typing: Biology, Technology, and Genetics of STR Markers, p 123 (2d ed 2005).

NOTE: There are accepted tests for stutter that reliably identify it; but because this is not a certainty, defense counsel can rightly question whether the DNA for another person is also present. When any artifact occurs at the location of a known allele, the issue of the analyst's subjectivity is underscored.

A different problem arises when an artifact is seen on an electropherogram at a location where there is no known allele. In that case, the software will alert the analyst who is then called on to characterize the artifact, or else determine whether an "off-ladder allele" has been detected. In some instances, the result does indicate a previously unknown allele that is not represented on the ladder of known alleles, which is run alongside the other evidence in every case. These rare or mutant alleles are discovered regularly and are listed on the Short Tandem Repeat DNA Internet Database for reference. For the STRBase website, go to http://www.cstl.nist.gov/biotech/strbase.

To determine definitively whether an off-ladder allele is present, the analyst must "sequence" the DNA, in other words he or she must perform a test that indicates the entire sequence of the questioned peak, and not just the measurement of its length. Before an analyst would undertake such a study, he or she would first re-run the test. If the off-ladder peak occurred again, sequencing may be justified. If the peak disappeared, it could be written off as a mere artifact, which in fact is by far the most common explanation for such a result. See Miozzo et al., *Characterization of the Variant Allele 9.2 of Penta D Locus,* 52(5) J Forensic Sci 1073 (Sept. 2007). All of this having been said, crime labs typically do not wish to expend the time on scrutiny of what is almost certainly an artifact. Defense counsel may want to argue, however, that the defendant deserves this special care before being convicted of a crime, and that the failure to do such testing must raise a reasonable doubt as to guilt. Evid C §500; Pen C §1096. On the other hand, if the defendant does have an incredibly rare or mutant allele in his or her genetic profile and this same anomaly is found in crime scene evidence, then the DNA is certainly unique and the defendant is almost certainly the donor. For a discussion of microvariants, see Butler, Forensic DNA Typing, chap 6.

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§5.32 B. Population Statistics: The Product Rule

The final step of forensic DNA testing is to calculate the statistical probability that the DNA profile of an unrelated person, selected at random from the relevant population, would contain all the alleles of the evidentiary sample. Butler, Forensic DNA Typing: Biology, Technology, and Genetics of STR Markers, chap 21, p 497 (2d ed 2005). Forensic DNA testing assumes that a population statistic must be supplied along with evidence of a match so that the trier of fact may grasp its significance. See National Research Council, The Evaluation of Forensic DNA Evidence (NRC II) (1996). Once a match is found, the DNA profile of the matched samples is compared with the DNA profiles of other available DNA samples in a relevant population database or databases in order to determine the statistical probability of finding the matched DNA profile in a person selected at random from the population or populations to which the perpetrator of the crime might have belonged. *People v Soto* (1999) 21 C4th 512, 518, 88 CR2d 34. Experts calculate the odds or percentages that a random person from the relevant population groups would have a similar match. *People v Wilson* (2006) 38 C4th 1237, 1242, 45 CR3d 73.

Experts use a statistical method called the "product rule" to calculate the rarity of the sample in the relevant population. The frequency with which each measured allele appears in the relevant population is estimated through the use of population databases. The frequencies at each tested locus are multiplied together to generate a probability statistic reflecting the overall frequency of the complete multilocus profile. The result reflects the frequency with which the complete profile is expected to randomly appear in the population. The result is sometimes expressed as the probability that the DNA of a person selected at random from the relevant population would match the evidentiary sample at all tested loci. *People v Nelson* (2008) 43 C4th 1242, 1258, 78 CR3d 69, quoting *People v Soto,* 21 C4th at 541.

For discussion of *Kelly* rule issues related to population statistics, see §5.45.

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C. Cold-Hit Cases

§5.33 1. Database Search or Trawl

A "cold hit" DNA match is one where the suspect is first identified by a database search or "trawl." This is in contrast to a "confirmation" match, which is a match in which a suspect has already been developed based on other information. *People v Johnson* (2006) 139 CA4th 1135, 1146, 43 CR3d 587. For example, in the leading California case, the evidentiary DNA sample was run against a database containing 184,000 DNA profiles, and the defendant's profile came back with a tentative match. The defendant had been interviewed by the police, but he was not charged. The defendant's complete profile was compared with the crime scene evidence, resulting in a confirmatory match. *People v Nelson* (2008) 43 C4th 1242, 1248, 78 CR3d 69.

California's offender database is a source for over 1 million convicted felons whose genetic profiles may be searched to find a match to the crime scene evidence. Also, a nationwide offender search is now possible because of the CODIS (Combined DNA Index System) program. The FBI, in conjunction with state and local forensic laboratories, created this computerized database of DNA profiles of known, convicted offenders and unknown forensic DNA samples. CODIS allows law enforcement at all levels to compare DNA profiles electronically. *People v Johnson* (2006) 139 CA4th 1135, 1150 n14, 43 CR3d 587.

One of the most extraordinary advantages of short tandem repeat (STR) testing of the 13 standardized loci (see §5.28) is the facility with which the results may be compiled into offender and forensic unknown databases. The CODIS program has been profoundly successful in generating "cold hits," matching offenders to previously unsolved crimes, many of which lacked any suspect at all. Many forensic unsolved cases have been linked to each other, revealing the work of serial offenders. Indeed, the law enforcement paradigm has been turned on its head—with DNA testing being the first step in criminal investigations rather than the last, thus generating enormous efficiency. See *U.S. v Kincade* (9th Cir 2004) 379 F3d 813, 838 n38. Also, at the time of this printing, 254 wrongfully convicted individuals have been able to obtain postconviction DNA crime scene testing with new DNA technology and have been freed, including nine from California. Further, some actual perpetrators of these same crimes have been found by running crime scene DNA profiles against the offender database. See Garrett, *Judging Innocence,* 108 Colum L Rev 55, 119 (Jan. 2008). See also The Innocence Project at http://www.innocenceproject.org.

Now, on a regular basis, all genetic profiles in the constantly updated offender database are compared with an updated database of genetic profiles from forensic unknowns (unsolved crimes). The search is a "moderate stringency search," meaning that the matches need not be perfect. The reason for this is a preference for being overinclusive rather than erroneously ruling out someone, in case there has been a slight typing error or perhaps incomplete results from degraded evidence from a crime. Also, very close nonmatches rule out suspects but strongly suggest that a relative is responsible. California Dep't of Justice, Division of Law Enforcement, *Information Bulletin: DNA Partial Match (Crime Scene DNA Profile to Offender) Policy, 2008-BFS-01* (visited June 3, 2010), available at http://ag.ca.gov/cms_attachments/press/pdfs/n1548_08-bfs-01.pdf (protocol for releasing name of CODIS "partial match" (match of 15 STR alleles) possibly implicating relative in unsolved crime). A moderate stringency search may generate a list of several possible suspects, most of whom can easily be ruled out; however, other suspects may be a close enough match for a review of the crime scene evidence or the reference sample to check for typing errors, to see if in fact a match exists. A perfect match will suggest the suspect at the outset. In any event, the cold hit gives rise to a retesting of the suspect to be sure that he or she is the person who gave the matching database sample. This acknowledges possible errors during the offender sampling process, which may involve less than ideal sampling conditions by unknown law enforcement officials, or possible sample confusion during the large scale batch testing of offenders, but at the same time gives good assurance that the right person is prosecuted.

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Source: Criminal Law/Scientific Evidence in California Criminal Cases/5 DNA Evidence/§5.34 2. Statistical Issues

§5.34 2. Statistical Issues

Cold-hit statistical issues have been the latest issues of controversy. Cold-hit statistics are not subject to a *Kelly* rule analysis when a database is used merely to identify a possible suspect. *People v Johnson* (2006) 139 CA4th 1135, 1141, 43 CR3d 587. Additionally, the use of the product rule to calculate the odds in a cold-hit or trawl case is not the application of a new scientific technique subject to the *Kelly* test. *People v Nelson* (2008) 43 C4th 1242, 1259, 78 CR3d 69. The California Supreme Court has explained that in cold-hit cases, the question is whether the odds calculated by the product rule are relevant, and it has held that the odds are in fact relevant. In a non-cold-hit case, the number derived from the product rule shows (1) the frequency with which a particular DNA profile would be expected to appear in a population of unrelated people ("the rarity statistic"), and (2) the probability of finding a match by randomly selecting one profile from a population of unrelated people ("the random match probability"). In a cold-hit case, the product rule number no longer accurately expresses the "random match probability" because the defendant has been located through a database search. However, the "rarity statistic" is still relevant because it shows the rarity of the existence of the specific DNA profile in society as a whole. Stated another way, "the question of how probable it is that the defendant not the database is the source of the crime scene DNA remains relevant … The rarity statistic addresses this question." *People v Nelson,* 43 C4th at 1263.

Notwithstanding resolution of the admissibility of cold-hit statistics, there may still be a trial issue. The jury may decide whether the random match probability (RMP) is appropriate given the fact that the reliability of the RMP is undermined by the dynamic of "ascertainment bias" in cold-hit cases. The idea is that a database search actually is comprised of multiple searches—as many searches as there are genetic profiles in the database, currently over 1 million. See Government Technology's News Report, *California Attorney General Expands DNA Search Policy to Relatives of Suspects* (Apr. 25, 2008), available at http://www.govtech.com/gt/articles/301780. Comparing one genotype to each of 1 million genotypes seriatim is different from finding one matching genotype at random, and many scientists believe this increases the likelihood of a coincidental match. The classic example of ascertainment bias is known as the birthday problem. Assume that birthdays are evenly distributed and that the chance of two people having the same birthday is about 1 in 365. The chance of finding two people in one room having the same birthday however is greater than 50 percent once there are 23 people in the room. When there are 64 people in the room, the chance of a shared birthday is more than 99 percent. Comparing each person against the other is what makes the computational difference, and it is analogous to a database search. See Hollander & Proschan, The Statistical Exorcist: Dispelling Statistics Anxiety, p 195 (1984).

CODIS software, in this fashion, dramatically increases the chance of finding a match, which naturally makes it an extraordinary crime-fighting tool. The side effect, however, is the increased chance of coincidental match. The trial issue is whether the statistics fairly describe the chance of coincidence and, more precisely, whether there is a reasonable doubt of guilt because of evidence that the defendant has matched due to an innocent coincidence. See Jefferson, *Cold Hits Meet Cold Facts: Are DNA Matches Infallible?,* 40(1) Boalt Transcript 28 (Spring 2008), available at https://www.law.berkeley.edu/alumni/transcript/spring-08/Transcript.Spring08.Weblow.pdf.

In DNA Technology in Forensic Science (NRC I) (1992), the National Research Council (NRC) acknowledged this problem and recommended using different loci to determine a random match probability. Since these loci would not have been used to obtain the database match, they would be free from ascertainment bias. See *People v Nelson* (2008) 43 C4th 1242, 1266, 78 CR3d 69. In The Evaluation of Forensic DNA Evidence (NRC II) (1996), the NRC found this approach to be too conservative and, instead, recommended multiplying the random match probability by the size of the database, thereby increasing the statistical assessment of the likelihood of finding a random, or coincidental, match. This statistic is known as the database match probability. See *Nelson,* 43 C4th 1242, 1261. Both NRC approaches indicate the need to correct the random match probability for the bias inherent in a database search. A third approach, known as the Bayesian (or Balding-Donnelly) approach, based on Bayes's theorem, is to use a likelihood ratio to compute the rarity of the profile. See *People v Nelson, supra*. While the Supreme Court has acknowledged these three methods, it has expressed no preference for a particular method. *People v Nelson, supra*.

Proponents of the "rarity statistic" argue that the database hit is nothing more than a "tip," and that the defendant is thereafter retested, and thus the resulting random match probability would be appropriate. See *People v Johnson, supra*. The problem here is that the systemic function of the retest after a cold hit is to confirm that no error was made in typing the original database sample. A test of the *same* loci does not serve the same statistical function as the test of different loci, as recommended by NRC I, and in no way reduces the chance of a coincidental match. To keep this all in perspective, however, one must be aware that with a 13-loci match, the numbers are so miniscule that even a million-fold difference (*e.g.,* using an NRC II calculation) does not essentially change the results. Nevertheless, in the event of an incomplete match, the difference could be significant.

Prosecutors have taken the "mere tip" argument a step further, citing *People v Johnson* (2006) 139 CA4th 1135, 43 CR3d 587, for the proposition that cold-hit statistics are not subject to *Kelly* challenge when the database "is used merely to identify a possible

suspect." The claim is that because the cold hit is a mere tip, it is *irrelevant* and must be excluded at trial. This argument appears to have met with some success in the trial courts, although the point of excluding a mere tip would ordinarily be protection of the defendant from unreliable or uncorroborated evidence. In this instance, the defense would be waiving such protection to rebut the random match probability statistic. This problem illustrates a common misunderstanding of the function of the *Kelly* rule. The point of the *Kelly* rule is to screen evidence that is unsuitable for presentation to a jury, not to settle scientific issues so as to prevent the opponent of the scientific evidence from attempting to rebut evidence. Indeed, *People v Nelson* resolves this issue in favor of admission of additional statistical measures. *Nelson,* 43 C4th at 1267 n3.

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§5.35 3. Statute of Limitations, Speedy Trial, Ex Post Facto, Search and Seizure

Statute of limitations issues may be significant in cold-hit cases. While a statute of limitations may be extended, an action cannot be revived once it has expired. *Stogner v California* (2003) 539 US 607, 609, 156 L Ed 2d 544, 123 S Ct 2446. To satisfy a statute of limitations that is about to run, a prosecutor may file a criminal complaint or seek an indictment against a person identified by a DNA profile, in lieu of a name, when the person's identity has not been ascertained. Although a California arrest warrant must contain the "name" of the suspect (Pen C §§804, 815), when no more "particular, accurate, or reliable" identification is available, a John Doe arrest warrant or complaint that describes the suspect's unique DNA profile or incorporates by reference an affidavit containing the DNA profile, satisfies the "particularity" requirements under the Fourth Amendment, Cal Const art I, §13 and Pen C §804(d). *People v Robinson* (2010) 47 C4th 1104, 1137, 104 CR3d 727.

In a cold-hit case involving a crime from previous decades, other speedy trial issues may be implicated such as prejudice to the defendant, including loss of witnesses and other evidence. See Comment, *Beyond Fingerprinting: Indicting DNA Threatens Criminal Defendants' Constitutional and Statutory Rights*, 50(4) Am U L Rev 979, 983 (Apr. 2001). In one case, the defendant complained of precharging delay, *i.e.,* delay between an alleged murder and the time the state first charged him with the crime. *People v Nelson* (2008) 43 C4th 1242, 1250, 78 CR3d 69 (murder occurred in 1976 and defendant charged in 2002). Although precharging delay does not implicate speedy trial rights, a defendant is not without recourse if the delay is unjustified and prejudicial. Any prejudice must be balanced against the justification for the delay, and in this case, the California Supreme Court held that the justification for delay outweighed the defendant's showing of prejudice. The delay was not for the purpose of gaining an advantage over the defendant, nor was it due to prosecutorial negligence. The delay was the result of insufficient evidence to identify the defendant as a suspect as well as the limits of forensic technology. As soon as the forensic technology became available to identify the defendant as a suspect and to establish his guilt, the prosecution proceeded with promptness. *People v Nelson, supra*. The defendant's right to a speedy trial is further discussed in California Criminal Law Procedure and Practice, chap 19 (Cal CEB Annual).

In addition to speedy trial issues, counsel must be aware of ex post facto issues. For example, although a complaint may allege violation of the one-strike rape law (Pen C §667.1) or may allege two- or three-strike sentence enhancements, the date of the crime determines the application of these statutes. A cold-hit case may involve a crime committed before the effective date of these statutes. Further, for an alleged prior strike to be valid, the defendant must have been convicted of that crime before he or she committed the new offense. *People v Flood* (2003) 108 CA4th 504, 507, 133 CR2d 516. For a discussion of three-strike enhancements, see California Criminal Law Procedure and Practice §§37.33A-37.36 (Cal CEB Annual).

In a cold-hit case, the attorney must carefully check statutory and case law in effect on the date of the crime. Elements of a crime may have changed as well as the range of punishments. For example, one must be careful when handling older special circumstance murders because at one time "intent to kill" was an element in felony murder special circumstance allegations. See *People v Rundle* (2008) 43 C4th 76, 156 n40, 74 CR3d 454, disapproved on other grounds by *People v Doolin* (2009) 45 C4th 390, 421 n22, 87 CR3d 209.

With regard to search and seizure issues, the Ninth Circuit has held that the forcible extraction of a DNA sample from a pre-trial detainee for inclusion in a cold case data bank, without a warrant and without suspicion, violated the Fourth Amendment. See *Friedman v Boucher* (9th Cir 2009) 580 F3d 847. But see *People v Robinson* (2010) 47 C4th 1104, 1121, 104 CR3d 727, wherein the California Supreme Court has expressed the view that the nonconsensual extraction of biological samples from adult convicted felons does not violate the Fourth Amendment.

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IV. DEVELOPING CASE STRATEGY

A. Proponent's Strategy

§5.36 1. Preparing to Present Evidence

The proponent of DNA evidence must set aside substantial time to meet with his or her expert to understand what was done in a particular case, what the significance of the results may be, and the limits of the evidence, *i.e.,* what it does not mean. See ABA Standards for Criminal Justice: DNA Evidence, Standard 5.3. Among issues the proponent must discuss with the expert are the following:

- Were all controls utilized?
- Were there any unexpected results?
- Is each result a single source or a mixture?
- Are there any issues the attorney should be aware of?
- In the expert's view, what would be the likely defense issues?

PRACTICE TIP: The emphasis is different at trial than in a *Kelly* hearing. At a *Kelly* hearing, the reliability, or general acceptance, of the testing procedure is the focus. This involves presenting detailed evidence on the test procedure. See §5.44.

At trial, evidence of the test's theoretical underpinning and procedure need not be presented in as much detail. While the expert must be qualified in the same way, the jury only needs to understand very generally how DNA testing works, what was done in the case, what care was taken, and what was the result and its significance.

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§5.37 2. Admission of Expert Testimony Under Evid C §801

Although the *Kelly* rule applies in California, some California courts have been willing to undertake what is essentially a federal *Daubert* analysis, which involves evaluating the science directly rather than deferring to "consensus" by a "relevant scientific community." See *Daubert v Merrell Dow Pharms., Inc.* (1993) 509 US 579, 587, 125 L Ed 2d 469, 113 S Ct 2786. See §§5.48-5.50.

Some of the language in opinions interpreting Evid C §801 may be used by criminal defense counsel arguing that the latest developments in DNA technology have not been adequately validated before a rush to utilize them in the courtroom. The proponent of DNA evidence must qualify the expert, try to establish impartiality as much as possible, and include whatever lab experience the expert has, even if that expert has a more "academic" career. Working together, the attorney and the expert should teach the important concepts to the jury. This requires that the witness define all terms methodically. It is a good idea to use the blackboard, or perhaps a PowerPoint presentation, or other visuals for the visual learners on the jury.

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B. Opponent's Strategy

§5.38 1. Determining Level of Attack

The opponent must choose its attack based on the particular vulnerabilities, or lack thereof, in the proponent's evidence. The opponent may attack at a highly theoretical level or may quarrel with fine details of the procedure. At all times, the advocate must keep the jury in mind, as jurors easily are overwhelmed and confused by this evidence and may dismiss a defense that does not make sense to them. Although the prosecution bears the burden of proving guilt beyond a reasonable doubt (Evid C §500; Pen C §1096), a jury will discount questions raised or evidence presented that it does not comprehend.

The opponent of the DNA evidence must develop all potential issues methodically. After obtaining and reviewing discovery, counsel must develop an overall strategy that involves determining at which level the prosecution's laboratory may have fallen short: at a theoretical level, industrial level, institutional level, individual level, or just in the instant case. The lowest level of shortfall is the most understandable and persuasive to a jury. In contrast, while theoretical criticism of DNA testing may have a legitimate basis, a close connection between that criticism and the particulars of the case is needed to have such an argument be persuasive. For example, counsel might challenge the small sample size of a population database made up of persons who describe their own race, perhaps incorrectly. This might cast doubt on the statistics in the minds of some jurors. In a mixture case, or a partial match case, the statistics are less impressive to begin with and such problems with population database composition can be more substantial in the minds of jurors.

DNA testing also might be legitimately challenged at an *industrial* level for the weakness or absence of firm standards, which typically permit an expert to use his or her discretion to reach the result he or she thinks is correct. In that case, although the conclusion is veiled by "science," the scientific method is abandoned, and the expert opinion is presented ipse dixit (or without scientific support). Also, DNA testing is not blind, and the expectations of the analyst can influence the result. These critiques, however, are typically insufficient to overcome the inculpatory hard data.

If the laboratory has a poor reputation, or has demonstrably insufficient standards relative to the industry, then a stronger attack is possible on an *institutional* level. If the specific analyst on a particular case has a clouded record of errors, weak proficiency exams, and poor training or experience, then a defense attack, focusing on the *individual* person, is stronger. To counteract an attack on an individual, a prosecutor may attempt to call an analyst with a better reputation, or a supervisor, instead of the weaker witness who performed the actual test. This tactic may present hearsay problems. See *Crawford v Washington* (2004) 541 US 36, 158 L Ed 2d 177, 124 S Ct 1354. However, a DNA laboratory report has been held to be nontestimonial, and therefore, not subject to a *Crawford* challenge. See *People v Geier* (2007) 41 C4th 555, 607, 61 CR3d 580, cert denied (June 29, 2009) ___ US ___, 174 L Ed 2d 600, ___ S Ct ___.

Not only may *Geier* be distinguished on its rationale from a case in which there is substantial interpretation involved, with resolution of complex mixtures, artifacts, and off-ladder alleles calling for the exercise of judgment rather than a mere "contemporaneous description of an unfolding event" (41 C4th at 605), but also after *Melendez-Diaz v Massachusetts* (2009) ___ US ___, 174 L Ed 2d 314, 129 S Ct 2527, *Geier's* rationale is subject to criticism.

In *Melendez-Diaz,* the United States Supreme Court held that the admission of certified forensic laboratory reports violated *Crawford.* The reports were "functionally identical to live, in-court testimony" (___ US at ___, 174 L Ed 2d at 321) and were used "*against*" the defendant (___ US at ___, 174 L Ed 2d at 323). Regardless of "indicia of reliability," the defendant was entitled to "be confronted with" the analysts at trial. The Confrontation Clause "commands, not that the evidence be reliable but that reliability be assessed in a particular manner: by testing in the crucible of cross-examination." ___ US at ___, 174 L Ed 2d at 326.

The Court noted, "Forensic evidence is not uniquely immune from the risk of manipulation." ___ US at ___, 174 L Ed 2d at 326. At least some of that methodology [used here] requires the exercise of judgment and presents a risk of error that might be explored on cross-examination." ___ US at ___, 174 L Ed 2d at 327. Furthermore, "Documents kept in the regular course of business may ordinarily be admitted at trial despite their hearsay status… But that is not the case if the regularly conducted business activity is the production of evidence for use at trial." ___ US at ___, 174 L Ed 2d at 328. The lead opinion cited with approval *State v Caulfield* (Minn 2006) 722 NW 2d 304, 310, and *Las Vegas v Walsh* (Nev 2005) 124 P 3d 203, 207, along with a number of cases that interpreted "testimonial evidence" so as to include forensic analysts' reports. In its own formulation, *Geier* had specifically rejected the rationale of these two cases. *Geier,* 41 C4th at 53. Even though an expert (a lab supervisor) testified regarding the laboratory results in *Geier,* Justice Scalia and the three justices who joined in his *Melendez-Diaz* opinion apparently would require confrontation with the laboratory analyst whose report was used against the defendant. Crucially, however, the controlling opinion in *Melendez-Diaz* was that of Justice Thomas, the concurring Justice, whose rationale was confined to the

presentation of "formalized testimonial materials" such as the test result certificates offered in lieu of witness testimony in that case. ___ US at ___, 174 L Ed 2d at 333.

The Supreme Court granted certiorari in *Briscoe v Virginia* (2009) ___ US ___, 174 L Ed 2d 600, 129 S Ct 2858, after Justice Sotomayor replaced Justice Souter on the Court. As Justice Souter had been one of the four Justices to join in *Melendez-Diaz*, it appeared that the Court might again address the issue; however, instead, the Court vacated and remanded the matter without comment. *Briscoe v Virginia* (2010) ___ US ___, 175 L Ed 2d 966, 130 S Ct 1316. The available briefing and oral arguments might yield insights to attorneys litigating these matters.

The California Supreme Court has granted review in a number of cases in which it plans to consider, among other issues, how the *Melendez-Diaz* decision affects *Geier*. See, *e.g., People v Bowman* (review granted Jun. 9, 2010, S182172; superseded opinion at 182 CA4th 1616, 107 CR3d 156) (supervisor testified based on non-testifying analyst's notes); *People v Benitez* (review granted May 12, 2010, S181137; superseded opinion at 182 CA4th 194, 106 CR3d 39 (acting supervisor of the county's crime laboratory testified based on notes made by another analyst); *People v Gutierrez* (review granted Dec. 2, 2009, S176620; superseded opinion at 177 CA4th 654, 99 CR3d 369) (testimony of lead nurse practitioner concerning exam and report of non-testifying nurse practitioner); *People v Lopez* (review granted Dec. 2, 2009, S177046; superseded opinion at 177 CA4th 202, 98 CR3d 825) (admission of blood-alcohol test results and report prepared by criminalist who did not testify at trial); *People v Dungo* (review granted Dec. 2, 2009, S176886; superseded opinion at 176 CA4th 1388, 98 CR3d 702) (testimony of forensic pathologist based on autopsy report prepared by another pathologist); *People v Rutterschmidt* (review granted Dec. 2, 2009, S176213; superseded opinion at 176 CA4th 1047, 98 CR3d 390) (testimony of supervising criminalist about results of drug tests and report prepared by another criminalist). Meanwhile, *Geier* remains good law.

In any event, the poor performance of the specific analyst is subject to a strong defense critique in final argument. The strongest defense attack clearly is when errors have been made in the instant case. Defense counsel may underscore the critique by commenting on the absence of the actual analyst, whose credibility thus cannot be ascertained by the jury.

For additional discussion of *Melendez-Diaz,* see §§1.27, 8.66. For additional discussion of the Sixth Amendment right of confrontation under *Crawford,* see California Criminal Law Procedure and Practice (Cal CEB Annual).

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§5.39 2. Challenging Proponent's Expert

An expert for the opponent to admission of DNA evidence can not only identify issues with the test, and possibly testify to problems with the test, but also can observe the testimony of the proponent's expert (at the court's discretion, if he or she will be testifying) and can assist with the preparation of cross-examination.

NOTE: Counsel should exercise discretion when deciding whether to call his or her own expert. If the expert's honest opinion is that "the proponent's test is fine," then don't call the expert! Likewise, it is important for opposing counsel to have a working understanding of DNA forensics. Counsel must know enough to question any potential error or inaccuracy.

While, in most cases, there will be no significant problem with the testing, this does not in the slightest way diminish the necessity to check in each case to avoid a miscarriage of justice. If the case cannot be settled, and the expert cannot contradict the match results, then the defense must nonetheless proceed to trial. Because statistical questions may be better fodder for an argument than whether there is in fact a match, the defense often will be able to call a population geneticist or expert in statistics. This is not true in every case, however, as sometimes, even when the statistics are recalculated more conservatively, they still will reflect overwhelming odds of identity. In many cases, the defense will not call any expert to the witness stand. In other cases, the defense will call only a population expert. With either of these scenarios, the defense will rely on cross-examination to try to undermine the evidence of a match. For potential areas of effective questioning, see §§5.81-5.82.

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Source: Criminal Law/Scientific Evidence in California Criminal Cases/5 DNA Evidence/§5.40 3. Checklist: Strategy for Attacking DNA Evidence

§5.40 3. Checklist: Strategy for Attacking DNA Evidence

To develop a strategy for attacking DNA evidence, counsel must do the following:

- **Examine case materials.** Examine all case materials, including crime reports, property reports, lab reports, tabular data, electropherograms, bench notes, correspondence, billing, and so forth.
- **Examine the chain of custody.**
- **Check the analyst's record.** Check the analyst's résumé, prior testimony, and reputation.
- **Re-run raw data.** This requires employment of an expert in possession of the proprietary software programs, known as GeneScan, GenoTyper, or Identifiler. This step is necessary to scrutinize the test results to see whether any of the parameters have been altered, contrary to the lab's own protocol, to artificially achieve a desired result, such as the implication of the client. Parameters can be altered by, for example, changing the baseline or injecting excessive polymerase chain reaction (PCR) amplification product. This step will also reveal whether additional tests had been attempted that for some reason had different results. Any such variation from procedure might indicate error or provide fodder for cross-examination.
- **Identify artifacts.** Identify all possible artifacts. For discussion of artifacts, see §5.31.
- **Check for indications that the sample was contaminated.** Unexpected DNA results might occur in the case of contamination. Similar in significance to artifacts, the absence of a DNA type where it is expected may occur because of "drop-out," possibly present due to a failure of DNA to amplify during the PCR process. This may be true in the case of a degraded crime scene sample.

NOTE: Allelic dropout is a failure to find and display an allele or a failure to properly amplify alleles. See the DNA Initiative *Glossary* (visited June 3, 2010), available at http://www.DNA.gov/glossary. Allelic dropout has been observed in tests utilizing two different short tandem repeat (STR) loci typing kits with different primers. The successful detection of an allele depended on the choice of test kits. Budowle, *STR Allele Concordance Between Different Primer Sets—A Brief Summary,* Promega's Profiles in DNA (Feb. 2000), available at http://www.promega.com/profiles/303/ProfilesinDNA_303_10.pdf. See *People v Wright* (1998) 62 CA4th 31, 41, 72 CR2d 246 (allegations of contamination go to weight of evidence, not admissibility).

- **Consider plausible alternative interpretations.** Counsel should consider all plausible alternative interpretations of the data that the proponent presents. Particularly in cases when two or more persons' DNA is mixed, it is arguably not a certainty which individual contributed a particular allele to the mixture. See *People v Smith* (2003) 107 CA4th 646, 671, 132 CR2d 230 (discussing allelic dropout, stutter, and artifacts; holding that, if properly analyzed, mixed samples can be accurately profiled and that questions about accuracy go to weight of evidence). This is substantially complicated when there is a debate as to whether a given result at a locus is an artifact or a real allele. For a discussion about artifacts, see §5.31. Complicating the issue further is peak height imbalance, or a greater than 30 percent difference in the heights of two peaks in typing a single allele, which can suggest other problems, such as a mixed sample, or may be attributed to insignificant test fluctuations. DNA peak heights from one person are generally fairly equivalent. See Forensic Bioinformatics, *Possible Issues With DNA Evidence* (visited June 3, 2010), available at http://www.bioforensics.com/genophiler/problems.html. If counsel has employed his or her own expert, he or she may be helpful in providing alternate interpretations or testifying about them.
- **Review the pertinent scientific literature.** The literature of forensic DNA testing is voluminous. No one has time to read it all in preparation of a case for trial or a *Kelly* hearing. But, particularly with an expert's help, it is possible for an attorney to narrow the scope of research to articles focused on the particular issues presented by a given case, such as mixture interpretation, contamination, or degraded samples. See *People v Henderson* (2003) 107 CA4th 769, 782, 132 CR2d 255 (court should hold a third-prong *Kelly* hearing to determine whether a degraded or mixed sample has been properly analyzed under generally accepted procedures); *People v Smith* (2003) 107 CA4th 646, 671, 132 CR2d 230 (discussing allelic dropout, stutter, and artifacts; holding that, if properly analyzed, mixed samples can be accurately profiled and that questions about accuracy go to weight of evidence); *People v Wright* (1998) 62 CA4th 31, 41, 72 CR2d 246 (allegations of contamination go to weight of evidence, not admissibility).
- **Scrutinize lab procedures.** Counsel should scrutinize the lab's standard operating procedure, quality assurance/quality

control manual, internal validation, contamination and unexpected results logs, lab audits, accreditation, corrective actions, proficiency tests, and so forth. Counsel should specifically request information on the particular lab's procedures at the discovery stage. If certain materials cannot be obtained through discovery, counsel should pursue other methods of obtaining them. All of these laboratory materials are valuable to help compare the procedure actually undertaken in the instant case with the standard procedure. Counsel must understand what the lab actually did versus what the lab was supposed to do. If there is any variation, this should trigger additional scrutiny to ensure that the lab reached the correct result. In any event, such discrepancies are good material for cross-examination. See *People v Smith* (2003) 107 CA4th 646, 651, 132 CR2d 230 (court approvingly discussed "strict protocol" that Cellmark uses to avoid contamination of samples at laboratory); *People v Axell* (1991) 235 CA3d 836, 860 n12, 1 CR2d 411 (noting Cellmark laboratory had mishandled and mislabeled DNA samples causing a false match during a blind study).

- **Analyze laxity of standards employed.** Even if the lab followed its own standards, those standards may be very lax. The lab's procedure should be compared to the following:

- Industry standards (see DNA Advisory Board, *Quality Assurance Standards for Forensic DNA Testing Laboratories,* 2(3) Forensic Sci Comm (July 1998), at http://www.fbi.gov/hq/lab/fsc/backissu/july2000/codis2b.htm; new standards, as of July 1, 2009, can be found at http://www.fbi.gov/hq/lab/html/testinglab.htm);

- Guidelines established by the Scientific Working Group on DNA Analysis Methods (SWGDAM) (see *Revised Validation Guidelines of SWGDAM,* 6(3) Forensic Sci Comm (July 2004), at http://www.fbi.gov/hq/lab/fsc/backissu/july2004/standards/2004_03_standards02.htm); and

- Publications of the International Organization for Standardization (ISO) (visited June 3, 2010) (see http://www.iso.org/iso/home.htm).

- ***Kelly* preparation and research.** Counsel should study case law for any unresolved issues regarding technology. Even if the technology has been generally accepted, the attorney may be able to show a change in prevailing views, in other words, to try to show that "the consensus" among experts in the relevant scientific community has changed. See *People v Barney* (1992) 8 CA4th 798, 820, 10 CR2d 731 (court held that DNA statistical probability calculations could no longer be considered generally accepted given dispute reflected in scientific literature after decision in *People v Axell* (1991) 235 CA3d 836, 868, 1 CR2d 411, finding them generally accepted).

- **Request third-prong *Kelly* hearing.** The attorney may use the rationale of *People v Venegas* (1998) 18 CA4th 47, 79, 74 CR2d 262, to seek a third-prong *Kelly* hearing in every case. The rationale is that DNA evidence is so persuasive that the court must ensure that the expert followed the correct techniques in the instant case. See §5.47; see also chap 2 on *Kelly*.

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V. PRETRIAL AND TRIAL ISSUES

§5.41 A. Challenging DNA Evidence at Preliminary Hearing

If a prima facie case depends on the DNA evidence, the prosecutor must present it at the preliminary hearing. While the prosecution may be tempted to call a law enforcement officer to present DNA results (see Cal Const art I, §30(b); Pen C §872), this is generally not a good strategy. While hearsay would be permitted, critical evidence may be objectionable "double hearsay." Also, the officer witness's inability to respond to the technical cross-examination would support a motion to strike the testimony or a subsequent motion to dismiss under Pen C §995. Using the Proposition 115 hearsay exception to admit evidence of an expert's opinion is discussed in *Hosek v Superior Court* (1992) 10 CA4th 605, 608, 12 CR2d 650, and *People v Sally* (1993) 12 CA4th 1621, 1628, 16 CR2d 161. Even without these pitfalls, testimony on the DNA evidence from an appropriate witness would be the best option because the power of that testimony would strongly encourage plea bargaining or dismissal. However, the officer could supply chain of custody testimony without the difficulties inherent in having the officer try to describe DNA testing procedures, alleles found at each locus, the nature of the match, and a calculation of the random match probability in the relevant populations.

When presenting DNA evidence at the preliminary hearing, the prosecution has no reason to present more than what is required to establish the prima facie case. While there is some authority for the idea that a judge may exclude evidence under *People v Kelly* (1976) 17 C3d 24, 31, 130 CR 144, even when the court is the trier of fact (see *Seering v Dept. of Social Services* (1987) 194 CA3d 298, 239 CR 422), the better view is that the preliminary hearing is *not* the time for a *Kelly* motion. The *Kelly* motion is a trial motion, premised on the idea that juries might give undue weight to an experimental technique (*People v Kelly* (1976) 17 C3d 24, 31, 130 CR 144 (citations omitted)):

Lay jurors tend to give considerable weight to "scientific" evidence when presented by "experts" with impressive credentials. We have acknowledged the existence of a "… misleading aura of certainty which often envelops a new scientific process, obscuring its currently experimental nature."

Instead, the opponent of the DNA evidence should consider challenging the foundation for its admission under Evid C §801(b) using *Kelly/Frye* or *Daubert* type argumentation. See §§5.37, 5.48-5.50. "A trial court can determine whether there is a reasonable basis for an expert opinion by examining the opinion and the matters on which the expert relies, and does not require evidence from a second level of experts in making this determination." *In re Lockheed Litig. Cases* (2004) 115 CA4th 558, 564, 10 CR3d 34. Also, the preliminary hearing presents a fine opportunity for the defense to commit the testifying analyst to specific aspects of the testing, of the science, or of the laboratory's protocols or standard operating procedure that are favorable to the defense case. For example, the idea that a one-allele difference excludes a contributor, or that evidence below a stated relative fluorescence unit (RFU) cutoff is not reliable, or that peaks from the same contributor should be roughly the same height (70 percent or more, depending on the locus) might ultimately support an interpretation that is consistent with an argument for innocence. It is best to commit the analyst to these principles long before the defense presents its argument at trial to head off any tendency on the part of the witness to qualify answers and hedge.

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B. The *Kelly* Rule

§5.42 1. Appointment of Expert for *Kelly* Hearing

It is important for the opponent of the DNA evidence, usually the defense, to retain an independent expert early in the proceedings for the efficient ascertainment of potential issues. In this way, the expert can assist in educating the attorney about the importance of any weak links in the evidentiary chain. An expert can re-run the raw data, using the same software utilized by the lab, to find any anomalies. Additional considerations underlie the decision whether or not to appoint an expert when there will be a *Kelly* hearing on reliability or general acceptance of the procedures in the instant case. The *Kelly* issue may only have been brought to counsel's attention by an expert's insights about the technology used in the particular case. Specialized expertise in the specific area of contention is particularly valuable. For example, if the issue is population genetics, then expertise in molecular biology is a secondary concern. If the problem of general acceptance in the scientific community involves a computer application, or an aspect of gas chromatography, then expertise in those areas would be needed.

Case-by-case adjudication as to the first prong of the *Kelly* test is "*not* required once the scientific technique in question has been endorsed in a published appellate opinion" (emphasis in original). *People v Wright* (1998) 62 CA4th 31, 42 n2, 72 CR2d 246. For economy, courts have joined cases for the purpose of the *Kelly* hearing when multiple highly paid experts must be employed. Courts have reasoned that other cases might rely on the transcript by stipulation of the parties or by judicial notice so that they might have a more complete record and preserve their issue for appeal. See *People v Smith* (2003) 107 CA4th 646, 666, 132 CR2d 230. See also California Criminal Law Procedure and Practice §31.12 (Cal CEB Annual). The caveat is that defense counsel on the joined cases must be able to collaborate effectively on a joint presentation. For further discussion of appointment of an expert, see §§5.59-5.60.

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§5.43 2. *Kelly*'s Three-Prong Test

New techniques for analyzing DNA evidence, like other new scientific techniques and processes, are subject to the *Kelly* rule. See *People v Kelly* (1976) 17 C3d 24, 130 CR 144. Under California law, new or novel scientific techniques are inadmissible in California courts until they have achieved "general acceptance" in the relevant scientific community. *People v Kelly, supra.* See *People v Leahy* (1994) 8 C4th 587, 34 CR2d 663. Once an appellate court has affirmed a trial court's determination that a novel technique has gained general acceptance, "the precedent so established may control subsequent trials, at least until new evidence is presented reflecting a change in the attitude of the scientific community." *People v Kelly,* 17 C3d at 32.

The *Kelly* rule applies to expert testimony based on a "technique, process, or theory which is *new* to science" (emphasis in original). *People v Stoll* (1989) 49 C3d 1136, 1156, 265 CR 111. To be admitted, evidence subject to the rule must satisfy a three-pronged test: (1) the technique must be generally accepted in the relevant scientific community, (2) the expert must be qualified, and (3) the test in a particular case must have been performed in accordance with correct scientific procedures. *People v Kelly,* 17 C3d at 30. Therefore, the proponent must demonstrate the theoretical basis of the technique and its general acceptance, the expert's qualifications, and the specific procedures utilized in the case. The *Kelly* rule is discussed in detail in chap 2.

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Source: Criminal Law/Scientific Evidence in California Criminal Cases/5 DNA Evidence/§5.44 3. Testing Methods

§5.44 3. Testing Methods

The technology and techniques available for testing DNA have evolved considerably in recent years. Although a number of different DNA testing methods have been employed in criminal cases, tests involving the analysis of short tandem repeat (STR) testing are the current standard for the scientific analysis of DNA evidence. *People v Nelson* (2008) 43 C4th 1242, 1258, 78 CR3d 69. Many of the most common types of DNA testing in criminal cases, including STR testing, have already been considered and approved as generally accepted under the *Kelly* test.

NOTE: Even when an appellate opinion purports to resolve admissibility, the defense may benefit from filing a *Kelly* challenge when the issue that actually has been resolved can be distinguished from the instant case. For example, *People v Allen* (1999) 72 CA4th 1093, 1099, 85 CR2d 655, held that STR testing was generally accepted; however, there was no trial court record, and the court relied on a rationale equating STR testing to "PCR testing." At that time, STR testing was in its infancy and laser fluorescent capillary electrophoretic testing of 13 multiplexed loci had not yet been introduced. *Allen* did not deter defense attorneys from filing *Kelly* motions, and other opinions followed that clarified what was, in fact, generally accepted. See *People v Jackson* (2008) 163 CA4th 313, 324, 77 CR3d 474. Those opinions benefited the justice system by ensuring the predictability of outcomes. Particularly in capital cases, out of an abundance of caution, a court will sometimes allow a *Kelly* challenge, and will not want to risk reversal for denial of a hearing. For this reason, an assertive posture can benefit the defendant.

The following cases represent general acceptance holdings:

- Short tandem repeat (STR) testing (*People v Allen* (1999) 72 CA4th 1093, 85 CR2d 655).
- Restriction fragment length polymorphism (RFLP) testing (*People v Axell* (1991) 235 CA3d 836, 1 CR2d 411).
- Polymerase chain reaction (PCR) amplification and dot blot analysis of DQ Alpha products (*People v Morganti* (1996) 43 CA4th 643, 665, 50 CR2d 837).

NOTE: "Dot-intensity analysis" for interpreting a mixed sample result in a PCR/DQ Alpha test has not received appellate approval in California (see *People v Doolin* (2009) 45 C4th 390, 448, 87 CR3d 209), and was criticized in *People v Pizarro* (2003) 110 CA4th 530, 618, 3 CR3d 21 (quoting *State v Harvey* (NJ 1997) 699 A2d 596), disapproved on another ground by *People v Wilson* (2006) 38 C4th 1237, 1250, 45 CR3d 73. *Pizarro* also rejected "band intensity analysis" for interpreting mixtures in RFLP results, but this opinion is of limited importance because the technique is superannuated.

- PCR amplification and typing with Polymarker (*People v Wright* (1998) 62 CA4th 31, 41, 72 CR2d 246).
- PCR amplification of STRs and current STR techniques (*People v Allen* (1999) 72 CA4th 1093, 1099, 85 CR2d 655; *People v Hill* (2001) 89 CA4th 48, 57, 107 CR2d 110).
- DNA analysis with gel electrophoresis (*People v Cooper* (1991) 53 C3d 771, 812, 281 CR 90; *People v Henderson* (2003) 107 CA4th 769, 780, 132 CR2d 255).

NOTE: New controversies subsequent to the decisions in *Morganti* and *Wright* undermine the holdings of general acceptance for DQ Alpha and Polymarker reverse dot blot testing. The combined kit, known as DQA-Polymarker, has not received appellate scrutiny, though it has required extensive new validation testing resulting in changes in the protocols. See Gross & Guerrieri, *HLA DQA1 and Polymarker Validations for Forensic Casework: Standard Specimens, Reproducibility, and Mixed Specimens,* 41(6) J Forensic Sci 1022 (Nov. 1996). One recent article regarding the combined DQA-Polymarker kit found that attempts at typing samples using this multiplex kit resulted in failed hybridization and allelic dropout. Riley, *Compromised Optimal Hybridization Temperatures May Explain PM Plus DAQ1 Anomalies,* 44 Biochemistry & Molecular Biology Int'l 59, 63 (1998). Allelic dropout is a failure to find an allele or a failure to amplify it properly during the PCR process. See the DNA Initiative *Glossary* (visited June 3, 2010), available at http://www.dna.gov/glossary. Hybridization is the process by which the two strands in a DNA helix link together. A failed primer hybridization during PCR amplification may result in allelic dropout. See Butler, Forensic DNA Typing: Biology, Technology, and Genetics of STR Markers, pp 19-20, 133-138 (2d ed 2005).

- Laser fluorescent capillary electrophoresis testing of 13 multiplexed STR loci (*People v Henderson* (2003) 107 CA4th 769, 773, 132 CR2d 255; *People v Smith* (2003) 107 CA4th 646, 666, 132 CR2d 230).
- Profiler Plus test kit using PCR and STR methods (*People v Hill* (2001) 89 CA4th 48, 107 CR2d 110).

NOTE: Other common testing techniques have not yet received California appellate approval, including mitochondrial DNA

testing and Y-STR testing. But see *People v Keene* (App Div 2005) 803 NYS2d 403, 407 (discussing defendant's postconviction request for Y-STR DNA testing and discussing utility of such testing in context of mixed male and female DNA samples). Until an appellate opinion supports admission of the evidence, even a well-accepted technique is subject to challenge. As a practical matter, courts have heard evidence of mitochondrial DNA and Y-STR testing and admitted them, and challenges have been posed without appellate resolution to date. Hence, a *Kelly* challenge is available to an opponent of these methodologies

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Source: Criminal Law/Scientific Evidence in California Criminal Cases/5 DNA Evidence/§5.45 4. Population Statistics Issues

§5.45 4. Population Statistics Issues

The fundamental population statistics issues have been resolved under the *Kelly* rule as well. The standard practice of using population databases to calculate frequencies for each allele, and then utilizing the "product rule" to determine a random match probability has been held to be generally accepted. *People v Brown* (2001) 91 CA4th 623, 651, 110 CR2d 750; *People v Soto* (1999) 21 C4th 512, 541, 88 CR2d 34 (RFLP); *People v Reeves* (2001) 91 CA4th 14, 41, 109 CR2d 728. The statistical methods for STR typing have also passed the *Daubert* analysis applicable under federal law. *U.S. v Trala* (D Del 2001) 162 F Supp 2d 336, 346. However, the determination of a match's statistical significance, like the other procedural steps of DNA profiling, will be subject to a third-prong *Kelly* challenge, focusing on the reliability of the procedure in the case, because of its complexity. *People v Brown* (2001) 91 CA4th 623, 649, 110 CR2d 750. Further, it is acceptable to present match probabilities from databases representing the major population groups in an area to which the suspect might belong. *People v Wilson* (2006) 38 C4th 1237, 1244, 45 CR3d 73. This is so even in the absence of independent evidence of the perpetrator's ethnicity. *People v Doolin* (2009) 45 C4th 390, 449, 87 CR3d 209.

NOTE: *Kelly* issues can arise in connection with the use of statistics in a cold-hit case, particularly use of the "Balding-Donnelly" statistical approach, which is also known as the "Bayesian formula." *People v Nelson* (2008) 43 C4th 1242, 1263, 78 CR3d 69. See §5.34.

It is settled that the product rule reliability shows the rarity of a profile in the relevant population, and to this extent the product rule has passed the *Kelly* test. Random match probabilities (illustrating the rarity of a specific combination of genetic material) and database match probabilities (showing probability of a match by searching a specific, particular database), both calculated under the product rule, trigger relevancy concerns, not reliability concerns under *Kelly*. *People v Nelson* (2008) 43 C4th 1242, 1265, 78 CR3d 69.

However, a statistical issue that may support a third-prong *Kelly* challenge arises when an unusual population database is required (*e.g.,* Hmong, Inuit, Tongan), or there is evidence of substructuring in a rural inbred community, or when relatives may be suspects. See §5.46. See also *People v Brown* (2001) 91 CA4th 623, 652, 110 CR2d 750 (noting, in dicta, that a challenge might be brought if one could show that a particular population database consisted of a bulk of persons of common ancestry, which would tend to overrepresent probabilities of a match).

A claim of "source attribution" (defendant is the source of DNA) would also be controversial as well. Some scientists opine that the power of discrimination with multilocus PCR-STR testing is so great that source attribution can be declared (*i.e.,* it can be declared that the defendant is the source of the evidentiary sample). This view does not appear to have achieved general acceptance. While an analyst may wish to testify that a profile is so rare that the source definitely is the defendant, there is no consensus as to how rare a profile must be for such a claim to be made, if ever.

In The Evaluation of Forensic DNA Evidence (NRC II) (1996), the National Research Council acknowledges that at some point this may be appropriate when the random match probability exceeds multiples of the population of the earth. In *People v Brown* (2001) 91 CA4th 623, 630 n14, 110 CR2d 750, the court noted that when the probability calculation exceeds the population of the earth, the probability is then phrased as "the numerical probability that a person randomly chosen from that population will possess the same genetic profile"—which does not amount to a definitive source attribution. Similarly, the court in *People v Johnson* (2006) 139 CA4th 1135, 1147, 43 CR3d 587, noted that "[t]he rarer the genetic profile, the more likely the suspect is the source of the evidentiary sample." But even this statement does not rise to a definitively absolute statement that a defendant is the source of the genetic material. Further, a definitive identification magnifies the problems of subjective match criteria and error rates that must not exist for the claim to be true. Also, such testimony obscures the nature of population statistics as a projection rather than a fact. If a person's entire genome were compared to a genome from a crime scene, a definitive identification would be more appropriate. On the other hand, the infinitesimally small probability of a random match generated by robust statistical methods makes the issue almost a matter of semantics.

NOTE: The phrase of choice for describing source attribution, "to a reasonable scientific certainty" (see dicta in *Johnson,* 139 CA4th 1135, 1146 n10), is also problematic because it is an oxymoron. Science is essentially probabilistic, rather than certain. Before testimony of absolute identification could be admitted, a foundation for that opinion would be required, and that foundation would be the appropriate statistical measure, such as a random match probability of sufficient discrimination.

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Source: Criminal Law/Scientific Evidence in California Criminal Cases/5 DNA Evidence/§5.46 5. Third-Prong Kelly Challenges

§5.46 5. Third-Prong *Kelly* Challenges

In any case involving DNA evidence, a third-prong *Kelly* hearing is supported by the rationale that DNA evidence is so persuasive that the court must ensure that the expert followed the correct techniques in the instant case. See *People v Venegas* (1998) 18 C4th 47, 80, 74 CR2d 262. See also *Kumho Tire Co., Ltd. v Carmichael* (1999) 526 US 137, 153, 143 L Ed 2d 238, 119 S Ct 1167. For example, although the random match probability statistic is generally accepted in short tandem repeat (STR) testing cases at trial, there are cases in which use of that statistic may be inappropriate, such as in the case of a complex mixed crime sample when it is unclear who among potential donors is the source of alleles at some or all of the loci.

NOTE: This may actually be the basis for a first-prong attack if it appears that there is not general acceptance for the use of this statistic rather than a combined probability of inclusion or exclusion, which actually is designed for such circumstances.

A third-prong challenge would be appropriate with any questionable application of a generally accepted technology. Other testing problems not pertaining to the reliability of the methods themselves or their applications, but rather to laboratory errors of some kind, such as "mislabeling, mixing the wrong ingredients, or failing to follow routine precautions against contamination," would be issues of weight and not admissibility. See *People v Venegas* (1998) 18 C4th 47, 74 CR2d 262. Third-prong *Kelly* issues are dealt with at the same hearing that resolves issues related to the first prong. While the same issues the opponent raises at the *Kelly* hearing also may be pertinent at trial, the focus is different because of the difference between satisfying a foundation of admissibility versus actually satisfying the burden of proof of guilt. Also a jury's presumably lesser capacity for comprehension of the technical issues means that the discussion will be simplified both in terms of language and sophistication of the presentation. The *Kelly* hearing places the proponent on notice as to at least some of the issues that may arise at trial, and the proponent should be prepared to respond to them again in front of the jury.

Assuming there was no validated approach for teasing out profiles from the mixture, and there was no adequate basis for assuming that particular alleles came from a particular donor, then using a random match probability statistic based on the assumed genetic profile, rather than a combined probability of exclusion or inclusion (which is based on all of the alleles, without assumptions as to which of the donors was responsible for any of the alleles, and only that collectively the alleles would find their source in one of the donors), is appropriate. But see Fung & Hu, *Interpreting DNA Mixtures Based on the NRC-II Recommendation 4.1,* 2(4) Forensic Sci Comm (Oct. 2000), available at http://www.fbi.gov/hq/lab/fsc/backissu/oct2000/fung.htm, who discuss the combined probability of exclusion but recommend analysis under NRC II Recommendation 4.2.

Because there is no appellate opinion on this issue, and one may assume that a lack of general acceptance is arguable, then the first-prong challenge would be appropriate. If however, the trial judge found at the hearing, or even based on a reading of precedents, that the random match probability statistic was generally accepted in mixture cases, the defense could then continue with a third-prong *Kelly* challenge. The defense would aver that even if use of the statistic were generally accepted, use of the statistic in this particular case was unreliable. If successful, the court would exclude the evidence. Hence, *any* first-prong issue may also be a third-prong issue, and third-prong issues remain when general acceptance already has been demonstrated. *People v Venegas* (1998) 18 C4th 47, 78, 74 CR2d 262.

Some DNA testing issues do not support a *Kelly* challenge. The *Kelly* test does not (*Venegas,* 18 C4th 47, 81 (citations omitted)):

cover all derelictions in following the prescribed scientific procedures. Shortcomings such as mislabeling, mixing the wrong ingredients, or failing to follow routine precautions may well be amenable to evaluation by jurors without the assistance of expert testimony. Such readily apparent missteps … amount only to "[c]areless testing affect[ing] the weight of the evidence and not its admissibility."

If the opponent of admission does not prevail at the motion to exclude, the same attacks may be made during the trial itself. For example, the somewhat different issue (the preliminary factual issue of reliability) is easily rephrased in terms of reasonable doubt about the defendant's guilt. Evid C §500; Pen C §1096. The approach will be affected by the jury's capacity for comprehension of these issues.

Absent a truly compelling argument, the defense may nonetheless proceed with the *Kelly* hearing to make an appellate record, to preview the trial evidence, and to have another opportunity to commit the witness to facts that are consistent with the defense. If the defense has arguments that have no realistic possibility of persuading a judge to exclude the evidence, but nonetheless could conceivably raise a reasonable doubt about the defendant's guilt, then the defense attorney is wise not to present them at the *Kelly* hearing, but instead present them at trial. Otherwise, the proponent will more easily prepare rebuttal.

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§5.47 6. Testing Kits

An issue with the potential for a *Kelly* challenge involves the newer testing kits, such as ABI's Identifiler. However, there is a strong argument that the Identifiler uses the same technology as Profiler Plus and COfiler, and thus is not a basis for a *Kelly* challenge, and *People v Jackson* has so held. *People v Jackson* (2008) 163 CA4th 313, 77 CR3d 474 (even though defendant outlined seven differences in older PCR-STR test kits as compared to the Identifiler, this did not affect *methodology* of the DNA test and, thus, the Identifiler did not have to separately meet the *Kelly* test). "Every new test kit for performing [the polymerase chain reaction (PCR) test using short tandem repeat (STR)] procedure does not require a separate determination of general acceptance." *People v Henderson* (2003) 107 CA4th 769, 779, 132 CR2d 255.

The issue does remain that a combination of kits in a new multiplex, which also adds two loci, must be independently validated and peer reviewed because the chemistry must be modified substantially to optimize reproduction at each locus. This may be best resolved in a third-prong *Kelly* challenge since it does present questions about what is a generally accepted technology that is being used in a somewhat different manner. See *People v Jackson, supra*. The issue would be the same with new tests that add new loci or use new protocols to obtain profiles from even more minuscule samples, such as low copy number (LCN) testing. See LCN DNA discussion in §5.24. Another issue that might be subject to either a first-prong or third-prong challenge is the use of a random match probability statistic in mixture cases when a combined probability of exclusion might be more appropriate. See §5.29. If new methods are adopted for resolution of the loci, such as gas chromatography, a first-prong challenge would be warranted. Likewise, when single nucleotide polymorphism (SNP) testing is first used, it will be subject to first-prong *Kelly* scrutiny. For discussion about SNP testing, see §5.24.

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§5.48 7. Challenges Based on Federal Standards

While the *Kelly* test, affirmed in *People v Leahy* (1994) 8 C4th 587, 34 CR2d 663, defers to the relevant scientific community when assessing whether a technique is generally accepted, the federal standard uses a "judicial gatekeeper" approach. See *Daubert v Merrell Dow Pharms., Inc.* (1993) 509 US 579, 587, 125 L Ed 2d 469, 113 S Ct 2786. *Daubert* provides valuable guidance in crafting a challenge to general acceptance by helping to identify the rationale that should be used by scientists to accept a new technique as reliable. *Daubert* identifies the following criteria for identifying reliability (509 US at 593):

- Whether the technique can be and has been tested;
- Whether the technique has been subjected to peer review and publication;
- Known or potential rate of error;
- Existence and maintenance of standards controlling the technique's operation; and
- Widespread acceptance in the relevant community.

Experts who aver that their scientific community generally accepts a technique notwithstanding deficiencies in these categories would not offer credible testimony. Hence, *Daubert* analysis is useful in any jurisdiction.

The opponent of the DNA evidence may also use *Daubert* type arguments in support of an Evid C §801(b) objection citing *In re Lockheed Litig. Cases* (2004) 115 CA4th 558, 564, 10 CR3d 34: "a trial court can determine whether there is a reasonable basis for an expert opinion by examining the opinion and the matters on which the expert relies, and does not require evidence from a second level of experts in making this determination."

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§5.49 a. Defining "Scientific Community"

A technology that is generally accepted in what was deemed the relevant scientific community may not be accepted in a larger or different scientific community. The *Kelly* test as phrased suggests that the courts look to a specialized audience within a broader community to assess with some expertise the reliability of a technology. See *People v Joehnk* (1995) 35 CA4th 1488, 1501, 42 CR2d 6 (court evaluates what constitutes scientific community for finding of general acceptance of horizontal gaze nystagmus (HGN) test and includes law enforcement scientists as properly part of the relevant community). Indeed, there are deep cultural divides between groups that consider themselves scientists. Most of the forensic sciences have an origin in police work rather than academia, and the practical orientation of police work may represent a radically different cosmology from that of a university- or research institution-based scientist. A university scholar holding a Ph.D. may look down on "police scientists," among whom Ph.D.s or masters degrees may be rare. On the other hand, an academic's idea of what is accepted as reliable and what is not may offend the sensibilities of the forensic scientists who consider academic critiques to be idealistic, unrealistic, and unnecessary. Careful consideration should be given to which court will hear the *Kelly* challenge to ascertain whether it may be more identified with one side or the other of this schism.

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§5.50 b. Other Changes Affecting General Acceptance

A technology previously accepted may lose favor due to scientific advances. Many legacy forensic sciences have passed from general acceptance due to the higher threshold for accuracy set by DNA evidence and the superior level of validation testing. See Saks & Koehler, *The Coming Paradigm Shift in Forensic Identification Science,* 309(5736) Science 892-895 (Aug. 5, 2005), abstract available at http://www.sciencemag.org/cgi/content/full/309/5736/892 and the National Research Council of the National Academies, Strengthening Forensic Science in the United States: A Path Forward (2009), available online at http://www.nap.edu/catalog.php?record_id=12589. In the same manner, earlier versions of forensic DNA testing may no longer hold general acceptance. At the time of the widespread introduction of STR testing, critiques of PCR dot blot testing were beginning to mount. Because the labs had shifted their resources to STR testing, there were few *Kelly* challenges based on a change in general acceptance of DQA and Polymarker. In fact, there never was an appellate ruling on the combined DQA-Polymarker multiplex test. It is possible that such a challenge to a dot blot test could be undertaken in an old case when this was the only testing extant, with no biological materials remaining to do STR testing. An advocate seeking to make an innovative *Kelly* challenge should look to research by those advocating an even newer technology to find documentation of faults in an existing methodology.

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C. Discovery in DNA Cases

§5.51 1. Criminal Discovery Rules

In California, criminal discovery between parties is governed by Pen C §§1054-1054.7. No discovery can occur in criminal cases except as provided by those statutes, other express statutory provisions, or as required by the U.S. Constitution. Pen C §1054(e). Discovery from third parties is by subpoena duces tecum. See Pen C §§1326-1327. Discovery in criminal cases is discussed in California Criminal Law Procedure and Practice, chap 11 (Cal CEB Annual). Subpoenas duces tecum are discussed in Crim Law, chap 4.

Items needed for an adequate defense review of DNA evidence either will fall under the statutory provisions for party discovery or will be subject to subpoena. For example, under Pen C §1054.1(f), the prosecutor must disclose to the defense the results of scientific tests, experiments, or comparisons that the prosecutor intends to offer in evidence at the trial. This includes laboratory notes, diagrams, and computer printouts made when the tests were conducted. *Woods v Superior Court* (1994) 25 CA4th 178, 183, 30 CR2d 182; *Hines v Superior Court* (1993) 20 CA4th 1818, 25 CR2d 712. See *In re Brown* (1998) 17 C4th 873, 72 CR2d 698.

Discovery issues are not usually litigated. Discovery is usually provided informally as contemplated by the statutory scheme. See Pen C §§1054(b), 1054.5(b). Practical reasons exist for an open discovery process, which is the norm in DNA cases in this state. First, open discovery facilitates plea bargaining and dismissal. Second, DNA evidence is so powerful that the prosecution has no reason to fear cross-examination, argument, or rebuttal; when DNA evidence is sound and used appropriately, juries eagerly accept it except in the rarest case. Third, the prosecutorial duty to seek justice means that the evidence should be open to scrutiny by the accused, who is motivated to find any flaw. If the flaw is legitimate, the prosecutor should be informed and should be given the opportunity to dismiss a case premised on an erroneous DNA match. If an alleged flaw in the evidence is not legitimate, the prosecution's qualified analyst should be able to explain why it is not. In short, there is no danger that the defense can somehow "change" the DNA evidence by its review, as the raw data remains immutable.

NOTE: It cannot be overemphasized how important it is for justice and the appearance of justice that prosecutorial agencies welcome and promptly comply with legitimate discovery requests.

Materials from law enforcement laboratories are typically provided to the defense without charge. However, sometimes private laboratories perform law enforcement testing on a contract basis and these laboratories have been known to demand payment for compilation and copying of materials. The prosecution cannot charge the defense for the discovery it provides. 85 Ops Cal Atty Gen 123 (2002). The prosecutor's office may pay for discovery from contract laboratories, or in the case of an indigent defendant, the court may provide funds. See Evid C §730; Pen C §987.9. The defense cannot be required to memorize substantial amounts of material; the prosecution must make actual copies of voluminous discovery for the defense. *Westerfield v Superior Court* (2002) 99 CA4th 994, 998, 121 CR2d 402 (photographs).

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Source: Criminal Law/Scientific Evidence in California Criminal Cases/5 DNA Evidence/§5.52 2. Discovery Checklist: Party Opposing DNA Evidence

§5.52 2. Discovery Checklist: Party Opposing DNA Evidence

Counsel should not assume that receipt of a laboratory's conclusion regarding test results is all that is necessary for a competent review of DNA evidence. Indeed, that report is the result of several degrees of abstraction—from the test itself, to the computer printout interpreting that test (the electropherograms), to the results listed in tabular form, to statistical tables pertaining to the rarity of each allele, and ultimately to the final product: the lab report. Information in lab notes and chain of custody documentation as well as the analyst's résumé may be vital to the defense. Accordingly, the opponent of the proffered DNA evidence (usually, but not always, the defendant) should request disclosure and production of the following materials and information. For materials the prosecution should be required to disclose to defense counsel, see ABA Standards for Criminal Justice: DNA Evidence, Standard 4.1, available at http://www.abanet.org/crimjust/standards/dnaevidence.html#4.1 (visited June 3, 2010). The author is grateful to Dr. Simon Ford for his original compilation of an expert's discovery checklist.

- **DNA testing documentation.** For the typical short tandem repeat (STR) test, the following documentation should be requested:

- **Case File.** A legible copy of all records of STR DNA testing in the instant case. This request includes but is not limited to all laboratory notes, printouts of all tabular data and electropherograms, and a complete and unedited copy of the electronic raw data saved on a CD-ROM, or similar media.

- **Hit file (cold-hit case only).** This request also includes any and all Combined DNA Index System (CODIS) and/or DNA database runs, including but not limited to, a complete copy of the Department of Justice "hit file," with all hit reports, a printout of all electropherograms of the DNA profile in the database hit, and all documents regarding the taking of the database DNA sample from the defendant. See Pen C §299.5(g).

NOTE: It is good practice to specifically request that for materials represented in any format other than black-and-white paper copies, the opposition should provide copies that are equivalent in content and quality (*e.g.,* X-ray film copies of X-ray films, photographic quality copies of photographs and Polaroids, CD-ROM copies of computerized data, and color copies of GeneScan printouts, including tabular data and color copies of GenoTyper printouts if such have not been provided).

- **Documents relied on in performing testing.** Legible copies of all documents that the proponent claims were followed or relied on in executing, interpreting, or reporting the DNA tests performed in the instant case. The following documents are typically used, and should be specifically requested:

- **Standard operating protocols (SOPs)** of the DNA testing laboratory.

- **Instructions** provided by manufacturers of commercial test kits ("package inserts" and "user's guides").

- **Protocols and manuals** relating to instruments or software.

- **STR population databases.** All materials for STR databases that were used or relied on in performing the statistical test in the instant case, including but not limited to:

___ Complete database or databases on CD-ROM in a format such that the multiprobe genotype is given for each sample tested.

___ Copies of all documents related to the source or origin of samples in any such databases, including (i) the method by which samples were collected, (ii) the background and/or characteristics of the individuals who were the source of the samples, (iii) the choice of populations and subpopulations that were sampled, and (iv) the nature of the sampling procedure that was used to collect the samples.

___ Laboratory notes and computer data files.

- **STR frequency tables.** Copies of any STR frequency tables relied on in performing the statistical test in the instant case.

- **Chain of custody and current disposition of evidence.** Copies of all chain of custody documents for each item of evidence subjected to DNA testing, starting with the first description or "log entry" for each item through to the current location of that item of evidence. This information should include documentation describing where and how the materials were stored (temperature and type of container); the amount of evidence material, if any, consumed in testing; the amount of material remaining; and where and how the remaining evidence is stored (temperature and type of container). This information

should include all logs indicating the movement of items of evidence from the instant case in, out, or between the applicable evidence rooms and evidence storage areas. This includes all correspondence between laboratories as well as individual logs from each laboratory for each item of evidence.

- **Data files.** Copies of all data files used and created in the course of performing STR testing and subsequent analysis of STR data in this case. These files should include all data necessary to independently reanalyze the raw data and to reconstruct the analysis performed in the instant case, including but not limited to:

- Project files;

- Sample files;

- Matrix files, including the data used to compile the matrix files;

- Analysis parameter files;

- Sample sheet;

- Injection list;

- Log files, firmware memory files (stored in ABI Prism 310 Genetic Analyzer memory backup);

- Additional GenoTyper files (or Identifiler files), including category list, templates, stationary pad documents, and unedited step list; and

- Stutter filter percentage assignments for each locus tested.

NOTE: Due process requires disclosure of material evidence favorable to the accused. See *Brady v Maryland* (1963) 373 US 83, 87, 10 L Ed 2d 215, 83 S Ct 1194. Under *Brady,* the data files are discoverable as documentation of artifacts, which universally occur in STR tests, that may be interpreted favorably to the defendant and, at least to some extent, undermine the analyst's conclusion. See *In re Brown* (1998) 17 C4th 873, 878, 72 CR2d 698.

- **Software and macros.** An accounting of software and macros used in the DNA testing in the instant case should be requested, including the following:

- A list of all commercial software programs used in the DNA testing, including the name of the software program, manufacturer and version used, as well as any commercial macros used to analyze data.

- Copies of any programs or macros written by the testing laboratory and used in the analysis of STR data.

- For any commercial software item that was modified in any way in the testing undertaken, either (i) a copy of the modified software item, or (ii) a detailed list of the changes or modifications that were made with regard to the software item used.

- **Records of troubleshooting or problems during testing.** Copies of any laboratory records or other materials that document any troubleshooting, repairs, modifications, or changes made to the genetic analyzer instrument used in the instant case, including:

- Copies of any notes, or records of communications, relating to troubleshooting that had to be done on the instrument, including calls to technical support lines and visits by field technicians to repair the instrument.

- Records of any changes that were made to the instrument in the course of testing samples, including replacement of parts such as a laser or CCD (charge coupled device) virtual camera.

- Records of all computer resets or reboots that had to be done during the testing, including soft reset, cold boot, or clear memory reset.

- Records of all incidents where manual control was used to override genetic analyzer presets.

- **Contamination Logs.** Any and all records of "anomalous" or "unexpected" results or the equivalent, regardless of how named or cataloged, for all involved lab(s) and for all DNA cases in each lab, *i.e.*, for the laboratory as a whole. This includes but is not limited to instances of unintended DNA transfer or sample contamination, or the detection of unexpected extra alleles in control or reference samples. In such cases, provide copies of all records maintained by the

laboratory(ies) (or equivalent) that document instances of unintended transfer of DNA or sample contamination, including but not limited to the case number, laboratory number, analyst's name, extraction/concentration method, type of control, nature of discrepancy, description of the discrepancy, the cause of the discrepancy, and any corrective measures taken.

NOTE: Laboratories use a wide variety of terms to describe such logs, which are universally maintained for the laboratories' own benefit. See the FBI's DNA Advisory Board (DAB), *Quality Assurance Standards for Forensic DNA Testing Laboratories,* 2(3) Forensic Sci Comm, Standard 14 (July 2000), available at http://www.fbi.gov/hq/lab/fsc/backissu/july2000/codis2b.htm#Corrective%20Action. Use of an analogous term to describe these logs should not shelter discovery, so the terms should be specifically defined in this request. Claims of the absence of such logs are implausible because contamination is ubiquitous. This evidence ordinarily would be discoverable under *Brady* because it could be used during cross-examination to show that contamination does happen in the particular laboratory. *Brady v Maryland* (1963) 373 US 83, 87, 10 L Ed 2d 215, 83 S Ct 1194. Testing in databasing labs is so voluminous that a 6-month window for contamination logs is a reasonable limitation. In "cold hit" cases, the response should include a copy of all logs of unexpected results for the databasing section of the laboratory for 3 months prior and 3 months subsequent to the test of the client's DNA sample.

- **Technicians' profiles.** With respect to the genetic loci tested in the instant case, the DNA profiles of all technicians in the laboratory involved in casework analysis. For purposes of privacy, these DNA profiles may be provided in a blind fashion without any personal identifiers.

NOTE: Some laboratories provide this as a matter of course, and routinely maintain such records in case of possible contamination. When contamination may be an issue, lab technicians are an obvious possible source. Prosecutors, or counsel for the laboratory, may object to this discovery on privacy and relevancy grounds. If contested, a showing that the laboratory results may indicate contamination might be required before such a discovery order would be issued. The showing may be made in camera. See *People v Superior Court (Barrett)* (2000) 80 CA4th 1305, 1320, 96 CR2d 264 (subpoena to California Department of Corrections).

- **Developmental validation.** Any and all developmental validation studies pertaining to the specific STR DNA test performed in the instant case pursuant to the Scientific Working Group on DNA Analysis Methods (SWGDAM), *Revised Validation Guidelines,* 6(3) Forensic Sci Comm, Guidelines 4.1, 4.2, and 4.4 (July 2004), and the DAB's *Quality Assurance Standards for Forensic DNA Testing Laboratories,* 2(3) Forensic Sci Comm, Standards 8.1.1 and 8.1.2 (July 2000), including developmental validation studies conducted by the testing laboratory and any additional developmental validation studies relied on by the testing laboratory in claiming that the test has been adequately validated pursuant to SWGDAM and DAB. These materials should include copies of laboratory notebooks, computer data files, unpublished scientific papers, and citations to published scientific papers. For the online SWGDAM and DAB articles, go to http://www.fbi.gov/hq/lab/fsc/backissu/july2004/standards/2004_03_standards02.htm and http://www.fbi.gov/hq/lab/fsc/backissu/july2000/codis2b.htm#Corrective%20Action, respectively (visited June 3, 2010).

- **Internal Validation.** Any and all internal validation studies pertaining to the specific STR DNA test performed in the instant case pursuant to SWGDAM Guideline 4.5 and DAB Standard 8.1.3, including internal validation studies conducted by the testing laboratory and any additional validation studies relied on by the testing laboratory in claiming that the test has been adequately validated pursuant to SWGDAM and DAB. These materials should include copies of laboratory notebooks, computer data files, unpublished scientific papers, and citations to published scientific papers.

NOTE: Developmental and internal validation materials may be voluminous. For this reason, prosecutorial agencies should scan them one time so that discovery may be easily accomplished by issuing digital copies upon request. It is good practice for prosecutors to make these documents as well as the local laboratory's current standard operating procedure (SOP) manual and quality assurance and quality control (QA/QC) manuals available to the local public defender's office so that there is no need for individual case discovery requests for documents with more general application.

- **Proficiency tests.** All STR proficiency tests that have been undertaken by the analyst or analysts who performed the STR testing in this case. These materials should include the following for each proficiency test: the complete proficiency test case file, computer data files, evaluations or reports by the testing agency, and records maintained pursuant to SWGDAM Guideline 9.3 and DAB Standard 13.1.1. If the proficiency testing was provided by an outside agency, then include the name, address, and phone number of the agency along with any identifying information to access proficiency test results.

NOTE: Prosecutors typically object to discovery of computer data underlying proficiency testing as burdensome. However, the defense will want to explore the nature of any errors that are revealed, or alternatively, will want to confirm that the positive evaluation is warranted.

- **Accreditation.** Copies of all licenses or other certificates of accreditation held by the DNA testing laboratory, if such have not been provided.

- **Documentation of laboratory audits.** All corrective action reports related to deficiencies identified in accreditation audits.

NOTE: The prosecutor or counsel for the laboratory may oppose such discovery requests. While the defense will consider any adverse findings to be *Brady* material, this may not be so if errors identified by an audit were corrected before the testing in the instant case or are otherwise unlikely to have affected the results. The argument regarding admissibility of lab audits, and to a lesser extent, their discoverability, is analogous to the inadmissibility of evidence of remedial conduct (see Evid C §1151). Because public policy favors the undertaking of remedial actions, admissibility may be limited unless an actual due process or fairness concern arises. See, *e.g.*, *Love v Wolf* (1967) 249 CA2d 822, 831, 58 CR 42 (evidence of remedial action admissible for purposes of impeachment). However, because discovery is not limited to admissible evidence, discovery of laboratory audits probably is appropriate. See Pen C §§1054.1(f) (disclosure of relevant scientific tests or experiments), 1326 (subpoena duces tecum); *People v York* (1980) 108 CA3d 779, 790, 166 CR 717 (defendant's right to subpoena his file from California Department of Corrections grounded in due process rights, and materials were potentially relevant; court abused discretion in quashing subpoena).

- **Laboratory personnel.** A current résumé and job description for each person involved in conducting or reviewing the DNA testing performed in the instant case, if such have not been provided.

- **Reports of preliminary testing by police.** Counsel should specifically request all lab notes and bench notes regarding preliminary DNA testing, quantitation, or other scientific testing completed by the particular police or law enforcement agency that conducted the preliminary testing.

- **Additional investigation.** Copies of investigators' chronological log. Counsel should specify the earliest possible relevant date and request the log dating from that date to the present, and counsel should request ongoing discovery of any subsequent entries to the log.

- ***Brady* evidence.** Any evidence that appears favorable to the accused, whether material to guilt or to punishment, or to the credibility of material witnesses, regardless of whether such evidence appears likely to affect the verdict.

Counsel should conclude the request for production with a sentence determining the date for compliance with the request, usually 15 days from the date of service of the request. See Pen C §1054.5(b).

Defense counsel may also issue a subpoena duces tecum for the DNA analyst's personnel file. The prosecutor or, if the prosecutor lacks standing to represent the laboratory (see *Bullen v Superior Court* (1988) 204 CA3d 22, 25, 251 CR 32), counsel for the laboratory may object to this subpoena. The assessment of the analyst's job performance is relevant because the analyst exercised his or her subjective judgment in performing the DNA analysis. Typically, the analyst is not a peace officer so *Pitchess* procedures would not apply. See Evid C §§1043-1046. See also *Pitchess v Superior Court* (1974) 11 C3d 531, 113 CR 897.

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§5.53 3. Testing Observation

Sometimes investigators or prosecutors will seek to test additional crime scene samples. There may not be an opportunity for the defense to retest these samples because the quantities are minute and will be entirely consumed by the prosecution's testing. Under those circumstances, the prosecutor may, and should, invite the defense to send an expert to observe the testing to ensure that it is done appropriately. Many attorneys routinely accept such offers in order to protect their clients. However, a defense observer is placed in a quandary if he or she observes errors during the testing. If the observer says nothing, the error could result in a result detrimental to the client. If the observer voices his or her concerns, and the analyst then corrects the error and proceeds to test appropriately, the question arises as to whether the expert has facilitated the prosecution if the results implicate the client. In either case, the defense expert has become a witness to the testing and might be called to testify as to his or her observations, or the testing analyst may be permitted to testify that all of the testing took place under the watchful eye of the defense expert, who did not express any concerns about the testing while observing it.

This quandary was illustrated in *People v Cooper* (1991) 53 C3d 771, 281 CR 90. In *Cooper,* the trial court denied a defense request to conduct an independent blood test that would have consumed the entire sample. Instead, the blood was tested by a prosecution expert in conjunction with a defense expert. 53 C3d at 814. During the trial, the prosecution criminalist testified, without objection, that the defense expert was present during some of the blood testing, and that the testing was a collaboration. Then, over defense objection, he also testified that in retesting the blood he followed the defense expert's suggestions on certain procedures he employed. 53 C3d at 823. The defense called its criminalist who testified on cross-examination, without objection, that he had worked with the prosecution criminalist in the past, and that the two had generally obtained the same results. The *Cooper* court denied the defendant's claim on appeal that the prosecution improperly "utilized" the defense expert as a witness against the defense, interfering with the defendant's right to effective assistance of counsel, stating (53 C3d at 824):

Since the defense made an issue of the manner in which the blood was tested, the prosecution was entitled to question [its criminalist] about all the circumstances surrounding the testing, including the involvement of the defense expert. The defense may choose either to have or not have an expert participate in the analysis of evidence, but if it chooses the former, no authority prohibits evidence of such participation.

An Evid C §402 motion might preclude admission of evidence of a defense observation. If this is not possible, many attorneys, predicting the likely outcome of the additional tests, choose not to send the expert. There may be cases, however, when a favorable outcome may be predicted and observation helps to protect the client. The best choice may be merely to videotape the examination.

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§5.54 4. Search of Genetic Profile Database to Show Third Party Culpability

A situation may arise in which defense counsel would like to perform a Combined DNA Index System (CODIS) search to aid in an investigation of a crime. While access to CODIS databases is limited by Pen C §299.5 and constitutional privacy rights to law enforcement agencies, due process concerns may arguably support issuance of a subpoena duces tecum to the custodian of records, the California Department of Justice, against a motion to quash. See *Davis v Alaska* (1974) 415 US 308, 39 L Ed 2d 347, 94 S Ct 1105 (state's interest in protecting confidentiality of juvenile offender's record must yield to defendant's confrontation clause rights). See also ABA Standards for Criminal Justice: DNA Evidence, Standard 8.3(a)(iii), which allows, on good cause shown, revelation of "any other information related to the database that is relevant to the defense." The Department of Justice, however, may argue that this is limited to genetic information about codefendants.

A hypothetical illustrates the circumstances in which such discovery may be warranted: A defendant in a murder case claims that his DNA is on the murder weapon along with the victim's because he found the knife and picked it up. The defense confidentially retests the knife and finds a third genetic profile, which might belong to the killer if the defendant's story is true. The defense seeks to search the database to ascertain if that third profile belongs to a known offender. With this lead, the defense can find the true killer and exonerate the client. On the other hand, the genetic profile might match another unknown victim. While, in that case, it might be reasoned that the defendant should pay the price for his dishonesty, the attorney, who must act in the client's best interest, would not risk the search unless it could be completed confidentially.

The defendant's ability to show his or her innocence is chilled when the attorney cannot conduct a search for the third person confidentially. It is inappropriate to give the defendant "the Hobson's choice of going forth with his discovery efforts … or refraining from pursuing these discovery materials to protect his constitutional rights and prevent undesirable disclosures to his adversary." *People v Superior Court (Barrett)* (2000) 80 CA4th 1305, 1321, 96 CR2d 264 (defendant entitled to in camera hearing to present relevancy arguments about desired discovery). The defendant should "not be forced to choose between pursuing discovery efforts by revealing privileged information or forgoing discovery to maintain a privilege." *Garcia v Superior Court* (2007) 42 C4th 63, 73, 63 CR3d 948 (discussing *Pitchess* discovery protections for defendant; for *Pitchess,* see §5.52).

Because a diligent and zealous advocate consistently utilizes the protections of the Sixth Amendment and the attorney-client privilege to investigate and prepare a defense, attorneys have issued subpoenas in attempts to gain such information. However, to the author's knowledge, the Attorney General has successfully moved to quash in every instance, denying the need for such a subpoena, citing the statutory scheme, and invoking the federal requirement for participation in the National Database Index System (NDIS) that such information not be revealed. In other words, the Attorney General argues that if the state were to comply with the subpoena, the federal government could terminate California's database privileges. The FBI has vigorously resisted any discovery requests regarding offender databases and has asserted that it may expel from CODIS any state that complies. See Felch & Dolan, *FBI Resists Scrutiny of 'Matches,'* Los Angeles Times 1 (July 20, 2008). While this seems to be a genuine concern at first blush, it may be irrelevant to the due process calculus: in the case of the invocation of a governmental privilege, an appropriate remedy would be to disallow the evidence that the discovered material would purportedly rebut. Evid C §1042(a). See *U.S. v Reynolds* (1953) 345 US 1, 12, 97 L Ed 727, 73 S Ct 528; *People v Garcia* (1967) 67 C2d 830, 64 CR 110. Another compromise solution is for the prosecution and defense to agree to the submission of the genetic profile to law enforcement without revealing its significance.

Defense counsel should also bear in mind the difficulty of convincing a court to allow admission of evidence of third party culpability. While it may be an error to exclude such evidence (see *People v Hall* (1986) 41 C3d 826, 831, 226 CR 112 (error harmless)), subsequent cases have upheld exclusion under arguably similar facts (see, *e.g., People v Kaurish* (1990) 52 C3d 648, 685, 276 CR 788).

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§5.55 5. Discovery From Third Parties by Subpoena Duces Tecum

Institutional records of agencies involved in the investigation of a case (but which were not necessarily generated for the purpose of investigation of the case) or records of law enforcement agencies or other organizations not involved in the investigation of the instant case (but which are material to facts at issue and would aid in a fair trial) are appropriately subject to subpoena duces tecum. *People v Superior Court (Barrett)* (2000) 80 CA4th 1305, 96 CR2d 264.

The opponent of testing may also subpoena developmental validation data from the manufacturer of the test at issue for use at a *Kelly* hearing. The opponent of the testing will want to use that data to demonstrate the relative weakness of the validation testing as well as to underscore the variance between the manufacturer's findings and the manner in which the testing is actually employed. The manufacturer may dispute the necessity of producing this material and may invoke trade secret privilege (see Evid C §1060) or claim, in the alternative, that the validation is in the public domain. However, use of the trade secret privilege is to be limited in criminal trials so that neither the defendant nor the people are deprived of a fair trial. Evid C §1062(a). For standard on assertion of trade secret privilege over DNA evidence, see ABA Standards for Criminal Justice: DNA Evidence, Standard 5.2.

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§5.56 6. Discovery Obligations of Defense

If the defense intends to present an expert or other evidence to rebut the prosecution's DNA evidence, the defendant is obliged under Pen C §1054.3(a)(1) to provide the prosecution with the name of that expert or other witness, and the witness's relevant statements 30 days before trial or as soon as counsel determines that the witness will be called. See Pen C §1054.7. If the defense intends to introduce the results of its own tests of DNA or other physical evidence, that must be disclosed as well. Pen C §1054.3(a)(2). When the defense is offering DNA evidence, the checklist in §5.52 is useful for prosecutors seeking discovery for the purpose of rebutting those results.

If the defense chooses not to present DNA evidence or a DNA expert, then there is no duty to turn over any such reports or tests. Defense discovery obligations solely concern evidence to be presented at trial. Pen C §§1054(e), 1054.3(a). See *Prince v Superior Court* (1992) 8 CA4th 1176, 1180, 10 CR2d 855. In fact, there is a duty *not* to disclose the defendant's secrets or confidences unless disclosure is required by law. See Bus & P C §6068(e).

Evidence that a proponent intends to submit in rebuttal also must be disclosed before trial. Pen C §§1054.1 (prosecution), 1054.3 (defense). See *People v Tillis* (1998) 18 C4th 284, 292, 75 CR2d 447.

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D. Responsibilities of Defense Counsel

§5.57 1. Due Diligence Responsibility of Defense Counsel

What is due diligence for the defense when the prosecutor intends to offer DNA evidence? At the least, defense counsel must ensure that an innocent person is not wrongfully convicted with DNA evidence. Because of the power of DNA evidence, jurors may be too willing to blindly accept a conclusion purportedly based on a correct interpretation of DNA evidence. Garrett, *Judging Innocence,* 108 Colum L Rev 55, 84 n109 (Jan. 2008) (DNA evidence overstated at trial; defendant exonerated by postconviction testing).

Defense counsel's duty is to look behind the prosecutor's argument and the lab report's conclusion to see if the data is truly consistent with the inference of guilt. This requires not just critical analysis of the prosecution's argument, and the lab report on which it is founded, but also scrutiny of the tabular data, the electropherograms summarized in the table, and the raw electronic data on which the electropherograms are based.

The raw electronic data is permanent, immutable, and objective. Neither the electropherograms nor the reports that interpret them represent the entirety of the data. They represent a perspective that can be varied, to some extent, by the operator to emphasize or minimize aspects of the raw test data. Due diligence requires an expert to use the appropriate software to ensure that the original data are consistent with the prosecution's conclusion.

DNA evidence is unique in this regard: there is no comparable check available for other forensic evidence, eyewitness identifications, or informant testimony. DNA evidence thus offers incomparable protection for the innocent equivalent to its power in identifying those who are responsible for crimes. This protection is actualized only if the defense is freely given access to the underlying discovery and has adequate funds to provide the above-described checks and balances.

PRACTICE TIP: In California in 2008, $250 per hour was the typical rate of compensation for an expert holding a Ph.D. in a relevant field with a license for the necessary software. The simplest of cases, with one suspect, one victim, one evidentiary sample, and positive and negative control samples, requires at least 4 hours of preparation, if not more. Although this represents a substantial cost in addition to the cost already borne by the prosecution, it is a necessary expense to ensure that justice is done.

Finally, notwithstanding the many avenues of attack available to a zealous defense attorney, the attorney must not forget that DNA evidence is powerful. While it is possible to prepare a multifaceted attack on forensic DNA evidence, this evidence often is insurmountable, and the attorney must think about sentencing and prepare for it.

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§5.58 2. Ensuring Adequate Time for Preparation

Preparation of a case involving DNA evidence involves a steep learning curve, voluminous discovery to organize and review, and the appointment of one or more experts and possibly a testing laboratory. In addition, there may be delays before complete discovery is received, and defense counsel may need to prepare a *Kelly* challenge and a Fourth Amendment challenge as well as other motions. See *People v Kelly* (1976) 17 C3d 24, 130 CR 144, and §5.43. Other aspects of the case require investigation, as in any other case. Defense counsel should not hesitate to continue the preliminary hearing and trial so as to prepare adequately. Counsel must be mindful that such continuances will not ordinarily be granted unless counsel has shown appropriate diligence and is not engaging in mere delay. See Pen C §1050; *People v Roldan* (2005) 35 C4th 646, 670, 27 CR3d 360, disapproved on other grounds by *People v Doolin* (2009) 45 C4th 390, 421 n22, 87 CR3d 209 (good cause requires diligence); *People v Mortimer* (1873) 46 C 114, 112 (when delay suspected, no abuse of discretion to deny continuance). See also California Criminal Law Procedure and Practice, chap 20 (Cal CEB Annual).

Due process concerns outweigh statutory speedy trial rights. Defense counsel may continue a hearing despite the defendant's objection to a continuance. *People v Memro* (1995) 11 C4th 786, 852, 47 CR2d 219; *Townsend v Superior Court* (1975) 15 C3d 774, 779, 126 CR 251. Defendant's choice to be represented by counsel constitutes agreement to delays required by counsel for preparation and waives statutory speedy trial rights for such delay. *People v Kowalski* (1987) 196 CA3d 174, 176, 242 CR 32. The attorney's overriding duty is to act in the client's best interest, even if that action does not coincide with the client's wishes.

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§5.59 3. Appointment of Opposing Expert

DNA evidence is complicated and beyond the common training and experience of most attorneys. Comprehensive scrutiny of the DNA evidence requires access to the raw electronic data, which is only reviewable with specialized software and only by a trained expert. Sixth Amendment effective assistance of counsel requires that an expert be provided to an indigent defendant at government expense in DNA cases. See ABA Standards for Criminal Justice: DNA Evidence, Standard 4.3. The right to effective assistance of counsel affords an indigent defendant access to county funds for ancillary services, such as a DNA expert, when other funds are not available. *Corenevsky v Superior Court* (1984) 36 C3d 307, 318, 204 CR 165. An indigent defendant must have "access to the raw materials integral to the building of an effective defense." *Ake v Oklahoma* (1985) 470 US 68, 77, 84 L Ed 2d 53, 105 S Ct 1087.

NOTE: The prosecutor has a similar obligation to work carefully with his or her laboratory analyst to understand what the DNA evidence does and does not prove, its power, and its limits. See ABA Standards for Criminal Justice: DNA Evidence, Standard 5.3(e).

A defense expert will review the data to ensure that there is no erroneous identification. The expert can identify issues that may arise as to interpretation of population statistics, can advise as to whether there are any *Kelly* issues on general acceptance of the science or reliability of procedures, and may assist in preparation of cross-examination. See *People v Kelly* (1976) 17 C3d 24, 130 CR 144.

While a defense expert does not necessarily need to have a laboratory, the expert does need to own the software required to read the raw data. It is unusual in practice for the defense to retest the DNA samples; standard practice involves re-running the electronic data. This is because the electronic data reliably reflects the test conditions; the DNA testing methods, as opposed to the interpretation, are extremely reliable; and DNA testing technology is not prone to the sort of errors that retesting would reveal. Retesting the DNA will not show a different type. Re-running the electronic data, however, will show any unvalidated techniques, unacceptable manipulation of data, anything omitted from the reports, contradictory low-level data, contaminated controls, or anything else that conceivably could go wrong.

An expert in DNA testing methods, typically a molecular biologist, may or may not have sufficient training in population genetics or statistics to qualify as an expert and give testimony on those issues. Thus, an additional expert in a population statistics field should be employed if there is an issue as to database/cold-hit statistics or correct statistics in the area of rare population subgroups, culpability of relatives, or DNA mixtures.

The identity of any expert appointed by motion of the defense should remain confidential. *Prince v Superior Court* (1992) 8 CA4th 1176, 1180, 10 CR2d 855. The appointment motion should be made ex parte and under seal. 8 CA4th at 1180. See ABA Standards for Criminal Justice: DNA Evidence, Standard 4.3(b). The prosecutor cannot call this witness to testify for the prosecution, and pretrial communication with this potential witness should cease if the scrupulous witness invokes attorney work-product protection and attorney-client and Fifth and Sixth Amendment privileges. ABA Standards for Criminal Justice: DNA Evidence, Standard 4.3(c). See *Izazaga v Superior Court* (1991) 54 C3d 356, 365, 285 CR 231; *People v Lines* (1975) 13 C3d 500, 509, 119 CR 225. The defense attorney should inform the witness at the outset of his or her duty to maintain the attorney-client privilege and attorney work-product protection that prevents informal conversation with the opposing party. The expert should be reminded that it is the attorney's duty to comply with discovery requests according to law—not the expert's.

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§5.60 4. Appointment of Expert for Independent DNA Testing

When a criminal defendant is indigent, case law supports appointment of a qualified expert upon the showing of need, which is obvious in a DNA case. While it is unusual in practice for the defense to retest the DNA samples, not only appointment of an expert, but also funds to conduct an independent and confidential test, may be required. The defense may want to confidentially test untested biological evidence or retest the defendant to see if the defendant has the same genetic profile found in the crime scene evidence and in the reference sample. This guards against the risk of a sample switch. A sample switch is less of a possibility in a cold-hit case in which the defendant typically has been retested to ensure that the sample in the offender database was, indeed, his or hers. See *Prince v Superior Court* (1992) 8 CA4th 1176, 1180, 10 CR2d 855 (trial court erred in denying defense independent confidential DNA testing of vaginal swabs obtained from murder victim). However, the size of the remaining samples is a factor to be considered by the court in deciding whether to allow additional testing, particularly if the sample would be completely consumed by one test. See *People v Varghese* (2008) 162 CA4th 1084, 1092, 76 CR3d 449. See also *People v Houston* (2005) 130 CA4th 279, 302, 29 CR3d 818 (extracted DNA was preserved and available for independent, confidential defense testing).

If the defense seeks to test or retest any physical evidence and that testing is destructive, as DNA testing is in that it uses up all or part of the sample, then notice must be given to the prosecutor. See *Walters v Superior Court* (2000) 80 CA4th 1074, 1078, 95 CR2d 880. A court may rule that test results under such circumstances may not remain confidential. See *People v Varghese, supra.* However, such notice is not necessary before reviewing or re-running electronic data supplied in discovery because that sort of analysis does not alter the evidence.

If the defense strategy is to retest the defendant or to test biological evidence that the prosecution had not tested nor intended to test, then an expert with a laboratory must be employed. This should not be the same expert who would testify about deficiencies in the prosecution's analysis, but should be a second expert. The reason for a second expert in such a case is that if the second expert's testing revealed something inculpatory, the first expert would still be available to testify about problems in the prosecution's testing. Likewise, a lab that performs a test that confirms the defendant's type as identical to the crime scene type should not then be asked to test crime scene samples. Another lab should do this work if needed. All of this testing must be done confidentially, and nothing must be disclosed in discovery that will not be presented at trial. Discovery is discussed in §§5.51-5.56.

Even if the defense foresees a risk in retesting the evidence and chooses not to do so, the prosecution may try to argue that the defense had that right but forsook it, which undercuts the defense attacks. See *People v Bennett* (2009) 45 C4th 577, 596, 88 CR3d 131. Still, the attack of missed opportunity is not as powerful as evidence that the defense did test the evidence and remained silent about the results, which strongly suggests that the testing was sound. See *People v Zamudio* (2008) 43 C4th 327, 356, 75 CR3d 289. Should the prosecution successfully make either argument, the defense is left with the attacks of contamination or planting, incorrect interpretation, or statistics, none which are refuted by retesting or a failure to do so. See discussion in §5.62.

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E. Jury Instructions

§5.61 1. Proponent of DNA Evidence

The proponent of DNA evidence should consider an instruction guiding the jury in its evaluation of this evidence. The following is a suggested jury instruction:

You have heard testimony that a DNA profile was detected on [*describe object*], which is physical evidence found at the location of [*describe location*], which was [*describe connection to crime*], and that based upon a DNA profile of [*defendant or other relevant person*], [*he/she*] could not be excluded as the source. You also heard testimony that the chance of a coincidental match between the DNA profile found on [*object and location*] and the defendant's profile would be [*appropriate fraction*] in the [*racial group*] community, [*appropriate fraction*] in the [*racial group*] community, and would be [appropriate fraction] in the [*racial group*] community. You may consider this evidence in determining the identity of the person who [*committed act constituting crime at location of the object*] and should give it whatever weight you consider to be appropriate.

If the prosecution argues that the defense had the opportunity to conduct its own tests but did not, then additional instruction may be required to avoid the risk that the jury will shift the burden of proof to the defense. However, see *People v Bennett* (2009) 45 C4th 577, 596, 88 CR3d 131. For a discussion of the position of the opponent of DNA evidence, see §5.62.

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Source: Criminal Law/Scientific Evidence in California Criminal Cases/5 DNA Evidence/§5.62 2. Opponent of DNA Evidence

§5.62 2. Opponent of DNA Evidence

The opponent of the DNA evidence may request a circumstantial evidence instruction. See CALCRIM 223. DNA evidence is circumstantial evidence, providing only inferential proof. See *People v Houston* (2005) 130 CA4th 279, 299, 29 CR3d 818. The jury should be instructed that all facts must be consistent with guilt and irreconcilable with innocence; that each fact on which an inference depends must be proved beyond a reasonable doubt (Evid C §500; Pen C §1096; see CALCRIM 103); and that if there are two reasonable interpretations and one is consistent with innocence, the defendant must be found not guilty (CALCRIM 224). However, if one interpretation is reasonable and another is unreasonable, the jury must adopt the reasonable interpretation. CALCRIM 224.

The opponent of the evidence may request an instruction on the weight of the evidence. See CALCRIM 332. The jury should be instructed that they may consider evidence of lab errors, failed proficiency tests, prior contamination, and any other negative factors in determining the weight of the DNA evidence.

The opponent of the evidence may request a burden of proof instruction depending on the tactical choices made by the prosecutor. "A prosecutor should not be permitted to argue or imply that a defendant's failure to test or retest DNA evidence, or the defendant's failure to offer evidence of such a test or retest conducted on the defendant's behalf, constitutes an admission of guilt." ABA Standards for Criminal Justice: DNA Evidence, Standard 5.4(a). An instruction on that same principle may help preclude jurors from making such arguments during deliberation:

The defendant has not chosen to [*retest the DNA evidence/conduct DNA tests*]. The defendant has the right to rely on the state of the evidence, because the burden of proof is on the prosecution. A choice not to [*retest the DNA evidence/conduct DNA tests*] is the defendant's right and is not evidence of guilt. You must not consider it in any way.

The opponent of the evidence may request a limiting instruction. See CALCRIM 303. The ABA Standards for Criminal Justice: DNA Evidence, Standard 5.4(b) states:

A prosecutor should be permitted to offer evidence or make argument concerning the defendant's failure to test or retest DNA evidence, or the defendant's failure to offer evidence of such a test or retest conducted on the defendant's behalf, only for a purpose other that an admission of guilt and only in fair response to evidence or argument of the defense. The court should instruct the jury that it may consider that evidence only for that other purpose.

The prosecution cannot comment on tests actually performed by the defense but not presented in evidence. See *Prince v Superior Court* (1992) 8 CA4th 1176, 1180, 10 CR2d 855 (if test matches defendant with crime, defense counsel will not call expert and case will proceed on evidence already possessed by prosecution as if defense test had not been made). However, *People v Bennett* (2009) 45 C4th 577, 596, 88 CR3d 131, allows evidence and argument about other aspects of this circumstance:

Griffin does not prevent a prosecutor from commenting upon the evidence or upon the failure of the defense to introduce material evidence. Nor did the prosecutor's questions, as defendant asserts, violate his attorney-client privilege. The privilege protects the disclosure of "a confidential communication between client and lawyer." (Evid. Code §954.) Asking whether there was evidence available for retesting, and even whether the defense sought a split of the sample, did not violate the privilege. Nor did the prosecutor's questions shift the burden of proof onto defendant. (Citations Omitted.)

Accordingly, if the prosecution has elicited evidence to the fact of a defense test, or argues that the defense had the capacity to retest but chose not to, and instead critiqued the prosecution's DNA evidence, then the court should allow the evidence and argument, but instruct the jury as follows:

You have heard evidence that the defense has not conducted its own DNA testing. You must not consider this to be evidence of a consciousness of guilt, rather, you may consider it only when determining the believability of the DNA evidence presented by the people.

Jury instructions are discussed in California Criminal Law Procedure and Practice, chap 32 (Cal CEB Annual).

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VI. SPECIFIC CHALLENGES TO DNA EVIDENCE

§5.63 A. Chain of Custody

A viable chain of custody challenge becomes apparent during discovery review. Any time gap during which the evidence is not accounted for gives rise to a foundational objection to introduction of the evidence as well as a strong attack based on possible contamination, fraud, sloppiness, and mistake.

The rules for establishing a satisfactory chain of custody are set forth in *People v Riser* (1956) 47 C2d 566, 305 P2d 1, overruled on other grounds in *People v Chapman* (1959) 52 C2d 95, 338 P2d 428, and *People v Morse* (1964) 60 C2d 631, 36 CR 201:

The burden on the party offering the evidence is to show to the satisfaction of the trial court that, taking all the circumstances into account including the ease or difficulty with which the particular evidence could have been altered, it is reasonably certain that there was no alteration.

The requirement of reasonable certainty is not met when some vital link in the chain of possession is not accounted for, because then it is as likely as not that the evidence analyzed was not the evidence originally received. Left to such speculation the court must exclude the evidence. … Conversely, when it is the barest speculation that there was tampering, it is proper to admit the evidence and let what doubt remains go to its weight.

In a case involving a bank robbery, the court held that the chain of custody of a reference sample of DNA that a criminalist compared with DNA found near the crime scene was inadequate and that there was a prejudicial violation of the defendant's constitutional right of due process. See *People v Jimenez* (2008) 165 CA4th 75, 80 CR3d 579.

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B. Laboratory Mistakes and Carelessness

§5.64 1. Contamination

Because DNA is microscopic, theoretically, DNA from one person could easily contaminate a sample thought to belong to another, or a suspect's DNA could be deposited inadvertently into a sample retrieved from the crime scene. Butler, Forensic DNA Typing: Biology, Technology, and Genetics of STR Markers, chap 4 (2d ed 2005); Saferstein, Criminalistics: An Introduction to Forensic Science, chaps 2, 13 (9th ed 2007). For this reason, laboratories typically go to great lengths to prevent contamination. Nevertheless, contamination can and does occur in crime labs. Further, first responders to a crime scene can contaminate samples unless they take due care. *People v Smith* (2003) 107 CA4th 646, 651, 132 CR2d 230 (court approvingly discussed "strict protocol" that Cellmark uses to avoid contamination of samples at laboratory).

Laboratories should test forensic unknown samples before the testing of reference samples to avoid reference sample DNA getting into the crime scene evidence via a contaminated instrument or other vector.

Labs maintain contamination logs that document incidents of such unexpected results. As part of every DNA test, it is standard protocol to test a "blank" control sample for contamination. This test should produce no results, and indicate contamination if there is a result. While this alerts the lab that there is a problem that needs to be corrected and that it needs to check its result, depending on the circumstances of the contamination, it may remain undetected.

Also, it must be noted that DNA evidence could be used fraudulently to falsely implicate individuals. Given this scientific possibility, careful scrutiny of the evidence, the chain of custody, and the reputation of persons with access to it is called for.

In cold-hit cases, contamination is less of an issue because the identity of the defendant is unknown at the time of the initial test and it would be unlikely (although perhaps not impossible) that the defendant's sample would be at the crime lab to contaminate the results. If the defendant's DNA was in the same lab for some other reason on the date of the test, due to a coincidental arrest on that date, or for some other reason, this could explain the cold hit. For example, in a case in Australia, the DNA associated with a child murder was matched to a female who could not have committed the crime because she was confined to a distant locked mental institution at the time. Coincidentally, she was the victim of a sexual assault while incarcerated, and the DNA testing in that case was performed at about the same time as the analysis of the child's homicide. Australian authorities were not willing to admit this contamination and for some time they maintained that the match was coincidental. Ultimately, the contamination theory was sustained. *Inquest Into the Death of Jaidyn Raymond Leskie, Coroner's Case No. 007/98,* State of Victoria, Australia (visited June 3, 2010), available at http://www.bioforensics.com/articles/Leskie_decision.pdf; see ABC news report Gearin, *DNA Evidence in Question* (Dec. 17, 2003), available at http://www.abc.net.au/7.30/content/2003/s1012265.htm. See Jefferson, *Cold Hits Meet Cold Facts: Are DNA Matches Infallible?,* 40(1) Boalt Transcript 28 (Spring 2008), available at https://www.law.berkeley.edu/alumni/transcript/spring-08/Transcript.Spring08.Weblow.pdf. See also §5.34.

In the case of the murder of Jane Mixer in the state of Michigan, a man with no other connection to the victim, retired nurse Gary Leiterman, stands convicted of her murder based on a cold hit. The victim's body also yielded DNA from a second individual who was in the database because of his status as a sex offender. This second individual was 4 years old, however, at the time of this homicide. One explanation for two matching profiles is that the lab had contaminated the evidence during its investigation of this cold hit. The convicted defendant argued (without success) that his DNA also was present due to contamination. *People v Leiterman* (Mich 2008) 743 NW2d 8. See Jefferson, *Cold Hits Meet Cold Facts*.

In another case, German investigators believed they had solved the case of a prolific serial killer responsible for nearly 40 serious crimes. The matching DNA turned out to belong to a 71-year-old grandmother who had been employed packing cotton swabs for DNA test kits. See CSI Gran Was Phantom Killer, Austrian Times, at http://austriantimes.at/news/Around_the_World/2009-05-15/13283/CSI_Gran_was_Phantom_killer (visited June 3, 2010).

Contamination can and does happen in cold-hit cases. Careful maintenance of records of contamination by a crime lab when it occurs can help a proponent demonstrate that the lab was "clean" at the time of the analysis in the instant case, and the result presented was not one of the very rare instances where contamination brings a result into question.

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§5.65 2. Innocent Transfer From One Surface to Another

Innocent transfer of DNA from one surface to another before the time of detection is similar to contamination in that suspect DNA has somehow moved to an incriminating location. However, the mechanism of transfer is not interference by a detective or a crime lab analyst, rather it is something that occurs naturally and inadvertently. Secondary and tertiary transfers of hair, fibers, and other trace evidence take place during contact with other persons and objects. Microscopic DNA is left behind or transferred with nearly any contact. The possibility of innocent transfer exists and has been discussed in laboratory studies. See van Oorschot & Jones, *DNA Fingerprints From Fingerprints,* 387(6635) Nature 767 (June 19, 1997), available at http://www.nature.com/nature/journal/v387/n6635/pdf/387767a0.pdf; Kafarowski, Lyon & Sloan, *The Retention and Transfer of Spermatozoa in Clothing by Machine Washing,* 29(1) Can Soc Forensic Sci J 7-11 (Mar. 1996), available at http://www.bioforensics.com/articles/Laundry-sperm%20transfer.pdf; Ladd et al., *A Systematic Analysis of Secondary DNA Transfer*, 44(6) J Forensic Sci (Nov. 1999).

The most likely scenario for an innocent transfer would involve a victim who is an incompetent witness (*e.g.,* due to disability) and a suspect who is a member of the same household. Examples of modes of DNA transfer include sperm from underwear or sheets transferring to a victim's underwear during machine washing, or a shared washcloth spreading DNA from one person to another. While jurors may be skeptical of a claim of innocent transfer, when there is substantial evidence of such a possibility, the surrounding circumstances and any corroborating evidence gain paramount importance in ascertaining guilt beyond a reasonable doubt.

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§5.66 3. Importance of Expert Review

Laboratory mistakes do occur in DNA analysis. A qualified expert, aside from the proponent's expert, should review the DNA report in every case. Smaller mistakes in the lab report or by the analyst may indicate sloppiness, which is problematic when precision is required for an accurate result. While the opponent may use the "cockroach analogy" (*i.e.,* there is never just one cockroach), the proponent should acknowledge a mistake for what it is, such as a typographical error or transposition, and emphasize the careful controls that are employed to ensure that the testing is accurate and reliable.

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§5.67 4. Proficiency Test Errors

Proficiency test errors may suggest a lack of skill on the part of the lab analyst. Lab audits may be discoverable, and would suggest critiques in the event that any problem was unremedied at the time of the testing in a particular case. It is difficult to determine an "error rate" for a crime lab. Lab representatives and technicians may claim that they have never made a testing error. Proficiency tests arguably are comparable measures, though there are some conceptual differences. The error rate is probably a more significant issue for the defense, and arguably a more valuable measure for the jury than the rarity of a profile random match probability. This is because an error rate, even in the area of one in thousands of tests, represents a much larger number than the infinitesimal figure of a typical random match probability fraction, say, 1 in 100 trillion. It is a much more likely explanation for a false identification than it would be for a coincidental match.

The defense attorney may wish to point out anecdotes of error, which show how errors have occurred in previous cases and how they may have occurred in this case, to give meaning to the error-rate statistic. One court expressly held open the possibility that the defense could present the jury with "evidence concerning rates of laboratory error *separate and apart* from the random match probability statistic" (emphasis in original). *People v Reeves* (2001) 91 CA4th 14, 46, 109 CR2d 728. Furthermore, the defense generally should be able to elicit testimony about laboratory error and specifically to establish specific error in the case. *Reeves,* 91 CA4th at 46.

In contrast, the proponent can point out that random match probabilities (under RFLP and PCR testing) have specifically been held to be generally accepted under *Kelly,* even acknowledging that the calculation does not account for laboratory error rates. *Reeves,* 91 CA4th 14, 46. If there is a concern about potential laboratory error, it has been suggested that the appropriate response is to split the sample and allow different laboratories to test the sample. 91 CA4th at 33. Additionally, a court may hold that the only relevant errors are those affecting the instant case, finding that proficiency test and historical error rates are irrelevant, particularly since once a laboratory error is discovered and investigated, it is unlikely to recur in the same laboratory. 91 CA4th at 34. Finally, the proponent can emphasize outstanding or perfect performance on proficiency tests or if imperfection becomes an issue, argue that the analyst who performed the test in the instant case passed and has maintained the appropriate certification. Also, the proponent must point out that all work is double- or triple-checked by superiors.

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§5.68 5. Variance From Standards

A lab's variance from external standards, such as those established by the federal DNA Advisory Board (DAB), the Scientific Working Group on DNA Analysis Methods (SWGDAM), manufacturer validation studies, and the second report (NRC II) of the National Research Council, The Evaluation of Forensic DNA Evidence (NRC II) (1996), or from internal standards such as the lab's standard operating procedures (SOP) or quality control (QC) manual, or the use of a procedure that is not validated, all support a line of attack on the reliability of the results.

The typical forensic DNA testing protocol has been subject to criticism based on its difference in character from DNA testing methods used by researchers in an academic, industrial, or medical environment. For example, only in the forensic context is DNA testing not blind: the analyst knows the expected outcome based on other evidence. When subjective judgment is called for, as it is in the case of DNA testing, the analyst is thus susceptible to a charge of bias when making an interpretation. See *State v Anderson* (NM 1994) 881 P2d 29, 43 (discussing laboratory requirement to carry out "rigorous external proficiency testing via blind trials"). Although blind testing may be a superior protocol, DNA testing protocols do incorporate objective criteria for making the subjective judgments as well as systematic preservation of the raw data, which remains available for scrutiny if the result is questioned.

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§5.69 6. Fraud and Abuse

DNA evidence is extremely vulnerable to manipulation. Much of the testing procedure is revealed only by lab notes or raw test data. The opacity of the records and attorneys' reluctance to scrutinize or understand the science can insulate those who would abuse or falsify tests. Unfortunately, stories of alleged fraud and abuse of DNA technology and other forensic science continue. See The Innocence Project at http://www.innocenceproject.org; Garrett, *Judging Innocence,* 108 Colum L Rev 55, 64 (Jan. 2008). Counsel must remain vigilant and carefully review test data to ensure that no abuse has occurred. Maintenance of the highest ethical standards is vital for the fair administration of justice when using this powerful tool.

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§5.70 7. Incorrect Interpretation of Data

Offering an alternative interpretation of the collected data is often the approach an opponent of the evidence must take in a DNA case. When there is a mixture of DNA types, the opponent of the evidence can challenge the attribution of alleles to one person to the exclusion of others. See *People v Smith* (2003) 107 CA4th 646, 671, 132 CR2d 230 (discussing allelic dropout, stutter, and artifacts; holding that, if properly analyzed, mixed samples can be accurately profiled and that questions about accuracy go to weight of evidence). The caveat is that when a victim's type can be definitively identified, and factored out of the mix, and the remaining types match the accused, this attack will not be very effective.

When this argument is made, the question becomes whether something called an allele by the analyst is actually an artifact, and whether something identified as an artifact is actually an allele. See *Commonwealth v Gaynor* (Mass 2005) 820 NE2d 233, 250 (discussing and approving Cellmark protocol in distinguishing between artifacts and true alleles in mixed DNA sample). This argument is strengthened when the lab uses questionable parameters, or when merely altering test parameters would change the result. This underscores the malleability and subjectivity of test results. This argument can also be used to challenge the statistical data the lab uses. In addition, when the heights of peaks on the electropherogram are balanced, this is consistent with a single source; thus, when they are not balanced, it can be argued that this is evidence of the presence of DNA from another donor and that the alleles that were attributed to the defendant should not have been. See *Roberts v U.S.* (DC Feb. 15, 2007) 916 A2d 922, 932 (discussing expert's interpretation of peak heights and intensity, from which he derived conclusions about number of donors). A lab analyst will explain that there are better explanations for peak height imbalance, although a retest would be a definitive method of ruling out the suggestion of an unaccounted for mixture. *People v Reeves* (2001) 91 CA4th 14, 33, 109 CR2d 728. Whether this sort of attack can raise a reasonable doubt about the defendant's guilt likely will depend on the other evidence, as well as the advocate's skill in arguing that his or her reasonable interpretation of this circumstantial evidence points toward innocence. The prosecutor must urge rejection of any unreasonable interpretation. See CALCRIM 224.

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§5.71 8. Wrong Evidence Tested or Wrong Test Performed

The basis of this argument is that the lab did not select the proper items for testing. For example, the opponent might argue that other, untested blood stains might have a different result. Anecdotally, a man was acquitted in a cold-hit rape case in Los Angeles when his DNA profile was matched to the foreign DNA found on the alleged victim's *neck,* but vaginal swabs were not tested because the analyst did not think this was logically necessary, figuring that the same person whose saliva was on her neck was also the rapist. The jury wanted a result from the vaginal swab before they would convict. As a practical matter, every sample cannot be tested as, for example, a murder case might involve hundreds of drops of blood. The lesson is that the proponent of DNA evidence must use good judgment on selecting material for testing.

A similar argument can be made when a possible alternative suspect was not ruled out. This argument would be strongest if the alternative suspect was a relative who might have a very similar genotype to the defendant's. See *Young v State* (Md 2005) 879 A2d 44, 56 n12 (noting higher match probability among close relatives).

Another argument is that other tests, perhaps better tests, were available, but that the lab stopped testing after finding a match with its first test. This argument posits that not all of the loci were tested and that it is possible that the lab tested the wrong loci and additional testing with other testing methods or kits would have ruled out the defendant, since an unexplained failure to match at *any locus* would definitively exclude the defendant. *People v Brown* (2001) 91 CA4th 623, 629, 110 CR2d 750; *People v Reeves* (2001) 91 CA4th 14, 29, 109 CR2d 728. Test kits that are available besides the standard Profiler Plus, COfiler, and Identifiler include Promega's PowerPlex 16 (with pentanucleotides), SGM+ (FSS, Europe), Y-STR, mitochondrial, single nucleotide polymorphism (SNP), DQA-Polymarker, and restriction fragment length polymorphism (RFLP).

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§5.72 9. Contradiction With Conventional Serology

There have been cases where conventional serological analysis (ABO-PGM) on a stain appeared to have ruled out a suspect before DNA typing established a match. The inconsistent results may suggest either a DNA typing error or perhaps another, as yet unknown, suspect.

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§5.73 10. Failure to Account for Coincidence

Coincidences can happen, despite the long odds. In the United Kingdom, where DNA database testing has been used systematically in criminal investigations, scientists expect occasional adventitious matches. See Dr. Peter Gill, "National DNA Databases and some other deliberations" available at http://www.foundation.org.uk/events/pdf/20080206_Gill.pdf. Despite the statistical likelihood, authorities deny proof of any coincidental matches. See "Adventitious (Chance) DNA Matches" on The Crown Prosecution Service website at http://www.cps.gov.uk/legal/s_to_u/scientific_evidence/adventitious_dna_matches/. Several claims of coincidence have been made, however. See for example, the 1995 case of Raymond Easton, a mobility-impaired disabled man whose DNA matched a sample from a home burglary. Goodwin, Linacre & Hadi, An Introduction to Forensic Genetics 99 (2007). While an increase in the number of loci tested in the U.K. will reduce the risk of coincidental match, the problem may persist in partial match cases. Goodwin, Linacre & Hadi, An Introduction to Forensic Genetics 99 (2007).

In addition, it has been revealed that a large number of supposedly unrelated individuals in the Arizona offender database matched at nine or more loci. See Budowle, Baechtel & Chakraborty, *Partial Matches in Heterogeneous Offender Databases Do Not Call Into Question the Validity of Random Match Probability Calculations,* Int'l J Legal Med (Nov. 2007); see also Felch & Dolan, *FBI Resists Scrutiny of 'Matches,'* Los Angeles Times 1 (July 20, 2008) and Jefferson, *Cold Hits Meet Cold Facts: Are DNA Matches Infallible?,* 40(1) Boalt Transcript 28 (Spring 2008), available at https://www.law.berkeley.edu/alumni/transcript/spring-08/Transcript.Spring08.Weblow.pdf.

This level of coincidental matches would seem inconsistent with the odds typically given for a random match probability. Using such studies, the defense may to try to rebut the statistics. An interesting online debate about this issue between mathematicians Charles Brenner and Keith Devlin can be found at http://dna-view.com/ArizonaMatch.htm#myerspostscript and at http://www.maa.org/devlin/devlin_10_06.html. Some experts see coincidental matches in offender databases as a red herring in that unknown relatedness may not be accounted for by such studies. On the other hand, in a cold-hit case, when the genetic profile is found within such a database by a systematic comparison of crime scene DNA to every profile within the offender database, there is, in fact, a greater risk of coincidental match than in cases where the suspicion is based on evidence obtained before a DNA test. See discussion of *People v Nelson*, *supra*. Still the chance of coincidence is remote when there is a 13 STR locus match. Coincidental match is a more plausible scenario when the crime scene sample yields results at only a few loci.

Mixture cases, in which more than one DNA type is found in the crime scene evidence, may require recalculation of the risk of coincidence, using a "combined probability of inclusion," which may change the statistics by several orders of magnitude. "In July 2000, the DNA Advisory Board endorsed two methods for calculating statistical ratios for mixed samples: the likelihood ratio and the probability of exclusion or probability of inclusion calculation." *People v Coy* (Mich App 2003) 669 NW2d 831, 836. See also *Coy v Renico* (ED Mich 2006) 414 F Supp 2d 744, 762 (likelihood ratios and the inclusion and exclusion probabilities were properly admitted in murder trial, particularly given mixed DNA samples).

A correction is appropriate if the alleged perpetrator belongs to a discreet subpopulation with a high degree of relatedness (*i.e.,* inbreeding). Challenges to the product rule might be possible given the appropriate evidence. Any linkage between the loci would justify use of a counting method (*i.e.,* how many times has this profile actually been seen compared to all profiles) rather than the product rule (a much more compelling number). There are statistical methods, such as an "exact" test for Hardy-Weinberg equilibrium, which have shown such association in STR population databases; however, experts disagree about the import of such findings. See Montoya-Delgado et al., *An Unconditional Exact Test for the Hardy-Weinberg Equilibrium Law: Sample-Space Ordering Using the Bayes Factor,* 158(2) Genetics 875-883 (June 2001); Zapata & Alvarez, *On Fisher's Exact Test for Detecting Gametic Disequilibrium Between DNA Polymorphisms,* 61 Annals Hum Genetics (Jan. 1997).

If a defendant's relatives are also suspected, the random match probability would not be appropriate, since that figure reflects rarity among unrelated persons. Also, identical twins have identical DNA. *People v Nelson* (2008) 43 C4th 1242, 1257, 78 CR3d 69; *People v Venegas* (1998) 18 C4th 47, 58, 74 CR2d 262.

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§5.74 11. Innocent Explanation

The presence of a person's DNA profile is evidence of contact but it does not provide any information about the time of that contact. Obviously, DNA evidence does not by itself contradict a claim of consensual intercourse or of killing in self-defense. The time of deposit however can be a critical issue, for example, when sperm is located on bedding, or the defendant has an innocent explanation for his or her presence at a location on an occasion before or after the crime.

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C. Error in Statistical Data or Interpretation of Data

§5.75 1. Alternative Interpretation of Proponent's Statistical Data

Population statistics may be disputed because there are widely varying approaches to the use of statistics in, for example, cold-hit calculations and cases of DNA mixtures. The issue of STR population databases in cold-hit cases was recently examined by the California Supreme Court. See *People v Nelson* (2008) 43 C4th 1242, 78 CR3d 69. For discussion of statistical issues arising from cold-hit cases, see §5.34.

One situation in which the defendant may argue for alternative interpretation of statistical data is when questions can be raised about the match determinations. Statistics can be recalculated to give the benefit of any doubt in the match criteria to the defendant (*e.g.,* a recalculation recognizing that stutter may actually constitute an allele). See discussion about stutter in §5.31. The strength of the statistic can be reduced if there is a reason to have less confidence in the quality of the matches. Computer programs are available with the capacity to make such an assessment, such as TrueAllele by Cybergenetics.

Partial match cases, which typically involve degraded crime scene samples that yield results only at a few loci, may lend themselves to even more compelling defenses when the match is the result of a database search. In such instances the statistical weight of the evidence may be highly arguable. See Humes, *Guilt by the Numbers,* Cal Law 20 (Apr. 2009), available at http://www.callawyer.com/story.cfm?eid=900572&evid=1.

Also, in DNA mixture cases, the combined probability of exclusion or a combined probability of inclusion would be more appropriate than a random match probability. See *People v Coy* (Mich App 2003) 669 NW2d 831, 836 (noting approval of DNA Advisory Board for use of the likelihood ratio and the probability of exclusion or probability of inclusion calculation for mixed DNA samples). If there is any possibility that the true perpetrator is related to the suspect, then the statistics change dramatically. The random match probability is typically defined as an infinitesimally small fraction, but the fraction is of random *unrelated* persons in the given population. Relatives are much more likely to share multiple alleles, hence the supposed estimate of rarity of the type would completely misstate the numbers pertaining to persons who are related and presumably share many alleles. The closer the relation, the better the odds of coincidence. See California Dep't of Justice, Division of Law Enforcement, *Information Bulletin: DNA Partial Match (Crime Scene DNA Profile to Offender) Policy, 2008-BFS-01* (visited June 3, 2010), available at http://ag.ca.gov/cms_attachments/press/pdfs/n1548_08-bfs-01.pdf (policy on release of names of persons in database whose relative might be perpetrator). Jurors in Nashville acquitted the defendant of double murder when a mixed DNA sample from the crime scene might also have matched the defendant's relatives who lived nearby. See Moore, *Damaged DNA Evidence Shrinks Serial Killer Case,* New York Times (May 21, 2009) (also describing sample degradation in a California case) available at http://www.nytimes.com/2009/05/22/us/22dna.html?_r=1. A caveat is that the numbers still might not be entirely favorable to the defense, especially when there is a 13-locus match, or more.

Another fact to keep in mind when interpreting statistics is to consider that population statistics are inexact—mere estimates designed to give a rough idea of the rarity of a type—and an expert witness might be able to reduce their denominator by an order of magnitude at the outset.

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§5.76 2. Alternative Statistical Data

If the wrong population database is used, the statistical results become questionable. The opponent may use an expert to try to find and present the appropriate population database, propose a different statistic based on a theta correction, or not call the expert and merely rely on the failure of proof of the appropriate statistical weight by the proponent.

NOTE: A theta correction is a mathematical adjustment applied to a frequency calculation to account for subpopulations.

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§5.77 3. Effect of Error Rate

An important factor in determining the reliability of a new technology is ascertainment of its error rate. See *Daubert v Merrell Dow Pharms., Inc.* (1993) 509 US 579, 587, 125 L Ed 2d 469, 113 S Ct 2786. Hence, an error rate for a particular lab or particular technology is certainly a relevant consideration for the jury or other trier of fact. Some experts have advocated considering the error rate in the context of population statistics, reasoning that the chance of error and the chance of a coincidental match to another person in the population are the two reasons why a match may not correctly identify the source of a crime scene sample. Others argue that population statistics and error rates are like apples and oranges, and that considering them simultaneously confuses the jury.

Increasing this difficulty is the lack of data for error rates. While typing errors certainly have been made, crime lab analysts will continue to maintain that their labs are completely error free, and even suggest that error would be impossible. One approach to creating an error rate is to compile proficiency test data, although proficiency tests may be easier than the examination of actual crime scene samples. Proficiency test error data should understate the error rate, in this view. Armed with such evidence, attorneys have suggested that the one or two errors from one laboratory in thousands of proficiency tests given over the course of a decade fairly suggested an error rate of 1 in 10,000. If the match probability data were combined with an error rate of this apparently small magnitude, then the result would be an adjusted random match probability very close to the size of the error rate. This is so because the random match probability is typically such a tiny number that adding it to a fraction such as 1 in 10,000 would essentially add *nothing* to that fraction.

Error-rate estimates might not seem persuasive to jurors who would want to see evidence of error in the very case they are judging. While an attorney may argue that DNA testing errors are by their nature not easily subject to detection, the ready availability of STR test records for scrutiny substantially undercuts this argument.

Error-rate evidence might be presented to a jury through cross-examination or by presentation of a defense expert. Even if an error rate as such were excluded as irrelevant, or perhaps unduly prejudicial or confusing (see Evid C §352), then anecdotes of a laboratory's previous errors might be instructive as to problems that could occur during DNA testing, and they might be more meaningful to jurors than mere statistical estimates of their possible occurrence.

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§5.78 D. Planted Evidence

A criminal defendant may claim that the evidence implicating him or her was "planted." Careful documentation of the chain of custody will serve to rebut such a claim when a crime scene has been secured methodically. In this instance, the honesty of the first responders who secured the crime scene is at issue. Questions as to motive as well the particular officers' access to the defendant to obtain biological samples before the time of the crime are difficult to answer when this claim is made. In a cold-hit case, the possibility of planting evidence becomes even more remote because the police would need access to the defendant's DNA before the defendant became a suspect. Alternatively, as in the novel *Presumed Innocent,* by Scott Turow, an acquaintance could have access to the defendant's DNA and then plant it to frame the defendant. The idea of planted evidence is more suitable to novels and films than real life.

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§5.79 E. Destruction of Evidence

Destruction of the evidence that yielded the DNA profile may be the basis for sanctions or jury instructions. See *California v Trombetta* (1984) 467 US 479, 81 L Ed 2d 413, 104 S Ct 2528. Only destruction in bad faith will support these sanctions. See *Arizona v Youngblood* (1988) 488 US 51, 102 L Ed 2d 281, 109 S Ct 333. *Trombetta/Youngblood* motions are discussed in California Criminal Law Procedure and Practice, chap 11 (Cal CEB Annual).

NOTE: Mr. Larry Youngblood, whose case was the basis for strictly limiting sanctions for the destruction of evidence, was able nonetheless to obtain additional postconviction DNA testing through other means, and he was exonerated by the Innocence Project. For information about the Innocence Project and Mr. Youngblood, go to http://www.innocenceproject.org/Content/303.php; Garrett, *Judging Innocence,* 108 Colum L Rev 55, 117 (Jan. 2008).

Destruction of biological materials that could yield exculpatory evidence through DNA testing is a challenge to the fair administration of justice. Efforts must be made to preserve such evidence, including written demands to law enforcement or possibly court orders to preserve evidence modeled on the postconviction statute for preservation of evidence. See Pen C §1417.9. The Sexual Assault Victims' DNA Bill of Rights (Pen C §680) creates an imperative for DNA testing of rape kit evidence. In establishing rights for the victims of sexual assaults, it establishes a standard of care that may be pertinent to a showing of bad faith under *Arizona v Youngblood,* although by its own language it creates no rights for defendants in and of itself. See Pen C §680(i); *Arizona v Youngblood* (1988) 488 US 51, 102 L Ed 2d 281, 109 S Ct 333.

DNA testing is destructive and may use up the entirety of an extracted sample. This is less of a problem since the advent of polymerase chain reaction (PCR) techniques, which do not require a large sample. If testing may destroy the entirety of the sample, precautions might include defense observation or videotaping of the testing. See §5.26. With short tandem repeat (STR) evidence, the raw electronic data always can be reexamined to check for errors. There is no justification for failure to maintain such records, which are easily preserved on electronic media. Destruction of raw data would support an argument for exclusion of the DNA testing evidence, pursuant to Pen C §1054.5(c), or even dismissal. *People v Moore* (1983) 34 C3d 215, 223, 193 CR 404; *People v O'Hearn* (1983) 142 CA3d 566, 571, 191 CR 481. Also, a jury instruction regarding the willful destruction of evidence may be a suitable remedy. *People v Wimberly* (1992) 5 CA4th 773, 791, 7 CR2d 152; *People v Sassounian* (1986) 182 CA3d 361, 226 CR 880.

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§5.80 F. Fourth Amendment Challenge Based on Surreptitious Collection

Law enforcement might follow a suspect based on a hunch or uncorroborated tip and wait for that suspect to discard, for example, a cigarette, chewing gum, or soda can and then swab the discarded item for a DNA sample. See Bieber, *Turning Base Hits Into Earned Runs: Improving the Effectiveness of Forensic DNA Data Bank Programs,* 34(2) J Law Med Ethics 222, 226 (Summer 2006) (discarded cigarette butt leads to successful DNA match). If that DNA sample matches evidence from an unsolved crime, then on arrest the defendant may mount a Fourth Amendment challenge to the search. While a court may hold that there is no legitimate expectation of privacy in abandoned property, the question as to whether a person who discards property expects that his or her genome, and that of his or her family, will thereby be subject to government scrutiny has not been comprehensively addressed. This issue will become substantially more complicated when familial searching protocols come into place at some point in the near future. See Bieber, Brenner & Lazer, *Finding Criminals Through DNA of Their Relatives,* 312(5778) Science (June 2, 2006), available at http://www.sciencexpress.org (search for article title). Meanwhile, the controlling authority holds that warrantless searches of abandoned property do not violate the Fourth Amendment. *U.S. v Burnette (Burnette)* (9th Cir 1983) 698 F2d 1038, 1047, citing, inter alia, *Abel v U.S.* (1960) 362 US 217, 240, 4 L Ed 2d 668, 687, 80 S Ct 683; see also *People v Ayala* (2000) 24 C4th 243, 279, 99 CR2d 532.

Surreptitious collection of DNA sample evidence may grow in popularity after the technique's success in the infamous Kansas BTK killer case. In that case, police developed interest in a suspect but had no probable cause to obtain his DNA. Under court order, they seized biological evidence from the suspect's daughter's doctor, determined her genetic profile, and deduced that her father's profile would have a high probability of matching the perpetrator. When a warrant was then obtained for the defendant's arrest, his DNA was sampled and he was identified as the serial killer. As the defendant had no expectation of privacy in his daughter's DNA, and she had no standing to challenge the evidence used against him, he was convicted of multiple murder. See Bieber, *Turning Base Hits Into Earned Runs: Improving the Effectiveness of Forensic DNA Data Bank Programs,* 34(2) J Law Med Ethics 222, 226 (Summer 2006); see NPR's online news report, Shapiro, *Police Use DNA to Track Suspects Through Family* (Dec. 12, 2007), available at http://www.npr.org/templates/story/story.php?storyId=17130501.

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VII. GUIDELINES FOR QUESTIONING WITNESSES

A. Proponent's DNA Expert

§5.81 1. Direct Examination of Proponent's Expert

The proponent of the evidence should first qualify its expert by eliciting testimony as to the expert's current position and responsibilities; experience in his or her current position; education and training, including professional certifications; supervised work experience; membership in professional organizations; and experience as an expert witness.

The proponent should then ask questions about the basis for the expert's opinion as well as if he or she has ever ruled out a suspect with DNA testing. In response, the expert should cover any or all of the following:

- Briefly explain DNA testing;
- Provide testimony on the chain of custody from the time of receipt to the time of return of each sample;
- Describe testing performed in the instant case; and, finally,
- State his or her conclusion and opinion as to the nature of the DNA match and its statistical significance.

NOTE: It is essential that the prosecutor (and the prosecution's expert) correctly state the applicable statistical measure. An incorrect formulation unfairly misstates the weight of the evidence. For example, it is fallacious to say that the statistical formula is "the chance that someone other than the defendant is the source." This is qualitatively different from stating that "this is the chance that an unrelated person would match at random." See *McDaniel v Brown* (2010) ___ US ___, 175 L Ed 2d 582, 591, 130 S Ct 665; Rubin & Felch, *Man Convicted in Sex Assault Should be Freed or Retried, Court Rules,* Los Angeles Times (May 6, 2008).

It is important to remember that the proponent of expert testimony may ask leading questions. *People v Campbell* (1965) 233 CA2d 38, 44, 43 CR 237. See Jefferson's California Evidence Benchbook §27.35 (4th ed CJA-CEB 2009). Judicious utilization of this technique may be critical for the jurors' comprehension of this complicated material.

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§5.82 2. Cross-Examination of Proponent's Expert

As much, if not more so, than with any other witness, it is vital that the cross-examiner ask only leading questions. Any experienced expert witness will wrest control of the examination if given the chance with open questions and the attorney will lose a chance to give persuasive force to the case. See Effective Direct & Cross-Examination Update §7.12 (Cal CEB); Pozner & Dodd, Cross-Examination: Science and Techniques (2d ed 2004). Leading questions require mastery of the relevant vocabulary and concepts, or else the witness can quarrel about the question itself and evade the answer. The attorney must be familiar with the material to ask effective questions.

The opponent will want to ask questions suggesting that errors can and do happen in DNA labs as well as questions demonstrating that the analyst had nothing to do with protecting the integrity of the sample before it was brought to the laboratory. If the testifying expert was not the lab analyst, and the lab report is admitted as a hearsay exception, then the witness should be asked questions that highlight the fact that he or she did not actually perform the test or observe it being conducted and must rely on the analyst's records regarding whether or not any errors were made. If the expert does not have a Ph.D., questions can address the relative lack of academic qualification as compared with the defense expert or to what jurors might have expected. Garrett, *Judging Innocence,* 108 Colum L Rev 55, 84 n109 (Jan. 2008) (criminalist claimed a DNA match even though only "initial inconclusive testing" had been done and actual testing exonerated defendant).

The opponent will want to ask questions about what law enforcement told the analyst about the case, which this information may have biased the analyst toward including the defendant; questions illustrating the degree of subjective interpretation of results; questions suggesting that standards of the industry, the lab, or the analyst are imperfect, too flexible, or may not have been complied with in the instant case; and questions suggesting that the statistics are overstated and may rely on questionable assumptions.

NOTE: It is important that the opponent of the evidence not misstate the applicable statistical measure. For example, it is fallacious to say, "if the random match probability is one in 1 million, 300 other persons in the country could be the source." This would depend on other evidence and is thus misleading.

Finally, the witness should be asked questions illustrating the steps that were not taken, such as items that were not tested, other suspects who were not ruled out, or tests not done that were available at other loci.

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B. Opponent's DNA Expert

§5.83 1. Direct Examination of Opponent's Expert

Presentation of testimony of an opposing expert in molecular biology is only recommended in cases of clear error or strong ambiguity in the proponent's results. The witness should first be qualified as an expert. See §5.81.

The witness should be asked questions about the basis for his or her opinion. This involves having the witness briefly explain the pertinent science, describe the materials he or she reviewed regarding the case, and state his or her conclusion and opinion. In stating the conclusion and opinion, the witness should apply the scientific principles to the facts of the case; explain his or her criticism of the prosecution's match result; and express an opinion about whether there is an exclusion, or only a partial match, or reduced confidence of a complete match. Finally, the witness should be asked, "What is the correct statistical significance of the actual match?"

Then, in anticipation of cross-examination, the witness should be asked the following:

Q: Are you paid for your work?

Q: How much, and why?

Q: Have you ever worked in a lab? [*If so*] When and where?

Q: [*If the answer is yes*] Do you work in a laboratory now? [*If not*] Why not and does this matter?

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§5.84 2. Cross-Examination of Opponent's Expert

The same general considerations that apply to the defense's cross-examination of a prosecution's expert apply to the cross-examination of a defense expert by the prosecution. See §5.82.

The prosecution's cross-examination should obtain the witness's agreement that DNA testing itself is valid and that DNA testing is a powerful means of including or excluding suspects. The questioning should also attempt to obtain the witness's agreement that the prosecution's lab analyst is qualified to render an opinion about a DNA match and relevant statistics. If significant studies or the weight of authority is contrary to the defense expert's basis for critique, then have the witness acknowledge the difference of opinion. If the witness's opinion is a minority position, then have the witness acknowledge this as well.

The cross-examination should establish that the witness does not work in a crime lab, like the prosecution's analyst, and that the witness always works for the defense, if this is so. The questions should explore the witness's compensation in the case as a source of bias. Finally, the questions should establish that even adjusting for the factors identified by the witness, the chance of a coincidental match is quite small.

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Source: Criminal Law/Scientific Evidence in California Criminal Cases/5 DNA Evidence/ VIII. POSTCONVICTION DISCOVERY AND TESTING/§5.85 A. Postconviction Testing by Defense

VIII. POSTCONVICTION DISCOVERY AND TESTING

§5.85 A. Postconviction Testing by Defense

A criminal defendant convicted of a felony and currently imprisoned has a right to make a motion for postconviction DNA testing. Pen C §1405(a). The motion must be verified by the defendant under penalty of perjury and must explain why the identity of the perpetrator was, or should have been, a significant issue in the case and how the requested DNA testing would raise a reasonable probability that the defendant's verdict or sentence would be more favorable if the results of DNA testing had been available at the time of conviction. Pen C §1405(c)(1)(A)-(B). The motion must reasonably attempt to identify the evidence that should be tested and the type of DNA test requested. Pen C §1405(c)(1)(C). In addition, the motion must reveal the results of any DNA or other biological testing that was conducted previously, if known, and state whether any earlier motion for postconviction testing was filed and, if so, the results of that motion, if known. Pen C §1405(c)(1)(D)-(E).

The court must grant the motion if it determines that all of the following are established:

- The evidence to be tested is available and in a condition that would permit the DNA testing requested (Pen C §1405(f)(1));
- The evidence to be tested has been subject to a chain of custody so that it has not been substituted, tampered with, replaced, or altered in any material aspect (Pen C §1405(f)(2));
- The identity of the perpetrator of the crime was, or should have been, a significant issue in the case (Pen C §1405(f)(3));
- There is a prima facie showing that the evidence sought to be tested is material to the issue of the defendant's guilt (Pen C §1405(f)(4));
- The requested DNA testing results would raise a reasonable probability that, in light of all the evidence, the verdict or sentence would have been more favorable if the results of DNA testing had been available at the time of conviction (Pen C §1405(f)(5));
- The evidence sought to be tested was either not tested previously, or was tested but the requested DNA test would provide results that are reasonably more discriminating and probative, or that have a reasonable probability of contradicting prior test results (Pen C §1405(f)(6));
- The testing requested employs a method generally accepted within the relevant scientific community (Pen C §1405(f)(7)); and
- The motion is not made solely for the purpose of delay (Pen C §1405(f)(8)).

To satisfy the materiality requirement of Pen C §1405(f)(4), a moving defendant must show only that the DNA testing sought would be relevant to the issue of identity, not dispositive of it. *Richardson v Superior Court* (2008) 43 C4th 1040, 1048, 77 CR3d 226. For the purposes of Pen C §1405(f)(5), a "reasonable probability" means "a reasonable chance and not merely an abstract possibility." 43 C4th at 1051. In making a "reasonable probability" determination, however, the trial court should keep in mind that the issue for it to determine "is whether the defendant is entitled to develop potentially exculpatory evidence and not whether he or she is entitled to some form of ultimate relief such as the granting of a petition for habeas corpus based on that evidence." 43 C4th at 1051.

An indigent defendant has the right to appointment of counsel to investigate and, if appropriate, file a motion for DNA testing. Pen C §1405(b). For this purpose, an indigent defendant has more rights than a person filing a petition for extraordinary relief, who is not entitled to appointed counsel as a matter of right. *In re Kinnamon* (2005) 133 CA4th 316, 34 CR3d 802. The standard of review of a trial court's ruling on a motion under Pen C §1405 is abuse of discretion. *Richardson v Superior Court* (2008) 43 C4th 1040, 1047, 77 CR3d 226.

NOTE: At least one appellate court has permitted constructive filing of a writ petition under Pen C §1405(j) challenging a postjudgment denial of DNA testing. See *In re Antilla* (2009) 176 CA4th 622, 627, 97 CR3d 849.

The right to retest has little value unless the physical evidence, which might be a source of DNA, is preserved. All biological material that is secured in connection with a criminal case must be retained during the period of the defendant's incarceration.

Pen C §1417.9. A governmental entity may be relieved of this obligation only if no other law requires the retention of the material and, after notice to all parties, the entity does not receive within 90 days either a motion under Pen C §1405, a request to preserve the material because of an intention to file such a motion, or a declaration of innocence. Pen C §1417.9(b). As a practical matter, counsel representing a defendant on appeal or habeas petition should make such a request for preservation in any case when it is possible that the biological material could establish innocence. See Garrett, *Judging Innocence,* 108 Colum L Rev 55, 84 n109 (Jan. 2008). In the appropriate case, trial counsel may also consider making such a written demand.

NOTE: In *District Attorney's Office v Osborne* (2009) ___ US ___, 174 L Ed 2d 38, 52, 129 S Ct 2308, the Supreme Court held that, postconviction, the due process right to obtain access to DNA evidence for testing is limited. Federal courts may upset a state's postconviction relief procedures only if those procedures are found "fundamentally inadequate to vindicate the substantial right provided." ___ US at ___, 174 L Ed 2d at 42. Alaska provided "a substantive right to be released on a sufficiently compelling showing of new evidence that establishes innocence." ___ US at ___, 174 L Ed 2d at 52. The state's procedures for access to evidence for DNA testing did not offend "some fundamental principle of justice" or transgress "any recognized principle of fundamental fairness in operation." ___ US at ___, 174 L Ed 2d at 42.

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B. Postconviction Database Sampling by Prosecution

§5.86 1. Mandatory Collection of DNA Samples

Under the DNA and Forensic Identification Data Base and Data Bank Act of 1998 (Pen C §§295-300.3), DNA samples for inclusion in California's state DNA databank and uploading into the national databank system must be collected from the following individuals, including juveniles (Pen C §296(a)):

- Any individual convicted of a felony or found not guilty of a felony by reason of insanity and any juvenile adjudicated a delinquent for commission of a felony;
- As of January 1, 2009, any adult arrested or charged with a felony;
- Any person (adult or minor) subject to registration as a sex offender or as a convicted arsonist; and
- Any person housed in a mental health facility or sex offender treatment program after being charged with any felony.

An infrastructure is now in place that makes this systematic DNA sampling practicable. In light of the fact that the genetic profiles of persons in this database will be compared with DNA results from unsolved crimes, it is anticipated that challenges will be brought to DNA sampling, such as a Fourth Amendment challenge to the sampling,

NOTE: Proposals for expanding offender databases are controversial because convicted felons and arrestees are disproportionately members of minority groups; thus, minorities will be disproportionately investigated because Caucasians are less likely to be included in the database. See Duster, *Expanding Differential Trust of DNA Forensic Technology: Grounded Assessment or Inexplicable Paranoia?,* 34(2) JL Med & Ethics 293 (2006). An alternative that has been suggested is the creation of a universal database. This is a profound policy question that remains to be resolved. See Kaye, Smith & Imwinkelried, *Is a DNA Identification Database in Your Future?,* 16 Crim Just 4 (2001).

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§5.87 2. Fourth Amendment Challenge to Sampling

A defense attorney may make a Fourth Amendment challenge to DNA sampling authorized by Pen C §296. The U.S. Supreme Court has long recognized that the compulsory extraction of blood is a substantial intrusion that constitutes a search within the meaning of the Fourth Amendment. See *Schmerber v California* (1966) 384 US 757, 767, 16 L Ed 2d 908, 917, 86 S Ct 1826. See also *Winston v Lee* (1985) 470 US 753, 760, 84 L Ed 2d 662, 668, 105 S Ct 1611. The standard procedure for DNA sampling, a buccal (oral) cotton swabbing, is far less intrusive than a blood draw, but still constitutes a search, as does the subsequent typing analysis of that sample and each comparison of the genetic profile in database searches. While this involves very little physical intrusiveness to balance against the interests favoring the search, the genetic information obtained represents important protected interests. Under the ABA Standards on DNA Evidence, Standard 2.2(b), DNA may be collected under court order from a suspect in a noninvasive manner (saliva) if there is "reasonable suspicion" that the suspect committed the crime and in an invasive manner (blood) if there is "probable cause" that the suspect did so.

However, challenges to state and federal DNA mandatory sampling provisions have not fared well in the courts, at least as applied to defendants convicted of crimes. For example, the First, Second, Fifth, and Sixth District Courts of Appeal held that, because individuals convicted of crimes have a diminished expectation of privacy, the forced collection of blood from individuals convicted of serious crimes does not violate the Fourth Amendment. See also Cal Const art I, §1; *People v McCray* (2006) 144 CA4th 258, 265, 50 CR3d 343 (Second District); *People v Johnson* (2006) 139 CA4th 1135, 1168, 43 CR3d 587 (Fifth District); *People v Travis* (2006) 139 CA4th 1271, 1290, 44 CR3d 177 (First District); *People v Adams* (2004) 115 CA4th 243, 259, 9 CR3d 170 (Sixth District); *People v King* (2000) 82 CA4th 1363, 1378, 99 CR2d 220 (First District).

In addition, the Third District Court of Appeal has upheld the constitutionality of Pen C §296 as applied to a juvenile. *In re Calvin S.* (2007) 150 CA4th 443, 449, 58 CR3d 559. Sitting en banc, the Ninth Circuit reached a similar result with respect to a federal statute authorizing DNA sampling of federal parolees. *U.S. v Kincade* (9th Cir 2004) 379 F3d 813, 832. However, five dissenting justices would have found the statute unconstitutional. 379 F3d at 842. See also *U.S. v Kriesel* (9th Cir 2007) 508 F3d 941.

NOTE: It remains an open question whether collection of a blood sample for DNA testing can violate a defendant's rights under the Religious Freedom Restoration Act of 1993. See *U.S. v Zimmerman* (9th Cir 2007) 514 F3d 851.

Until the Supreme Court resolves the matter, a federal claim remains and should be asserted by defense counsel when practicable. A defense attorney must decide whether to object to a Pen C §296 sampling order. The argument can be made that objection to sampling is not required, as no waiver can be inferred from a compulsory act. While there is no harm in a defense attorney objecting at the time of a sampling order, a challenge may be more effective in the context of a Pen C §1538.5 motion following a database hit resulting from authorized sampling, or in defense of a misdemeanor charge of refusal to be sampled under Pen C §298.1(a).

It has also been held that there is no ex post facto violation when a person is sampled based on a felony committed before the effective date of the enabling legislation. *Good v Superior Court* (2008) 158 CA4th 1494, 1510, 71 CR3d 125; *People v Espana* (2006) 137 CA4th 549, 40 CR3d 258.

It has been reported that local authorities have created DNA databases separate and apart from those authorized under Pen C §296. It appears that such databases contain samples obtained by consent, but not under conditions that would permit uploading to NDIS. There may be a basis for objecting to evidence obtained in conjunction with this unauthorized resource, however to the extent this is analogous to a "mere tip," exclusion may be not be a remedy. See Abdollah, *Orange County D.A.'s DNA Database Rapidly Growing*, Los Angeles Times, October 5, 2009.

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§5.88 3. Mistaken Inclusion in Database

If a defendant's genetic profile is found in a database search, but there was no legal basis to obtain that profile or include it in an offender database, or it was not expunged despite an order to do so, then this does not invalidate the arrest or conviction. See Pen C §297(f)-(g); Pen C §299(d). See also *People v Robinson* (2010) 47 C4th 1104, 1129, 104 CR3d 727 (as in *Herring v U.S.* (2009) ___ US ___, 172 L Ed 2d 496, 129 S Ct 695, unlawful collection of genetic material did not amount to "systemic error" or "reckless disregard" for constitutional requirements triggering exclusion). While the statutes do not literally preclude a court from excluding the test results, that does seem to be the intention of the drafters. Likewise, subsequent reduction of the qualifying offense to a misdemeanor does not invalidate the previous DNA sampling. *Coffey v Superior Court* (2005) 129 CA4th 809, 29 CR3d 59. But see *In re Nancy C.* (2005) 133 CA4th 508, 34 CR3d 871 (juvenile wobblers).

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§5.89 4. Expungement of Sample From Database

When persons are sampled on arrest but are not prosecuted, or there is no felony filing, or the case is dismissed, or the defendant is acquitted, or the conviction is a nonqualifying misdemeanor, or if there is a reversal on appeal, and the person does not otherwise qualify for sampling because of a prior conviction, he or she has a right to have the sample expunged from the database. Pen C §299(a).

A written request for expungement, with notice to specified others, must be filed with the trial court of the county where the person was arrested or convicted. Pen C §299(c)(1). To grant the request, the court must conduct a noticed hearing on the issue. Pen C §299(c)(2). The decision whether to grant or deny the request is within the sole discretion of the court. A denial is a nonappealable order and is not subject to review by petition for writ. Pen C §299(c)(1). But see *Coffey v Superior Court* (2005) 129 CA4th 809, 815, 29 CR3d 59.

The sample will be expunged from the DNA database only on receipt of a court order that includes the following:

- The written request for expungement (Pen C §299(c)(2)(A));
- A certified copy of the order dismissing the case/documenting the acquittal, or a letter from the District Attorney stating that no charges have been filed (Pen C §299(c)(2)(B));
- Proof of service on the District Attorney and the State Department of Justice's DNA Laboratory (Pen C §299(c)(1)(C)); and
- Verification that it has been at least 180 days since the District Attorney and Department of Justice were notified, and that the court has not received an objection from the Department of Justice or the District Attorney (Pen C §299(c)(1)(D)).

The issue of expungement has increased in significance since January 1, 2009, because all persons arrested for a felony are subject to sampling. However, some defendants may not ultimately be prosecuted for a felony, but instead may be referred for misdemeanor prosecution. Those persons will be eligible for expungement, if they affirmatively seek a court order (as outlined previously in this section). The Judicial Council has designed two forms to accommodate expungement requests and associated orders: Petition for Expungement of DNA Profiles and Samples (Penal Code §299) (Judicial Council Form CR-185/JV-796) and Order for Expungement of DNA Profiles and Samples (Penal Code §299) (Judicial Council Form CR-186/JV-798). These forms are available at http://www.courtinfo.ca.gov/forms. If database searches are run on the profiles of these arrestees before expungement, then Fourth Amendment litigation may result.

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Source: Criminal Law/Scientific Evidence in California Criminal Cases/6 Evidence of Alcohol Intoxication/Chapter Outline

6

Evidence of Alcohol Intoxication

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I. PHYSIOLOGICAL ASPECTS OF ALCOHOL INGESTION ASSOCIATED WITH INTOXICATION

§6.1 A. Purpose of Chapter

As the laws regarding driving under the influence (DUI) have become stricter and the penalties harsher, individuals accused of driving while intoxicated are seeking legal assistance more frequently. The purpose of this chapter is to introduce the practitioner to the evidence regularly introduced in a DUI case, the scientific underpinnings, and the areas for examination when preparing the case for trial.

Many persons reading this will have had personal experience with alcohol. At some level, we understand that we ingest alcohol and some time later we feel the effects of the alcohol. There are many factors that determine how quickly we feel the effects of alcohol, how intoxicated we become, and how long we feel the effects of alcohol. The purpose of this chapter is not to completely discuss each of the aspects that may affect the medicolegal aspects of alcohol, but to introduce some of the major factors affecting the absorption, elimination, and measurement of alcohol.

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§6.2 B. Physiological Aspects of Alcohol Ingestion

Alcohol is commonly ingested orally and passes from the mouth through the esophagus, into the stomach, and then into the small intestine via the pyloric sphincter. A majority of the alcohol consumed is absorbed into the blood as it passes through the small intestine; however, some absorption occurs in the mouth lining and stomach. The alcohol absorbed into the blood is then distributed throughout the body by blood flow; it passes through the liver, which is primarily responsible for its metabolism, then to the heart, then to the lungs, then back to the heart where it is distributed to the rest of the body simultaneously. Tortora, Principles of Human Anatomy, chap 12 (10th ed 2005).

Because alcohol is completely soluble (miscible) in water, it is eventually distributed uniformly in body water and in all the soft tissues of the body. Urine, being mainly water, will contain a given ratio relative to the blood which makes the urine a potential fluid for determining blood alcohol level. Likewise, due to the water solubility and the volatility of alcohol, the breath contains a given ratio of the alcohol relative to the blood, therefore enabling the breath to be a suitable means of measuring blood alcohol level as well. See Saferstein, Criminalistics: An Introduction to Forensic Science, chap 10 (9th ed 2007).

However, during the absorptive phase, there are significant differences between alcohol concentrations in arterial blood, venous blood, breath, and urine, with arterial blood having the highest concentration of alcohol. It is believed that during the absorptive phase, breath alcohol concentration is closer to the concentration of alcohol in arterial blood than it is to the concentration of venous blood. The question of whether breath alcohol concentration more accurately reflects the concentration of alcohol in the brain where the depressant effects are manifest is still unresolved. For more information see Saferstein, Criminalistics, chap 10. See also Simpson, *Accuracy and Precision of Breath Alcohol Measurements for Subjects in the Absorptive State,* 33 Clinical Chemistry 753, 755 (June 1987); for the online version of this article, go to http://www.clinchem.org/cgi/reprint/33/6/753.

Fatty tissues have lower water concentrations than other tissues such as muscle. Thus, a lean person who consumes a given amount of alcohol potentially attains a lower blood alcohol concentration (BAC) than a person of the same weight with a higher body fat content. Because women normally have more subcutaneous fat and less total body water than men do, a woman who consumes the same amount of alcohol as a man of the same weight potentially attains a higher BAC, although some studies have suggested that women tend to have faster elimination rates. Mumenthaler, Taylor, O'Hara & Yesavage, *Gender Differences in Moderate Drinking Effects,* 23 Alcohol Res & Health 55, 57 (Winter 1999); for the online version of this article, go to http://pubs.niaaa.nih.gov/publications/arh23-1/55-64.pdf.

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§6.3 C. Absorption of Alcohol

Since the majority of the alcohol absorption occurs in the small intestine, food becomes a relevant factor in the consideration of alcohol absorption. Any delay in the absorption of alcohol will result in a delay in the perceived effects by the brain and judgment of the drinker. In order to effectively interpret a particular blood alcohol result, it is important to know whether a breath sample was collected during the absorptive phase or sometime thereafter. Many experts will not attest to the reliability of breath results collected during the absorptive phase as they may overreport the actual blood concentration (as measured by a venous blood sample) by as much as 100 percent or more. Simpson, *Accuracy and Precision of Breath Alcohol Measurements for Subjects in the Absorptive State,* 33 Clinical Chemistry 753, 755 (June 1987); for the online version of this article, go to http://www.clinchem.org/cgi/reprint/33/6/753.

The rate at which the body absorbs alcohol varies from person to person. In addition, a variety of factors can influence the rate at which an individual absorbs alcohol on any particular occasion. Because most alcohol absorption occurs in the small intestine, after the alcohol has left the stomach, any factor that delays the passage of the contents of the stomach into the small intestine will slow absorption. See Boggan, *Alcohol, Chemistry and You: Absorption of Ethyl Alcohol,* Kennesaw State U (2003); for the online version of this article, go to http://chemcases.com/alcohol/alc-04.htm.

The most significant factor affecting the rate at which alcohol is absorbed is the presence or absence of food in the stomach. Food in the stomach, whether consumed before or during the consumption of alcohol, will slow its absorption. The rate of absorption depends mainly on the amount of food consumed. The type of food consumed (heavy, fatty, or high in carbohydrates or calories) may also play a role. In addition to slowing absorption, the presence of food has been found to increase elimination rates. Ramchandani, Kwo & Li, *Effect of Food and Food Composition on Alcohol Elimination Rates in Healthy Men and Women*, 41(12) J Clinical Pharmacology 1345, 1348 (2001); for the online version of this article, go to http://jcp.sagepub.com/cgi/reprint/41/12/1345.

Depending on various factors, the full absorption of alcohol may not be reached until after 2-3 hours. Normally, however, when people drink socially, it can take up to 105 minutes after the cessation of drinking to reach peak BAC. Saferstein, Criminalistics: An Introduction to Forensic Science, chap 10 (9th ed 2007). See also Jones, Jonsson & Neri, *Peak Blood Ethanol Concentrations and the time of its Occurrence After Rapid Drinking on an Empty Stomach,* 36(2) J Forensic Sci 376 (Mar. 1991). Another study of drinkers with empty stomachs established this same time frame of up to 90 minutes to reach peak BAC. Ramchandani, Bosron & Li, *Research Advances in Ethanol Metabolism*, 49 Pathologie Biologie 676 (Nov. 2001); for the online version of this article, go to http://www.ncbi.nlm.nih.gov/pubmed/11762128?itool=EntrezSystem2.PEntrez.Pubmed.Pubmed_ResultsPanel.Pubmed_RVDocSum&ordinalpos=1. See also Note, *In Vino Veritas: The Truth About Blood Alcohol Presumptions in State Drunk Driving Law,* 64 NYU L Rev 141, 147 (Apr. 1989) citing a time frame of 45-90 minutes to reach peak BAC on an empty stomach and 2-3 hours if food is consumed with or after ingestion of alcohol.

Other factors may also affect the rate at which alcohol is absorbed. Some studies have indicated that high concentrations of alcohol irritate the stomach lining and slow gastric emptying. Beer, with its low alcohol content and high level of carbohydrates, may be absorbed more slowly than other alcoholic beverages. Saferstein, Criminalistics, chap 10. Smoking, drinking a larger volume in shorter periods of time, trauma, shock, and blood loss are also believed to slow absorption. See Garriott, ed., Medical-Legal Aspects of Alcohol, chaps 3-4 (4th ed 2003).

Certain prescription drugs have been shown to delay gastric emptying. Hall, Brown, Carter & Kendall, *The Effect of Desmethylimipramine on the Absorption of Alcohol and Paracetamol,* 52(605) Postgraduate Med J 139 (Mar. 1976). Nausea; shock; anticholinergic agents (*e.g.,* Benadryl, many selective serotonin reuptake inhibitors (SSRIs)), which decrease gastrointestinal (GI) motility; pain; fear; sympathomimetic agents (used as decongestants and to treat asthma), which decrease GI blood flow; stimulants; exercise; emotional disturbance; gastric fibrosis; and carcinomatosis can delay gastric emptying. Cooper, Schwär & Smith, Alcohol, Drugs, and Road Traffic (1979). See also Brown, *What Is the Accuracy of Alcohol Screening Tests?* Medscape (posted Oct. 11, 2001) (false positives from asthma medication); available at http://www.medscape.com/viewarticle/413585 (must complete free log-in first). In addition, a variety of factors, for example, chronic gastritis, gastric ulcers, ingestion of warm liquids or food, stress, anxiety, fever, carbonation in the beverage, chronic alcoholism, and gastrectomy, have been shown to increase the rate of absorption. Cooper, Schwär & Smith, Alcohol, Drugs, and Road Traffic (1979).

Absorption ends when the level of alcohol in the gastrointestinal system is at equilibrium with the rest of the body. Many of the emotional factors that the DUI suspect experiences during the stop and investigatory portion of the arrest may inadvertently affect the final blood alcohol determination. Choices made during the course of the drinking session (including what type of beverage to consume, and when and what to eat during the session) also contribute to the BAC both at the time of driving and at the time of the actual evidentiary measurement.

NOTE: California law generally penalizes *driving* with a BAC of.08 grams or more. Veh C §13353.2(A)(1) (persons under age 21 must be under.01 grams, and commercial drivers must be under.04 grams). In situations where the applicable test shows that a defendant's BAC is very close to this amount, defense counsel may consider the argument that an individual who begins driving while still in the absorptive phase, may not be over the legal limit during the time he or she is behind the wheel. This may be true even though a breath test taken some time after the individual has stopped driving indicates that he or she is over the legal limit at that time. See generally Note, *In Vino Veritas: The Truth About Blood Alcohol Presumptions in State Drunk Driving Law,* 64 NYU L Rev 141, 149 (Apr. 1989).

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D. Elimination of Alcohol From Bloodstream

§6.4 1. Changes as Liver Metabolizes Alcohol

The alcohol passes into the liver and then to the heart and lungs. From the lungs, it is transported back to the heart via the pulmonary artery to the circulatory system and the brain. Once alcohol reaches the stomach, the metabolic process starts. A characteristic blood alcohol curve shows a steep rise in blood alcohol concentration (BAC) to a peak concentration during the absorptive phase, followed by a more gradual decline as the absorption rate becomes slower than the elimination rate of the body metabolic rate. The BAC may continue to rise for some period of time after the last drink until absorption and metabolism reach equilibrium when absorption and elimination are equal (peak BAC is reached), and as the absorption rate slows further, when the BAC will start to fall. See Li, Yin, Crabb, O'Connor & Ramchandani, *Genetic and Environmental Influences on Alcohol Metabolism in Humans,* 25(1) Alcoholism: Clinical & Experimental Res 136 (Jan. 2001); for the online version of this article, go to http://www.ncbi.nlm.nih.gov/pubmed/11198709?itool=EntrezSystem2.PEntrez.Pubmed.Pubmed_ResultsPanel.Pubmed_RVDocSum&ordinalpos=1.

Most of the alcohol an individual consumes is metabolized (*i.e.,* converted into water and carbon dioxide) by liver enzymes, but a small amount is excreted in urine and sweat and is exhaled through the breath. Saferstein, Criminalistics: An Introduction to Forensic Science, chap 10 (9th ed 2007). See also *Forensic Medicine: Alcohol and Alcoholism* (1998); American Medical Association, Committee on Medicolegal Problems, *Alcohol and the Impaired Driver—A Manual on the Medicolegal Aspects of Chemical Tests for Intoxication*, 111(6) Cal Med (Dec. 1969), available at http://www.pubmedcentral.nih.gov/articlerender.fcgi?artid=1503721. Studies have shown that elimination rates may be increased by the presence of food in the stomach, which increases the time alcohol is exposed to liver enzymes in the stomach before it gets absorbed into the blood stream. This is a phenomenon known as "first pass metabolism." See Mumenthaler, Taylor & O'Hara, Yesavage, *Gender Differences in Moderate Drinking Effects,* 23 Alcohol Res Health 55 (Winter 1999).

Both urine and breath will contain a semi-fixed ratio of alcohol relative to blood. This makes it possible to calculate the concentration of alcohol in a subject's blood by measuring the concentration of alcohol in the subject's urine or breath. Saferstein, Criminalistics, chap 10; Hingson & Winter, *Epidemiology and Consequences of Drinking and Driving,* 27(1) Alcohol Res & Health 63, 66 (2003), available at http://pubs.niaaa.nih.gov/publications/arh27-1/63-78.htm.

NOTE: Urine tests are not commonly used in California to determine BAC. In California, under Veh C §23612(a), a person who drives a motor vehicle in California impliedly consents to submit to a blood or breath test upon a valid arrest for driving under the influence of alcohol. Only if neither blood nor breath testing is available will a urine test be used to determine BAC. Veh C §23612(d)(2).

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§6.5 2. Blood Alcohol Concentration (BAC) Decreases When Alcohol Level Reaches Equilibrium

If an individual absorbs consumed alcohol at a rate equal to the rate at which the liver metabolizes the alcohol consumed, the blood alcohol concentration (BAC) of the subject would not rise. It is when the absorption of alcohol exceeds the metabolic capacity (absorptive capacity) of the liver that the alcohol level rises and begins to affect the brain and becomes measurable in breath, blood, or urine. Once the alcohol level has reached equilibrium (when the rate of absorption slows such that it becomes slower than the rate of elimination), the alcohol concentrations will begin to decrease. After absorption is complete, the decline in alcohol concentrations are somewhat uniform depending on the genetic constitution and drinking history of the drinking subject. Heavy, regular drinkers tend to have faster clearance rates than social drinkers. Men have been found typically to have slower clearance rates than women. Studies using male subjects have determined the average rate of elimination to be.015 (.011-.022) per hour while female subjects averaged.018 (.011-.022) per hour. Dubowski, *Human Pharmacokinetics of Alcohol,* 5 Alcohol Tech Rep 55 (1976).

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II. DISCOVERY AND EVIDENTIARY ISSUES

§6.6 A. Discovery

Pursuant to Pen C §1054.3, the defense has a discovery obligation to the prosecution. That obligation includes the names and addresses of witnesses to be called at trial and any statement or recording that may have been made by the witness. This is broadly interpreted to include any report or statement made by an expert witness in connection with the case or the results of any physical or mental examinations, experiments, or comparisons that are intended for introduction at trial. *Hines v Superior Court* (1993) 20 CA4th 1818, 1822, 25 CR2d 712.

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§6.7 B. Evidentiary Issues Most Commonly Encountered

California's intoxication provision is codified as Veh C §23152(b). Proof of the requisite blood alcohol concentration (BAC) can be based on either grams per 100 milliliters of blood or grams per 210 liters of breath. Veh C §23152(b). In other words, the prosecution can establish a violation of the provision with evidence of a blood sample containing.08 grams of alcohol per 100 milliliters of blood, or with evidence of a breath sample containing.08 grams of alcohol per 210 liters of breath. See *People v Bransford* (1994) 8 C4th 885, 35 CR2d 613. If the blood or breath sample was taken within 3 hours after driving, Veh C §23152(b) establishes a rebuttable presumption that the defendant had a BAC of at least.08 percent while he or she was driving.

As a result, the evidentiary issues most commonly encountered in DUI cases tend to be limited to questions involving the reliability of the chemical tests used to establish BAC, the accuracy of the results obtained, and whether the reliability of the inference that the defendant's BAC at the time of the chemical test accurately reflects the defendant's BAC while he or she was behind the wheel.

NOTE: In a case in which a standard breath test administered to the defendant shortly after an accident showed a blood alcohol level of 0.07 percent, the prosecution sought to introduce expert testimony to show that the defendant's blood-alcohol level was at least 0.08 percent at the time he drove his vehicle based on a methodology known as "retrograde extrapolation," which considered the breath test results, the defendant's statements concerning when he last consumed alcohol, and studies regarding the normal "elimination rate" for alcohol in the blood. See *People v Warlick* (2008) 162 CA4th Supp 1, 77 CR3d 564. The trial court excluded the proposed expert testimony, inferring a legislative intent to require a valid chemical test showing a blood-alcohol content of.08 or higher to prove a violation of Veh C §23152(b). The Appellate Department of the San Diego Superior Court disagreed, concluding that "[n]othing in either the language of section 23152(b) or the construction of the statute by California appellate courts prevents the prosecution from trying to prove a statutory violation using expert testimony that relies on retrograde extrapolation evidence." 162 CA4th Supp at 8.

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§6.8 C. Laying a Foundation to Enter Chemical Tests Into Evidence

There are two separate methods for laying a foundation sufficient to enter chemical test results into evidence in court. The proponent of the evidence (usually the prosecutor) may choose to proffer test results by demonstrating compliance either with Title 17 regulations or with three foundational requirements for admissibility of breath testing evidence. *People v Adams* (1976) 59 CA3d 559, 131 CR 190. See also *Davenport v DMV* (1992) 6 CA4th 133, 142, 7 CR2d 818. Compliance with the regulatory scheme seems to be the preferred method for introducing chemical test evidence, as discussed below.

The three foundational requirements for admissibility of testing results require that (1) the apparatus utilized for testing was in proper working order; (2) the test was properly administered; and (3) the operator conducting the test was competent and qualified. *People v Adams,* 59 CA3d at 567. The California Department of Public Health (CDPH) has also promulgated regulations in 17 Cal Code Regs §§1215-1222.2 setting standards for the licensing and operation of alcohol laboratories, personnel training, collection and analysis of samples, and the manner of expressing results. Compliance with these regulations establishes a foundation for admission of the test results and ensures that a standard for competency of the test results has been met. See *Davenport v DMV,* 6 CA4th at 142.

However, even though courts look favorably on compliance with Title 17, there is no express statutory authority providing that a failure to follow the regulations will result in exclusion of the test evidence. Therefore, the *Adams* court held that failure of the prosecution to demonstrate compliance with the Title 17 regulations when a test was performed does not result in exclusion of the test evidence; noncompliance with the Title 17 regulations only goes to the weight of the evidence. *People v Adams,* 59 CA3d at 566. However, the prosecution is still required to demonstrate the validity of the test by showing that the three foundational requirements set forth in *Adams* were met. *People v Adams,* 59 CA3d at 567. See also *Coombs v Pierce* (1991) 1 CA4th 568, 579, 2 CR2d 249.

Both the official Judicial Council of California Criminal Jury Instructions (CALCRIM) and California Jury Instructions (CALJIC) have incorporated this standard by permitting the jury to consider whether or not the person administering the test followed regulations adopted by the CDPH. See CALCRIM 2111 (final paragraph); see also CALJIC 12.61 (final paragraph).

NOTE: The United States Supreme Court has held that state lab analysts' sworn "certificates of analysis" identifying the substance seized and connected to the defendant as cocaine were testimonial statements, rendering the analysts "witnesses" for purposes of the Sixth Amendment right of confrontation under *Crawford v Washington* (2004) 541 US 36, 158 L Ed 2d 177, 124 S Ct 1354. Thus, absent a showing of their unavailability to appear at trial and a prior opportunity for cross-examination, the defendant was entitled to confront the analysts through live testimony at trial. *Melendez-Diaz v Massachusetts* (2009) ___ US ___, 174 L Ed 2d 314, 321, 129 S Ct 2527. For additional discussion of *Melendez-Diaz,* see §§1.27, 5.38, 6.51, 7.3.

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§6.9 D. Effect of Implied Consent to Chemical Testing

Under Veh C §23612(a), every person who drives a motor vehicle in the state of California is deemed to have consented to chemical testing to determine the alcohol content of his or her blood or breath if lawfully arrested for driving under the influence of alcohol. A driver who is arrested for driving under the influence of alcohol has a choice of blood or breath tests. Veh C §23612(a)(1)(A). If neither a blood nor a breath test is available, the driver may choose a urine test. Veh C §23612(d)(2).

Implied consent statutes, such as Veh C §23612, are constitutional as long as "(i) the testing is incident to a lawful arrest, (ii) the circumstances require prompt testing, (iii) the arresting officer has reasonable cause to believe the arrestee is intoxicated, and (iv) the test is conducted in a medically approved manner." *Mercer v DMV* (1991) 53 C3d 753, 757, 280 CR 745, citing *Schmerber v California* (1966) 384 US 757, 768, 16 L Ed 2d 908, 918, 86 S Ct 1826. Therefore, in view of the implied consent statute, the proponent of chemical test evidence should be able to overcome a challenge to the "seizure" of an individual for the purpose of administering the test if the above standards are met.

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§6.10 E. Effect of Nonlicensure of Testing Laboratory

The Health and Safety Code states that the Department of Health Services (DHS), now the California Department of Public Heath (CDPH), shall adopt rules and regulations to be used in approving and governing the operation of laboratories in the performance of testing blood, urine, tissue, or breath for determining blood alcohol concentration. Health & S C §100700. Health and Safety Code §100700 provides that breath testing must be conducted in compliance with regulations promulgated by the CDPH in the California Code of Regulations—specifically, Title 17. 17 Cal Code Regs §§1215-1222.2.

In 2004, the Legislature changed the law so that it no longer requires laboratories conducting forensic alcohol analysis to be licensed by the CDPH. Health & S C §100700(b). Title 17 of California Code of Regulations §1216.1 was repealed effective January 1, 2005. However, the current regulations remain in place for laboratories providing forensic alcohol analysis until new regulations are designed and approved. As of this writing, new regulations have not been put into place. The change in the law did not change the requirement for periodic proficiency testing, which may be done using Department of Health testing procedures or any approved vendor that conforms to the American Society of Crime Laboratory Directors/Laboratory Accreditation Board (ASCLD/LAB) standards. But see the ASCLD/LAB statement at http://www.ascld-lab.org/programs/prgrams_of_accreditation_index.html (visited June 3, 2010), ASCLD/LAB offers "voluntary programs" in which laboratories "may participate." See also 17 Cal Code Regs §1221.4 (sets standards for breath analysis).

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III. FIELD SOBRIETY TESTING FOR ALCOHOL INTOXICATION

§6.11 A. Development of Field Sobriety Test (FST)

Once an individual has been stopped for a traffic violation, the law enforcement officer may make certain observations, such as detecting the odor of an alcoholic beverage, that lead him or her to initiate an alcohol investigation. This investigation usually starts with a brief interrogation of the suspect, leading to field sobriety testing. These field sobriety tests (FSTs) may include tests endorsed by the National Highway Traffic Safety Administration (NHTSA) as well as other tests created by various law enforcement agencies or the investigating officer. These tests are intended to test the subject's ability to listen to and follow instructions. Often, these tests measure "divided attention," which is an important skill that is required to operate a motor vehicle (*e.g.,* operating the gas and brake while observing changing conditions on the roadway). For an article that covers types of tests included in the FST, see Horizontal Gaze Nystagmus: The Science & The Law, A Resource Guide for Judges, Prosecutors and Law Enforcement, available at http://www.nhtsa.dot.gov/people/injury/enforce/nystagmus/hgntxt.html (visited June 2, 2010).

These are physical tests that measure a person's ability to follow instructions and perform seemingly simple tasks. The purpose of these tests, as generally set forth in the Department of California Highway Patrol's (CHP's) *Driving Under the Influence Enforcement Manual,* chap 2 (Aug. 1995, updated May 2003), is to (1) determine sobriety, (2) develop probable cause, (3) show that the driver was under the influence at the time of the stop, and (4) gather evidence for the prosecution. The CHP utilizes ten FSTs for helping to determine sobriety, but others may be given if approved by the local district attorney. As discussed below, not all tests are created equal; the NHTSA has tested repeatedly three specific field tests (one-leg stand (OLS), walk and turn (WAT), and horizontal gaze nystagmus (HGN)) to determine their accuracy and reliability. These three tests are the Standardized Field Sobriety Tests (SFSTs). *CHP Manual, supra*. For an online version of the CHP's *Driving Under the Influence Enforcement Manual* (visited June 2, 2010), see http://www.southern-california-dui-defense.com/images/CHPDUIManual.pdf. While these three tests have some scientific support for the conclusions drawn by specific performances, most tests are easily admitted into court under Evid C §352. See *People v Joehnk* (1995) 35 CA4th 1488, 1493, 42 CR2d 6 (HGN test is generally accepted in the relevant scientific community and police officer is qualified to testify on results of test as expert witness).

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§6.12 B. Development of National Highway Traffic Safety Administration (NHTSA) Standards

Confronted with high statistics regarding highway accidents, the National Highway Traffic Safety Administration (NHTSA) funded a study to develop physical activities that could be conducted roadside, quickly, with no equipment, while optimizing officer safety. The result of this study was the establishment of the Standardized Field Sobriety Tests (SFSTs). The three SFST tests are the one-leg stand (OLS), walk and turn (WAT), and horizontal gaze nystagmus (HGN). See §6.11.

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§6.13 1. History and Correlation Studies

In the early 1970s, the National Highway Traffic Safety Administration (NHTSA) contracted with the Southern California Research Institute (SCRI) to study many different field tests that were in use at the time. The study was conducted to determine what, if any, field tests were more likely to identify people with blood alcohol concentrations (BACs) of.10 percent or above because, at the time, many states had a.10 percent standard. See, *e.g.,* former Veh C §23102 (now Veh C §23152).

NOTE: "Reliable," as defined in the scientific community, requires that the protocols for the test be replicable.

After the study, SCRI concluded that three tests satisfied the criteria set forth by NHTSA. These tests are horizontal gaze nystagmus (HGN), one-leg stand (OLS), and walk and turn (WAT). The SCRI found that the reliability of the tests was expressly contingent on following the instructions regarding performance and the testing environment. National Highway Traffic Safety Administration (NHTSA), *Development of a Standardized Field Sobriety Test (SFST) Training Management System* (Nov. 2001); you can view this report online at http://www.nhtsa.dot.gov/people/injury/alcohol/SFST. These three tests were adopted by NHTSA and were referred to as the "Standardized Field Sobriety Tests" (SFSTs). These tests remain the only "validated" tests.

In the 1970s, these SFSTs were tested in laboratories and all were found to be 83.4 percent reliable when used together to determine BACs of.10 and above. Halperin & Yoltin, *Is the Driver Drunk? Oculomotor Sobriety Testing, 57* J of the Am Optometric Assoc 654 (Sept. 1986). In 1981, a study by Tharp, Burns, and Moskowitz found the reliability of all three SFSTs for BACs of.10 or above to be 81 percent. See NHTSA, *Development of a Standardized Field Sobriety Test (SFST) Training Management System, App A* (visited June 2, 2010); you can view Appendix A online at http://www.nhtsa.dot.gov/people/injury/alcohol/SFST/appendix_a.htm.

The same three SFSTs have been validated for BACs of.08 and above. These studies have been conducted in Colorado (Colorado Validation Study of the Standardized Field Sobriety Test (SFST) Battery, *Technical Summary* (1995); for the online version of this article, go to http://www.owidefenselaw.com and select the "Site Map" on the bottom left, then scroll down to the entries under "F," looking for "Field Sobriety Tests" links and click on the article's name), San Diego (Standardized Field Sobriety Test (SFST) Validated at BACS Below 0.10 Percent (Mar. 1999), located online at http://www.nhtsa.gov/About+NHTSA/Traffic+Techs/current/Standardized+Field+Sobriety+Test+(SFST)+Validated+at+BACS+Below+0.10+Percent), and Florida (*A Florida Validation Study of the Standardized Field Sobriety Test (SFST) Battery* §V (1995), located online at http://www.drugdetection.net/NHTSA%20docs/Burns%20Florida%20Study.pdf), and all of them have supported the reliability of the SFSTs at BACs as low as.04. In August 1998, NHTSA published a report authored by Stuster and Burns that stated that use of SFSTs in predicting alcohol levels at or above.08 percent was 91 percent accurate. See NHTSA, *Development of a Standardized Field Sobriety Test (SFST) Training Management System, App A.*

However, a subsequent journal article showed that these statistics were overly weighted with people who had BACs greater than.10 percent. Closer analysis for people around the.08 percent level were only 33-60 percent accurate. Hlastala, Polissar & Oberman, *Statistical Evaluation of Standardized Field Sobriety Tests,* 50(3) J Forensic Sci 662 (May 2005). Another study done at Clemson University (with officers observing performance of FSTs by video) showed that, based on the observed performance by trained officers, 46 percent of the people who were alcohol free were judged as having too much to drink. Cole & Nowaczyk, *Field Sobriety Tests: Are They Designed for Failure?, 79* Perceptual & Motor Skills, pp 99-104 (Aug. 1994). The continuing study and "validation" of these tests lends support to their accuracy at detecting BACs. However, the defense may still make arguments against the admission of these tests.

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2. Types of NHTSA Tests

§6.14 a. Horizontal Gaze Nystagmus (HGN)

Horizontal gaze nystagmus (HGN) is the involuntary jerking of the eye as it moves from center toward the extreme right or left. The "jerking" becomes more obvious when an individual is impaired. The HGN test is the most complex of the Standardized Field Sobriety Tests (SFSTs) and requires the greatest attention to detail. From the outset it is the easiest to administer and is the most reliable for determining the presence of alcohol, other central nervous system depressants, phencyclidine (PCP), and some inhalants (volatile solvents, aerosols, anesthetics).

The test consists of the administrator placing a stimulus (*e.g.*, a pencil or small ruler) between 12-15 inches from the subject's nose, slightly above eye level. The administrator then moves the stimulus in a center-to-left/center-to-right path, smoothly across the subject's entire field of vision, several times measuring tracking, pursuit, presence of nystagmus (eyeball jerking), and "angle of onset" of nystagmus. *People v Joehnk* (1995) 35 CA4th 1488, 1495, 42 CR2d 6. Each eye is measured for three elements: (1) Can it smoothly follow the stimulus? (2) Is nystagmus present at the extreme? (3) Is the angle of onset 45 degrees or less? If the subject exhibits two or more "clues" in each eye (for a total for four "clues"), then, according to the original NHTSA research, the test has a reliability of 77 percent. National Highway Traffic Safety Administration (NHTSA), U.S. Dept. of Transp., DWI Detection and Standardized Field Sobriety Testing, Student Manual, *Session VII,* p VII-3 (2006). For an online version of this manual, see http://breathtest.wsp.wa.gov/SupportDocs/DRE_Forms/Manuals/dwi/Student%20Manual%20-%20February%202006.pdf. Also online at: http://www.1800dialdui.com/CM/DUIDWIPublications/2006_NHTSA_Student_Manual.pdf.

NOTE: California courts have deemed HGN to be a scientific test and have held that the "general acceptance" standard derived from *Kelly* should be applied to evaluating whether it is generally accepted in the scientific community. *People v Leahy* (1994) 8 C4th 587, 34 CR2d 663; see also *People v Joehnk* (1995) 35 CA4th 1488, 1493, 42 CR2d 6.

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§6.15 b. One-Leg Stand (OLS)

The one-leg stand (OLS) is another field sobriety test that has been validated by the National Highway Traffic Safety Administration (NHTSA). From a position with both legs together, the subject selects either his or her right or left leg to lift approximately 6 inches from the ground. The subject is then instructed to look at the elevated foot and count by thousands until the administrator ends the test. The administrator must keep time and end the test at 30 seconds. The administrator is instructed to observe four specific "clues" to measure the subject's performance: (1) sway exhibited by the subject, (2) use of arms for balance (*i.e.*, whether arms are raised 6 inches or more from sides), (3) hopping, and (4) whether the subject puts his or her foot down during the test. Depending on the observations of the test administrator, a subject exhibiting two or more clues has a 65 percent chance of having a BAC above.10 (note, however, that the California standard is.08). National Highway Traffic Safety Administration (NHTSA), U.S. Dept. of Transp., DWI Detection and Standardized Field Sobriety Testing, Student Manual, *Session VIII,* p VIII-13 (2006) (available online at http://breathtest.wsp.wa.gov/SupportDocs/DRE_Forms/Manuals/dwi/Student%20Manual%20-%20February%202006.pdf). See also Department of California Highway Patrol, *Driving Under the Influence Enforcement Manual,* chap 2 (Aug. 1995, updated May 2003); for the online version of this article, go to http://www.southern-california-dui-defense.com/images/CHPDUIManual.pdf.

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§6.16 c. Walk and Turn (WAT)

The subject begins the "walk-and-turn" test from a position of the right foot in front of the left foot (heel-to-toe), with his or her arms at his or her sides. The administrator then instructs the subject to walk along either a real or imaginary line, with nine steps in one direction and nine steps in the other. The subject turns at the end of the first nine steps to face the other direction; the turn is executed by keeping the ninth step in place and rotating around that foot (counter-clockwise) by taking small steps with the other foot 180 degrees or until the subject is facing the opposite direction. The subject must keep his or her arms at his or her sides (raising them no more than six inches) throughout the test, touch heel to toe, and (once started) not stop walking until the test is completed. The subject is evaluated on eight separate elements: whether or not he or she (1) can keep his or her balance during the instruction phase, (2) starts too soon (*i.e.*, before being told to start), (3) stops walking during the walking phase of the test, (4) touches his or her heel to toe (not leaving more than 0.5 inch gap), (5) steps off the line (real or imagined), (6) raises his or her arms more than six inches from his or her side, (7) improperly turns, or (8) takes the improper number of steps. If the subject exhibits two or more clues, then he or she has a 68 percent chance of having a BAC above.10 (note, however, that the California standard is.08). National Highway Traffic Safety Administration (NHTSA), U.S. Dept. of Transp., DWI Detection and Standardized Field Sobriety Testing, Student Manual, *Session VIII,* p VIII-11 (2006); for an online version of this manual, see http://breathtest.wsp.wa.gov/SupportDocs/DRE_Forms/Manuals/dwi/Student%20Manual%20-%20February%202006.pdf. See also Department of California Highway Patrol, *Driving Under the Influence Enforcement Manual,* chap 2 (Aug. 1995, updated May 2003); you can view an online version of this manual at http://www.southern-california-dui-defense.com/images/CHPDUIManual.pdf.

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§6.17 3. California Standards

While many other states have adopted the NHTSA-accepted (National Highway Traffic Safety Administration) Standardized Field Sobriety Tests (SFSTs) and have had their applicability tested within the court system or legislative process, California has not adopted the tests nor is there any applicable law to the admissibility of the tests except in Evid C §352. Evidence Code §352 provides that the court, in its discretion, may exclude evidence if its probative value is substantially outweighed by the probability that its admission will (a) necessitate undue consumption of time or (b) create substantial danger of undue prejudice, of confusing the issues, or of misleading the jury. Of course that assumes that the proponent of the field sobriety test (FST) evidence does not seek to have it appear as if the "test" is a scientific test that carries any additional credibility.

These tests have not been accepted in California as science, and might properly be challenged under Evid C §402. Pursuant to Evid C §402, the existence of any "preliminary fact" is in dispute, and the court may hear and determine the admissibility of that fact. In the context of field sobriety testing, the question is whether the techniques are a scientifically valid way of measuring a subject's sobriety. This places a burden on the party proffering the evidence regarding the subject's performance on the FSTs to first prove the preliminary fact, *i.e.*, that the tests administered are scientifically valid. To demonstrate that a test is scientifically valid, the standard set forth in *Kelly* is applicable. *People v Kelly* (1976) 17 C3d 24, 30, 130 CR 144. First, the court must determine whether the technique is reliable, then that the person providing testimony relating to the technique is properly qualified as an expert on the subject, and, finally, that correct scientific procedures were used. *People v Kelly, supra*. See *People v Joehnk* (1995) 35 CA4th 1488, 1505, 42 CR2d 6, citing and quoting *People v Diaz* (1992) 3 C4th 495, 526, 11 CR2d 353.

The only field tests that have been studied and found to support conclusions regarding sobriety are the "standardized field sobriety tests" (SFSTs). These tests have been subject to many validation studies since their inception in the early 1980s, and they continue to be the only tests subject to such scrutiny. See §6.13. In practice, most judges simply assume that because these tests have been used for decades they are accepted within the scientific community to determine the sobriety of the subjects being tested. See *People v Kraft* (2000) 23 C4th 978, 1037, 99 CR2d 1 (probable cause for DUI arrest partially supported by failure to properly perform FSTs); *People v Sugarman* (2002) 96 CA4th 210, 213, 116 CR2d 689 (fact accepted by appellate court that defendant failed five FSTs). However, law enforcement is not a scientific community, but scientists concerned with law enforcement may be. See *People v Joehnk* (1995) 35 CA4th 1488, 1501, 42 CR2d 6, discussing the scientific community analysis undertaken in *State v Superior Court (Blake)* (Ariz 1986) 718 P2d 171, 190.

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C. California Highway Patrol's Role in DUI Investigations and Citation of NHTSA Tests

§6.18 1. Role in DUI Investigations

The California Highway Patrol (CHP) probably conducts more DUI investigations than any other law enforcement agency in California. The reason for this is due in part to the fact that the CHP is exclusively charged with providing safety on the roadways of the state, while other law enforcement agencies have additional duties as part of their commitment to community safety. As a result, CHP officers assist local law enforcement agencies in conducting DUI investigations on motorists stopped for vehicle code violations as well as motorists stopped at DUI checkpoints. The CHP has an extensive training block that focuses on DUI detection—especially field sobriety testing.

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§6.19 2. Citation of NHTSA Tests and Standards in Training Materials

The California Highway Patrol's (CHP's) official manual cites the National Highway Traffic Safety Administration (NHTSA) standardized tests as being "the most sensitive and efficient in detecting alcohol influence." The manual insists that "to enjoy the full benefit of these tests in evaluating the DUI suspect, and the support of the correlation study in court, the officer must administer the tests as detailed below under 'test instructions' for each test." Department of California Highway Patrol, *Driving Under the Influence Enforcement Manual,* chap 2 (Aug. 1995, updated May 2003). However, many times, an officer will not know what the NHTSA standards are or a judge will preclude questioning regarding the NHTSA standards and the correlation studies.

Though the CHP has adopted the three standardized field sobriety tests (SFSTs) as recommended and studied by NHTSA tests, it does not mandate that they be administered as detailed in the CHP training manual and in compliance with the protocols researched and validated by the NHTSA and the Southern California Research Institute (SCRI). By failing to require compliance with the standardized method for administration, the conclusions drawn from field tests cannot be supported by the validation studies that require strict compliance with the NHTSA methodology. The NHTSA specifically states that "if any one of the standardized field sobriety test elements is changed, the validity is compromised." National Highway Traffic Safety Administration (NHTSA), U.S. Dept. of Transp., DWI Detection and Standardized Field Sobriety Testing, Student Manual, *Session VIII,* p VIII-19 (2006); for an online version of this manual, see http://breathtest.wsp.wa.gov/SupportDocs/DRE_Forms/Manuals/dwi/Student%20Manual%20-%20February%202006.pdf.

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§6.20 D. Miscellaneous Roadside Sobriety Tests

In addition to incorporating the National Highway Traffic Safety Administration's (NHTSA's) accepted and scientifically corroborated field tests (one-leg stand (OLS), horizontal gaze nystagmus (HGN), and walk-and-turn (WAT) tests) in California, law enforcement officers may administer any roadside physical test including combinations of the standardized tests. Law enforcement officers in California continue to administer many of tests that were explicitly rejected by the Southern California Research Institute (SCRI) during its initial study, such as the "finger count," "hand pat," and "modified position of attention" tests (sometimes in combination with the "Romberg" balance test). Occasionally, law enforcement will have the subject recite the alphabet or will combine physical tests. See Department of California Highway Patrol, *Driving Under the Influence Enforcement Manual,* chap 2 (Aug. 1995, updated May 2003). However, all FSTs, whether standardized or not, are merely diagnostic tools used at the officer's discretion in a DUI investigation.

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E. Admitting Field Sobriety Test (FST) Evidence

§6.21 1. FST Used in Nearly Every Investigation

Nearly every DUI investigation will include field sobriety testing. It is the officer's testimony of poor performance of such tests that provides relevant evidence of impairment. It is important that a proper foundation is laid for the administration of the particular tests used in the field and for the conclusions drawn by the officer as they relate to the particular performance.

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§6.22 2. Horizontal Gaze Nystagmus (HGN)

One court determined that a consensus drawn from a typical cross-section of the relevant, qualified scientific community accepts the Horizontal Gaze Nystagmus (HGN) testing procedures as a useful tool when combined with other tests and observations in reaching an opinion whether a defendant was intoxicated. *People v Joehnk* (1995) 35 CA4th 1488, 1507, 42 CR2d 6. The court further held that "[o]nce it has been shown that HGN testing is generally accepted in the relevant scientific community, no reason exists why police officers would be deemed unqualified to administer and report results of those tests." 35 CA4th 1488, 1508.

NOTE: The testimony of the officer alone regarding the "mere administration" of the test is insufficient to establish general acceptance in the relevant scientific community as required by the *Kelly* rule. *People v Leahy* (1994) 8 C4th 587, 609, 34 CR2d 663. An officer who has performed an HGN test on a defendant may not, in his or her testimony, use the results of that test to estimate the blood alcohol concentration of the defendant. *People v Joehnk* (1995) 35 CA4th 1488, 1498, 42 CR2d 6.

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Source: Criminal Law/Scientific Evidence in California Criminal Cases/6 Evidence of Alcohol Intoxication/§6.23 F. Challenging Field Sobriety Test Evidence

§6.23 F. Challenging Field Sobriety Test Evidence

Anytime the protocols used to measure the field performance of a DUI suspect deviate from the standards set forth by the National Highway Traffic Safety Administration (NHTSA) for horizontal gaze nystagmus (HGN), defense attorneys should argue that any conclusion made by the test administrator is unsupported by the corroboration of the laboratory studies and confirmatory field studies paid for by the NHTSA in their studies.

In general, field sobriety test (FST) observations may also be argued as not being scientific or conclusive to alcohol impairment, especially in an arrest situation. Controlled studies have illustrated a poor correlation between FST observations and a police officer's conclusion as to impairment based on FST performances. Cole & Nowaczyk, *Field Sobriety Tests: Are They Designed for Failure?,* 79 Perceptual & Motor Skills 99-104 (Aug. 1994). However, the average person sitting on the jury may not require a high level of proof to convict a person of DUI.

PRACTICE TIP: Defense attorneys may argue that the key point of FST reliability in predicting impairment is the testing environment. Defense attorneys may also argue that no laboratory studies can reproduce the environment of an arrest situation, which may have a significant impact on FST performance that may overcome or nullify the findings under controlled laboratory conditions.

The alcohol level alone in some jurisdictions may be sufficient to arrest, regardless of the lack of evidence of impaired driving or FSTs. Defense attorneys may choose to argue that a client's poor driving would be consistent with a lower blood alcohol concentration at the time of driving. For example, one-time driving events such as swerving once over the double-yellow line may be explained by fiddling with the radio or temporarily losing focus on the road. The prosecution will counter that it is a sign of divided attention impairment.

Dr. Marceline Burns, director of the Southern California Research Institute (SCRI), has repeatedly stated that FSTs do not measure an individual's ability to drive a car. See Burns, *The Robustness of the Horizontal Gaze Nystagmus Test* (Report No. DOT DTNH22-98-D-55079), U.S. Dep't of Transp., National Highway Traffic Safety Administration (Sept. 2007); for the online version of this article, go to http://www.docstoc.com/docs/857564/The-Robustness-of-the-Horizontal-Gaze-Nystagmus-Test-in-Standard-Field-Sobriety-Tests.

Further, it may be argued that any deviation from the testing FST protocols will invalidate and render the officer's conclusion as unsupported by the research and, therefore, simply no better than a guess. For example, the Ohio Supreme Court determined that any deviation from the NHTSA protocols rendered the results "inherently unreliable" and, therefore, inadmissible. Following the *Ohio v Homan* decision, the Ohio legislature enacted legislation to permit the introduction of SFSTs regardless of strict compliance. *Ohio v Homan* (Ohio 2000) 732 NE2d 952, 955, superseded by statute allowing "substantial compliance" with SFST instructions as stated in *State v Boczar* (OH 2007) 863 NE2d 155, 159.

However, the point is that it is better practice to follow the procedures precisely, because that ensures that the conclusions drawn comport with the conclusions of the validation studies completed by the NHTSA. This argument may well be compelling to some judges, because there is no case law prohibiting this argument nor requiring a judge to permit FST testimony. It further determined that the only tests that were scientifically reliable were the three tests studied and recommended by the NHTSA. Other state courts have held that conclusions drawn from these tests are admissible but not as scientific evidence, thereby permitting law enforcement to provide a lay opinion on FSTs (excluding HGN). *State v Shadden* (Kan App 2009) 199 P3d 167, 175, review granted September 2, 1009, 2009 Kan Lexis 1025; *State v Meador* (Fla App 1996) 674 S2d 826, 831; *Commonwealth v Ragan* (PA App 1995) 652 A2d 925, 928; *Illinois v Sides* (Ill App 1990) 556 NE2d 778, 779. The NHTSA standards also recognize that certain allowances must be made for age and physical condition of the test subject.

NOTE: The testimony of the officer alone regarding the "mere administration" of the test is insufficient to establish general acceptance in the relevant scientific community as required by the *Kelly* rule. *People v Leahy* (1994) 8 C4th 587, 609, 34 CR2d 663. An officer who has performed an HGN test on a defendant may not, in his or her testimony, use the results of that test to estimate the blood alcohol concentration of the defendant. *People v Joehnk* (1995) 35 CA4th 1488, 1498, 42 CR2d 6.

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IV. BREATH TESTING

§6.24 A. Underlying Theory

Breath testing was initially developed as a way for law enforcement personnel to avoid the delays and other problems associated with the need to have qualified medical personnel available to draw blood. It was widely recognized that a urine sample could vary from the actual blood alcohol content of the suspect; therefore, a method by which law enforcement could collect an evidentiary measurement of the alcohol level of the suspect was required. Breath testing became that method. See Saferstein, Criminalistics: An Introduction to Forensic Science, chap 10 (9th ed 2007).

Breath testing is based on research indicating that the concentration of alcohol in deep-lung breath (*i.e.,* air coming from the alveoli—tiny sacs in the lungs where the exchange of oxygen and carbon dioxide takes place) has a proportional relationship to the alcohol concentration in the blood in the lungs. Saferstein, Criminalistics, chap 10. See Simpson, *Accuracy and Precision of Breath Alcohol Measurements for Subjects in the Absorptive State,* 33 Clinical Chemistry 753 (June 1987); for the online version of this article, go to http://www.clinchem.org/cgi/reprint/33/6/753. The measured sample should be the last third of the subject's exhalation which should represent the alveolar plateau which is "substantially expired alveolar air." Dubowski, *Studies in Breath-Alcohol Analysis: Biological Factors,* 76(2) Zeitsschrift für Rechtsmedizen (J Legal Med) 93 (Nov. 1975) (available); for the online abstract of this article, go to http://www.ncbi.nlm.nih.gov/pubmed/1189628.

More recent study suggests that a breath sample does not actually reflect the alcohol concentration of alveolar air but instead a variable concentration of alcohol as a result of the interaction of alcohol molecules with the mucous membrane of the airway, depending on body temperature and breathing technique (airflow), during exhalation. See Hlastala, *Paradigm Shift for the Alcohol Breath Test*, 55 (2) J.Forensic Science (March 2010).

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§6.25 B. Breath Testing Technologies

The two technologies most often used to measure breath samples are electrochemical (fuel cell) testing and infrared spectrometry. Saferstein, Criminalistics: An Introduction to Forensic Science, chap 10 (9th ed 2007). Some devices, such as the Dräger 7110 MK III C and the Intoximeter EC/IR, use both technologies. There are three additional methods of breath testing that will not be covered in this chapter: gas chromatography, chemical oxidation/photometry, and the Taguchi Gas Sensor. These methods of blood alcohol concentration measurement are rarely, if ever, used in California.

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§6.26 1. Electrochemical Testing as Early Technology

Electrochemical or fuel cell testing was first introduced in the 1970s. At the time, these tests were not deemed reliable enough to be used in an evidentiary capacity. As the technology improved, manufacturers were able to meet the specifications of the National Highway Traffic Safety Administration (NHTSA). Initially, this technology was predominantly used in handheld alcohol screening devices. It has gradually been incorporated into nonportable breath testing machines as it has become able to meet the standards of the federal Department of Transportation (DOT).

Electrochemical technology determines alcohol concentration by measuring the electrical reaction caused by alcohol oxidization. The testing device converts alcohol into acetic acid; the process produces two electrons for each alcohol molecule. The electrons generated produce a measurable electrical current that can be converted into a blood alcohol concentration measurement. Saferstein, Criminalistics: An Introduction to Forensic Science, chap 10 (9th ed 2007). The main advantage of electrochemical technology is the specificity of its chemical reaction with alcohols, therefore avoiding issues of possible cross-reactivity/contamination with other organic compounds such as acetone (which may be present in the breath of patients with diabetes). However, while fuel cell devices limit cross reactivity, they do not eliminate it. Approximately 15 percent of uncontrolled diabetics were found to have Isopropanol in their blood (up to 0.05 percent) which will crossreact with a fuel cell device, reading as ethanol with a ratio of approximately 2:1. That is, 0.05 percent Isopropanol will read as approximately 0.025 percent Ethanol. See Bailey, *Detection of Isopropanol in Acetonemic Patients Not Exposed to Isopropanol,* 28(4) Clinical Toxicology 459 (1990).

Interestingly, fuel cell testers are not continuous flow analyzers, which limit the sample to a small fixed volume. Therefore, these devices do not have a slope detector to indicate mouth alcohol contamination. Usually, fuel cell testers may be manually activated to measure the breath at any stage of exhalation, which may not be deep-lung air as generally required under 17 Cal Code Regs §1221.2 ("Title 17").

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§6.27 2. Infrared (IR) Spectrophotometry Is Most Prevalent Technology Used

Since the 1980s, infrared spectrophotometry has been the prevalent method for breath testing. The underlying premise of infrared spectrophotometry is that all organic material absorbs infrared radiation at a specific wavelength corresponding with its structural characteristic. The testing entails the passing of a beam of infrared (IR) light through a sampling chamber. The light on the other side of the chamber is then analyzed and a breath alcohol concentration is determined by using the scientific, optical "Lambert-Beers" law that defines the relationship between sample concentration and IR absorption. See Saferstein, Criminalistics: An Introduction to Forensic Science, chap 10 (9th ed 2007).

This method of breath testing is valuable because it generates a complete profile of the breath sample, which helps to ensure that deep-lung air is measured by use of a slope detector, and with proper operator technique, it reduces the chances for mouth alcohol contamination. Saferstein, Criminalistics, chap 10. On operator standards and mouth contamination, see §§6.34, 6.36-6.37.

The downside to this particular technology is that alcohol absorbs IR light at a frequency similar to many common household or industrial chemical compounds. The manufacturers of these devices have modified the machines with various filters that attempt to eliminate the compounds found near the frequency of alcohol. See *Oxley v State* (1993) 435 SE2d 705, 706.

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§6.28 C. Importance of Meeting Federal Department of Transportation (DOT) Standards

The National Highway Traffic Safety Administration (NHTSA) of the Department of Transportation (DOT) has drafted specifications for the precision and accuracy of evidential breath testing (EBT) equipment. The current version of those specifications, revised in 1993, can be found at 58 Fed Reg 48705. Using these specifications, the NHTSA tests EBTs and periodically publishes a conforming products list. See 69 Fed Reg 42237 (2004). Federal funds are available to the States for the purchase of complying EBTs under the Highway Safety Act. 23 USC §§402-403. Under California's Health & S C §100701, laboratories using breath testing devices to perform forensic alcohol analysis for law enforcement agencies must use instruments that are listed on the NHTSA's list of conforming devices.

The federal standard divides testing equipment into mobile and nonmobile devices. Mobile devices are designed to be moved to nonpermanent sites while the nonmobile machines are intended for use at fixed locations.

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§6.29 D. Common Preliminary Alcohol Screening (PAS) Devices

The major preliminary alcohol screening (PAS) devices used by law enforcement personnel are described below.

Alcosensor IV (Intoximeters Inc.). The Alcosensor is a portable, handheld device using fuel cell technology that (according to the manufacturer) is relatively specific to alcohols. See its specifications at http://www.intox.com/products/asiv_datasheet.asp. The device can be calibrated by personnel with little or no scientific training and, in practice, is often calibrated by a "PAS coordinator" inside the station house. The PAS coordinator is usually a deputy or officer who has been trained how to conduct accuracy checks (and perform calibrations when necessary) by another officer; sometimes the officer has attended a special class but this is unusual. The lack of qualification of the calibrators is arguably the major potential source of inaccuracy. This device has no slope detector, but it has a radio frequency sensor and shield. The device is commonly referred to as a PAS.

Alcotest 7410 Plus (Dräeger Co.). The Alcotest is another portable, handheld device using fuel cell technology with no slope detector. It employs a radio frequency sensor and is commonly referred to as an EPAS (Evidentiary Portable Alcohol System). For specifications, see http://www.draeger.com/ST/internet/US/en/Products/Detection/Breathalyzers/Alcotest/evidential/DragerAlcotest7410Plus/pd_alcotest_7410plus_evidential.jsp (visited June 2, 2010). The California Department of Justice (DOJ) uses this device throughout the state, and while the device (hardware) is available throughout the world, California owns a proprietary model with specialized software that, according to Dräeger, is not available for sale to anyone outside of the DOJ.

NOTE: The DOJ has had some problems with falsely high accuracy checks that have not been explained in the accuracy and maintenance records. As it turns out, the problem was caused by the operator inadvertently covering the exit port, which is the end of the plastic mouthpiece that clips to the top of the device. As of this writing, the Alcotest 7410 Plus device in use in California does not have the capability to detect and alert the operator when the exit port has been covered either inadvertently or purposefully. Covering the exit port compresses the breath that enters the fuel cell chamber and causes falsely high results that can be reproducible if the pressure is consistent between breath samplings. Right now, the only fix to this problem is to educate the officers to the problem. However, the fact that covering the exit port could be done purposefully without detection is not an ideal situation in the adversarial process of DUI arrests.

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§6.30 E. Slope Detector Detects Mouth Alcohol

Some instruments have a feature called a "slope detector" that is capable of detecting mouth alcohol. The normal "slope" (rate of rise) of a breath alcohol measurement is initially very steep. As seconds pass, the rate of rise will slow down until the measurement levels off to a constant number. When this happens, the slope is equal to zero. If the slope detector notices a slope that is negative, an error message is printed that indicates mouth alcohol is present. In theory, this should solve the problem. However, studies have shown that mouth alcohol can be measured to be within.02 percent on two subsequent tests that is not detected by the slope detector. Logan & Distefano, *Ethanol Content of Various Foods and Soft Drinks and Their Potential for Interference With a Breath Alcohol Test,* 22 J Analytical Toxicology 181-183 (May/June 1998).

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§6.31 F. Breath Testing Equipment Used for Evidentiary Purposes

In some jurisdictions in California, the handheld breath device serves as both the evidentiary test and the "in-field" screening device. On these devices, the law enforcement officer operates a switch to change the status of the device from screening to evidentiary. The measurement is conducted in the same fashion; however, a "breath card," or other printed record of the test results, is produced. The rules and regulations regarding the admissibility of the screening test are different from those relating to the evidentiary test. The primary difference is that the screening test can be admitted by demonstrating compliance with either the foundational requirements of *Adams* or compliance with Title 17. *People v Adams* (1976) 59 CA3d 559, 131 CR 190. See §6.8.

Many jurisdictions have specific breath testing devices located throughout the county, usually in jails and law enforcement headquarters. These instruments are large and not especially portable, although many counties use them for their mobile breath testing programs.

Breath testing results from the following devices are commonly relied on in the decision to charge an individual with DUI, and therefore play a key evidentiary role in DUI cases. "Evidentiary devices" differ from a "PAS device" only in procedure (*i.e.,* the instruments used for both purposes are equally capable of the same accuracy and are typically both approved for use under NHTSA (conforming products list).

NOTE: It is the administration or procedures followed that separates the quality of testing. Portable alcohol screening (PAS) devices are used in the field to screen for the presence of alcohol. Often, the Title 17 precautions (15-minute observation and taking two tests under 17 Cal Code Regs §§1219.3, 1221.4) are not observed. There may be other lax procedures such as not having a scientist prepare and review accuracy checks or permitting nonscientists to perform the calibration of the devices.

Intoxilyzer 5000 (CMI, Inc.). The Intoxilyzer is a table-top device that employs infrared detection dual wavelength reading to detect acetone, ethyl alcohol, or other volatile solvents. It contains a slope detector to identify mouth alcohol and has a radio frequency sensor. This model is becoming very outdated; however, there are still some in service.

Dräger 7110 MK III C (Dräeger Co.). The Dräger 7110 is a table-top model that uses both infrared and fuel cell technology. It has a slope detector, is built in a Faraday cage to eliminate radio frequency interference (RFI), and has an optional breath temperature sensor or correction option. This device is sold exclusively to the law enforcement community.

Alcotest 7410 Plus (Dräeger Co.). The Alcotest is a portable, handheld device using fuel cell technology with no slope detector. It can be, and sometimes is, used as a PAS device. It employs a radio frequency sensor. The California Department of Justice (DOJ) uses this device throughout the state and owns a proprietary system known as the EPAS (Evidentiary Portable Alcohol System) that, according to Dräeger, is not available for sale to anyone outside of the California DOJ.

NOTE: Manufacturer's claims regarding slope detectors, RFI detectors, specificity, and/or linearity may or may not be as stated under the variable circumstances of an arrest situation and should be vetted and confirmed by the agency's scientists. For example, independent experiments have demonstrated that the slope detector designed to flag mouth alcohol doesn't always work in the Intoxilyzer 5000. See Logan & Distefano, *Ethanol Content of Various Foods and Soft Drinks and Their Potential for Interference With a Breath Alcohol Test*, 22(3) J Analytical Toxicology 181 (1998).

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§6.32 G. Discovery in Breath Test Cases

The request for breath test discovery is permitted under Pen C §1054.1 and may be broadly interpreted by the court. Generally speaking, any document that is prepared pursuant to Title 17 compliance should be discoverable. Counsel should argue that evidence supporting the inaccuracy of test results is exculpatory and, therefore, must be turned over by the prosecution pursuant to *Brady v Maryland* (1963) 373 US 83, 87, 10 L Ed 2d 215, 83 S Ct 1194.

In breath test cases, the defense should always request the following documents:

- **The subject test record log.** This log is the record of all the people tested and the results of those tests. Attorneys should request records surrounding the date of the defendant's chemical test. The defense request may allow that the names of other subjects tested may be redacted to ensure privacy. Defense counsel should request the log for at least 3 months before and 1 month after the date of the client's test. Defense counsel should look through the records and note if there are an unusual number of error messages or large differences between duplicate test results in individual cases. Instrument malfunctions may be apparent in these records but not apparent in the accuracy check records. Also, information about the number or type of arrests by a particular officer may demonstrate a pattern. For example, there may be an officer who made a number of arrests in which the blood alcohol concentration was very low or not present at all.

- **Accuracy check records.** These are the records of when the instrument is checked for accuracy using a known solution. A simulator device may be used, or a dry gas cylinder with a "known" concentration of alcohol may be used. Title 17 of California Code of Regulations §1221.4(a)(2)(B) mandates that "periodic" accuracy checks are to be made at least every 10 days or within 150 subjects, whichever comes sooner. An attorney should request records from at least 3 months before and 3 months after the date of the client's test. These records should be scanned for "failed accuracy checks," which means that the reading of the known solution ("RESULT" on the log) is outside the acceptable range of.01 percent (weight/volume, w/v) of the "expected value" of the simulator solution or gas. The correlation between blood or breath samples testing for alcohol concentration is expressed in a weight per volume or w/v percentage for law enforcement purposes. Dubowski, *Studies in Breath-Alcohol Analysis: Biological Factors,* 76(2) Zeitsschrift für Rechtsmedizen (J Legal Med) 93, 104 fig 5, 114 (Nov. 1975). See also *State v Lewis* (Haw App 1987) 736 P2d 70, 72. When a failed accuracy check occurs, the cause should be investigated and determined, and corrective action should be taken to properly resolve the issue to ensure that the error does not occur again. If this has been done properly, there should also be a comment on the cause and the correction in the maintenance records. If a failed accuracy check occurs without immediate correction (*i.e.,* within 1 week) near to the defendant's test, the problem may have affected the defendant's test result. If there are no comments regarding failed accuracy, a defense attorney may be able to argue that the test was performed with a laboratory or scientific administrator who was not following accepted procedure or was simply asleep at the switch.

- **Maintenance records.** These records should be obtained for the 1-year period prior to the defendant's last test and at least 1 month after the defendant's test. Whenever, the instrument has required service or has had a failed accuracy check, comments and explanations as to the cause of the problem and the corrective action or the solution to the problem should be logged here.

- **Records of testing to confirm viability.** These are laboratory records of in-house experiments done to confirm the manufacturer's claims of, *e.g.,* radio-frequency interference (RFI) shields, slope detectors, cross-reactivity, sensitivity, and linearity. These records are often not available because these vetting experiments are rarely done. Scientists (experts) who take the manufacturer's word that the features actually work or that the limitations of the features are as stated by the manufacturer cannot testify that said features are in good working order on a particular machine in use on a specific case. Take for example the question: Is the breath instrument capable of providing accurate results at the 0.01 level when the accuracy checks are all done at the 0.10 level? This is a question of linearity and can be answered only by experimentation and demonstration by running known solutions at 0.01 percent (w/v). A claim that the instrument is linear at the 0.01 percent level is simply speculation unless this has been demonstrated.

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§6.33 H. Special Rules for Admissibility of PAS Breath Testing Devices

The use of portable alcohol screening (PAS) devices has spread throughout California, and it is routine to have PAS device test evidence in a DUI case. The California Supreme Court held that PAS test evidence is admissible despite failure to comply with the regulations of Title 17 in the administration of the test. *People v Williams* (2002) 28 C4th 408, 121 CR2d 854.

NOTE: It may be relevant that *Williams* is a refusal case (defendant refuses evidentiary test) where the only evidence of a blood alcohol concentration above.08 was the PAS test. *Williams,* 28 C4th at 411. The fact that *Williams* is a refusal case may be an important distinction when the proponent of the PAS results argues that while the PAS test does not comply with the statutory protection promised by Title 17, it is admissible under *Adams*. *People v Adams* (1976) 59 CA3d 559, 567, 131 CR 190. For a discussion of *Adams,* see §6.8.

The *Williams* court reiterated that *People v Adams, supra,* sets forth three foundational requirements that must be shown before breath test evidence is introduced in court: (1) the reliability of the instrument used to take the test, (2) the proper administration of the test, and (3) the competence of the operator performing the test. *Williams,* 28 C4th at 414; see also *Adams,* 59 CA3d at 567. The *Williams* court held that these three foundational requirements may be met either by showing compliance with Title 17 or by other independent proof of compliance with these three requirements. The proper means for determining the admissibility of the PAS test result is through an Evid C §402(b) hearing. See *People v Williams* (1992) 3 CA4th 1326, 1330, 5 CR2d 130.

At the hearing, the proponent of the PAS device should present the testimony of both the officer responsible for maintenance and calibration (often the PAS coordinator) of the PAS device and the officer administering the test. The PAS coordinator's testimony should delineate the maintenance and accuracy checks as they relate to establishing the reliability of the instrument and the procedures taught or put in place to capture the evidence. The officer administering the test must testify regarding the compliance with the procedures. The party challenging the evidence may choose to either cross-examine witnesses relating to failure to comply with the procedures or provide expert testimony relating to techniques commonly accepted in the scientific community and how the test in question may not comply with those accepted techniques.

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I. Challenging Breath Test Evidence

§6.34 1. Importance of Breath Sample Quality in General

The quality of the sample of breath measured is probably the single most important element of the breath test. California law requires certain safeguards to ensure the integrity of the breath sample, including a "standard of performance" required of all breath control alcohol analysis devices. Title 17 of the California Code of Regulations ("Title 17") sets forth these standards.

For breath sample collection, it is required that the breath test subject be "under continuous observation for fifteen minutes" prior to providing a breath sample. 17 Cal Code Regs §1219.3. The regulations also require that two separate breath samples be taken from each person tested, and that they be within.02 of each other. 17 Cal Code Regs §1221.4(a)(1). For discussion of the issues regarding sample compliance with Title 17 and mouth alcohol contamination, see §§6.34, 6.36-6.37.

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§6.35 2. Effect of Temperature on Sample

Significant factors to consider regarding a breath sample are breath temperature, which is related to body temperature, and breathing technique (airflow). See Dubowski, *Studies in Breath-Alcohol Analysis: Biological Factors,* 76(2) Zeitsschrift für Rechtsmedizen (J Legal Med) 93, 107 (Nov. 1975).

Body temperature and, therefore, breath temperature will affect the number of alcohol molecules distributed between the blood and the alveolar breath as well as the equilibrium in the airway (throat). Studies have demonstrated that 1 degree Celsius (1.8 degrees Fahrenheit) will cause an approximate 7-percent increase (or decrease) in alcohol molecules being distributed in the air in equilibrium with a liquid. *Foley*, 851 A2d at 131 ("An increase in temperature of 1° C above 34° C will overestimate a breath alcohol reading by 6.58%"). An increase of 8.62 percent per degree was documented in Fox and Hayward's article, *Effect of Hyperthermia on Breath-Alcohol Analysis*. Fox & Hayward, 34(4) J Forensic Sci 836 (July 1989); for an online abstract of this article, see http://www.astm.org/DIGITAL_LIBRARY/JOURNALS/FORENSIC/PAGES/JFS12711J.htm.

The extent of impact that a change in temperature has on the breath sample may be buffered or exacerbated by other variables such as the breathing technique or collection (measurement) of upper-respiratory breath. The New Jersey Supreme Court has held that installation of the temperature monitor on the Dräger 7110 would be "redundant" and unnecessary. *State v Chun* (NJ 2008) 943 A2d 114, 145. (Redundant because the calculation carries two inherent balances that act in favor of the test subject: "truncation of results and the use of the 2100 to 1 blood/breath ratio.") In contrast, Alabama requires reduction by 6.58 percent of all results from the Alcotest. 943 A2d at 144.

The measurement of "deep-lung air" is what is desired to estimate the blood alcohol level of the lungs more closely. The devices in use in California all have software-controlled monitors to maximize the likelihood of obtaining a "deep-lung air" sample. Minimum pressure or flow requirements for a minimum number of seconds help to ensure that the sample that is measured comes from the "deep lungs" as opposed to the upper-respiratory tract that would contain a lower amount of alcohol than the deep-lung air. The Dräger Alcotest 7410 Plus EPAS device requires, within 4.5-12 seconds, a minimum flow of 6 liters/minute with a minimum volume of 1.2 liters before a sample is taken for measurement. See Dräeger Safety AG & Co., Manual for the 7410 Plus (3d ed 2003). These pressure and time requirements may not work for all people. Depending on individual lung capacity, some people may not reach deep-lung air until well after the minimum pressure and time requirement is met. Average lung capacities for adults range from 2.5-9.4 liters. Venes & Taber, eds., Taber's Cyclopedic Medical Dictionary (20th ed 2005). Some women under 60 have been found to have smaller lung capacities and, therefore, have been physically unable to complete the sample. *State v Chun* (NJ 2008) 943 A2d 114, 144, cert filed & distributed for conference of Sept. 29, 2008, 07-1562 (court lowers minimum acceptable breath volume for alcohol test for women over 60 from 1.5 liters to 1.2 liters). More recent studies dispute that alcohol molecules from "deep lung" air are actually measured by breath samples and, instead, suggest that alcohol molecules from the alveolar sacs ("deep lung") are exchanged in equilibrium with the respiratory tract (*i.e.*, interact with airway tissue) at a variable rate depending on body temperature and breathing technique, which then dramatically affects the concentration of alcohol in a breath sample. See Hlastala, *Paradigm Shift for the Alcohol Breath Test,* 55(2) J Forensic Science, (March 2010). In any event, a longer, more complete breath will result in higher values and a shallow, less complete breath will result in lower values.

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§6.36 3. Contamination of Breath Sample by Mouth Alcohol

The error of most concern in breath testing is that which may occur due to mouth alcohol contamination. As discussed above, breath alcohol testing is meant to measure the concentration of alcohol in the lungs that is discharged through breath; therefore, the sample collected for analysis should ideally consist of expired breath from the lungs. See 17 Cal Code Regs §1219.3 ("A breath sample shall be expired breath which is essentially alveolar in composition"); see also *People v French* (1978) 77 CA3d 511, 521, 143 CR 782. The interference of alcohol that may remain in the mouth is often referred to as "mouth alcohol contamination." Mouth alcohol may occur from recent drinking, burping, belching, or regurgitation when alcohol is present in the stomach. Saferstein, Criminalistics: An Introduction to Forensic Science, chap 10 (9th ed 2007).

The potential for mouth alcohol contamination is addressed in Title 17, which requires certain precautions to be taken to help avoid mouth alcohol contamination during the testing process.

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§6.37 4. Violation of "15-Minute Rule"

Title 17.4 attempts to ward off mouth alcohol contamination of breath tests by requiring that "[t]he breath sample shall be collected only after the subject has been under continuous observation for at least fifteen minutes prior to collection of the breath sample, during which time the subject must not have ingested alcoholic beverages or other fluids, regurgitated, vomited, eaten, or smoked." 17 Cal Code Regs §1219.3. If regurgitation, belching, or any other potential mouth alcohol-generating event occurs, the 15-minute period should be started again from the beginning.

In practice, the 15-minute continuous observation period is often not observed as closely as the wording of the statute might imply. The first interpretation of the continuous observation period required by the California statute is found in *Manriquez v Gourley* (2003) 105 CA4th 1227, 130 CR2d 209. In *Manriquez,* the court held that "continuous observation for purposes of compliance with regulation 1219.3 does not mean an officer must keep his or her eyes focused on the subject for an uninterrupted 15-minute period." 105 CA4th at 1235. Noting that "[o]bservation is not limited to perception by sight," the court held that uninterrupted eye contact for 15 minutes is not required when an officer's perception with other senses is sufficient to comply with the statute. 105 CA4th at 1236. Likewise, a single officer need not observe the subject to be tested for the entire 15 minutes. *Taxara v Gutierrez* (2003) 114 CA4th 945, 951, 8 CR3d 172 ("Two or more observers, acting in succession, can ensure the subject did not ingest food or drink, regurgitate, vomit, or smoke in the 15 minutes before the test, just as easily as a single observer").

In the real world of law enforcement, and as approved by the case law in these situations, the defense can argue that regurgitations (and burps in particular) may easily be missed in the 15 minutes prior to the breath test. Even if a subject is closely observed, a burp that brings up alcohol can go unnoticed. This has also occurred in the author's laboratory in a controlled drinking study. Even with all the precautions observed stringently, the defense can argue that mouth alcohol may interfere with breath testing results. To counter this argument, the prosecutor should stress the circumstances of the continuous observation and the reliability of the test.

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§6.38 5. Error in or Lack of Slope Detector

Some instruments have a feature called a "slope detector," which is capable of detecting mouth alcohol levels. The normal "slope" (rate of rise) of a breath alcohol measurement is initially very steep as the subject introduces his or her breath sample into the instrument. As seconds pass, the rate of rise will slow down until the measurement flattens to a more or less constant number (plateau). When this happens, the slope is level or approaches zero. If the slope detector notices a slope that is downward or negative (declining) during the initial blowing phase when the breath alcohol measurement should be rising, an error message is printed which indicates that mouth alcohol is present. In theory, this slope detector should solve any problems. However, studies have shown that mouth alcohol can be measured to be within.02 percent on two subsequent tests that is not detected by the slope detector. Logan & Distefano, *Ethanol Content of Various Foods and Soft Drinks and Their Potential for Interference With a Breath Alcohol Test,* 22 J Analytical Toxicology, pp 181-131 (May/June 1998). Other scholarly treatises and articles have criticized the effectiveness of the slope detector. See Gerstenzang, *Breath Issues—Partition Ratio or Blood-Breath Presumption,* Champion Mag, National Association of Criminal Defense Lawyers p 52 (Jan./Feb. 1999); to view a copy of this article online, see http://www.nacdl.org/public.nsf/ChampionArticles/99jan08?OpenDocument.

NOTE: This author also has had clients whose breath tests contained mouth alcohol contamination that was undetected by the slope detector and whose test results (with two tests) were within.02 percent.

In addition, the defense may argue that some widely used devices, such as the EPAS (Dräger Alcotest 7410 Plus) and the Alcosensor IV (PAS), are not equipped with a slope detector. The argument has been presented that regardless of the lack of a slope detector, requiring 4-6 minutes to pass between the two tests would essentially eliminate mouth alcohol interference. This is not necessarily true if two burps occur, one before each breath test, at approximately the same time and intensity. This would be a highly unlikely possibility, but nevertheless it is possible, especially if the person being tested has gastroesophageal reflux disease (GERD). On GERD, see §6.39.

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§6.39 6. Gastroesophageal Reflux Disease (GERD)

Gastroesophageal reflux disease (GERD) is a condition in which ethanol in the gut may reflux up into the mouth, causing mouth alcohol interference with breath testing. Currently, not much is known about how GERD actually impacts breath alcohol testing, but a few studies have been done. A test of 10 people (5 males, 5 females) who suffered from "severe" GERD found that the "risk … of [GERD] causing a falsely high result in a breath test is highly improbable." Kechagias, Jönsson, Franzén, Andersson & Jones, *Reliability of Breath-Alcohol Analysis in Individuals With Gastroesophageal Reflux Disease,* 44 J Forensic Sci, pp 814 (July 1999); for the online version of this article, go to http://www.ncbi.nlm.nih.gov/pubmed/10432616.

Another study of a single subject found no significant falsely high results. See Gullberg, *Breath Alcohol Analysis in One Subject With Gastroesophageal Reflux Disease,* 46(6) J Forensic Sci 1498 (Nov. 2001); for an abstract of this article online, see http://www.astm.org/DIGITAL_LIBRARY/JOURNALS/FORENSIC/PAGES/JFS15179J.htm. However, an article published in the California Defender provides data that shows a clear effect of mouth alcohol on breath tests done with two subjects: one with GERD and one without. Wells & Farrar, *Breath-Alcohol Analysis of a Subject With Gastric Regurgitation,* Cal Defender, pp 80-83 (Winter/Spring 1997-1998).

NOTE: The California Defender article is published in a criminal defense-oriented journal and is not a peer-reviewed scientific article, but the results of the study may help defense attorneys to argue that more research needs to be done in this area before any reliable conclusions may be made.

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§6.40 7. Raising Mouth Alcohol Contamination Defenses

A mouth alcohol contamination argument is a difficult argument to make without some supporting evidence. Breath tests with differences greater than.02 percent may provide support for this possibility, or breath devices that have a slope detector that give error messages (see §6.38) indicating mouth alcohol (such as a message of "IVS" (invalid sample) with the Intoxilyzer 5000) would be strong supporting evidence as well. In the field, such an error message should be followed by repeating the 15-minute observation period (see §6.37) and retesting. So far, this author has never seen this "retesting" occur when such an error message is encountered. The published belief is that the various sources of residual mouth alcohol (including gastroesophageal reflux disease (GERD)) would be effectively eliminated if established safeguards are followed. Garriott, ed., Medical-Legal Aspects of Alcohol, p 190 (4th ed 2003). This practice may not always be followed, judging from the hundreds of DUI investigation reports the authors have reviewed. In addition, mouth alcohol can be introduced, even if the 15-minute observation is faithfully observed, by way of a silent burp. In a perfect world, such precautions would make mouth alcohol contamination a highly improbable event. However, this is not a perfect world, and the more relaxed forms of "observation" discussed above may allow for greater possibilities of mouth alcohol contamination. For a discussion of the meaning of observation, see §6.37.

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§6.41 8. Margin of Error

Breath testing is subject to a margin of error. See, *e.g.*, *People v Campos* (1982) 138 CA3d Supp 1, 188 CR 366; *People v Rangel* (1988) 204 CA3d Supp 10, 12, 251 CR 638; *People v Randolph* (1989) 213 CA3d Supp 1, 5, 262 CR 378. The amount of error to assign to a breath measurement is a matter of debate and some disagreement between experts. The number of variables in the testing process causes some disagreement among experts as to what the extent or magnitude of the error may be. Body temperature, blood viscosity (hematocrit), breathing technique, determination of the known value in a solution used for calibration, and temperature of the solution used for calibration in a simulator device may all contribute to the potential error. Jones, *How Breathing Technique Can Influence the Results of Breath-Alcohol Analysis,* 22(4) Med Sci Law (Oct. 1982); Jones, *Physiological Aspects of Breath-Alcohol Measurement,* 6(2) Alcohol, Drugs & Driving (April-June 1990). Since these variables cannot be effectively or practically monitored, the uncertainty exists but the magnitude and direction (high or low) is not known in any given test.

Margin of error is evaluated based on two factors: precision and accuracy. Precision is the quality of being reproducible, and accuracy is the difference between the true value and the measured value. Instruments are engineered to deliver precision, but accuracy is something we create by using reliable calibration schemes.

The true value of a measurement, such as a breath test, cannot be known due to the number of variables which contribute independently to the uncertainty. However, the accuracy cannot be assumed to be better than the precision of the instrument. If the precision of the instrument is.02, which is accepted under Title 17 for two breath tests taken within minutes of each other, then the accuracy of a measured result can be assumed, at best, to be.02. 17 Cal Code Regs §1221.4(a)(1). Breath alcohol simulators are designed to give a consistent vapor of known alcohol concentration. Accepted variance in an accuracy check is.01 percent (weight/volume, w/v). (The correlation between blood or breath samples testing for alcohol concentration is expressed in a weight per volume or w/v percentage for law enforcement purposes. Dubowski, *Studies in Breath-Alcohol Analysis: Biological Factors,* 76(2) Zeitsschrift für Rechtsmedizen (J Legal Med) 93, 104 fig 5, 114 (Nov. 1975). See also *State v Lewis* (Haw App 1987) 736 P2d 70, 72. This is not the measurement of accuracy because there are physiological variables in testing humans (body temperature, blood viscosity, breathing technique) that are not included in an accuracy check done without human variables. Accuracy checks also do not take into account the uncertainty in the determination of the "known" solution (which is assumed to be perfect). See Archer, De Vos & Visser, *The Preparation, Assay and Certification of Aqueous Ethanol Reference Solutions*, 12 Accred Qual Assur 188 (2007). A record of successful calibration checks indicates an instrument has demonstrated a precision and accuracy of.01 percent plus the bias of the simulator and the "known" solution (probably less than 10 percent total). This would result in a potential maximum variation of at least 20 percent (.01 percent at a.10-percent level).

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§6.42 9. Assumed Partition Ratio of Breath to Blood Alcohol

The breath alcohol concentration (BrAC) obtained from a breath test performed during the absorptive phase can significantly overstate the blood alcohol concentration (BAC). Simpson, *Accuracy and Precision of Breath Alcohol Measurements for Subjects in the Absorptive State,* 33 Clinical Chemistry 753 (June 1987); for the online version of this article, go to http://www.clinchem.org/cgi/reprint/33/6/753. See also Saferstein, Criminalistics: An Introduction to Forensic Science, chap 10 (9th ed 2007).

Partition ratio refers specifically to the breath-to-blood ratio of the amount of alcohol vapor in the deep-alveolar air in the subject's lungs and the alcohol in the subject's blood. When translating the results of a particular individual's test, the breath testing device makes an assumption that the ratio is 2100:1, which translates into 2.1 liters of deep-lung air containing the same amount of alcohol as 1 cubic centimeter of lung blood. 17 Cal Code Regs §1220.4(f). Saferstein, Criminalistics, chap 10. Defense attorneys have argued that this assumption creates numerous sources of error, because a partition ratio will vary from person to person (Jones, *Determination of Liquid/Air Partition Coefficients for Dilute Solutions of Ethanol in Water, Whole Blood, and Plasma,* 7(4) J of Analytical Toxicology, p 193 (July-Aug. 1983)), and in a specific individual depending on the time of day (Jones, *Viability of the Blood: Breath Alcohol Ratio in Vivo,* 39 J of Studies on Alcohol 1931 (1978); Tsukamoto, Karasawa, Sudo, Muto & Ueno, *An Experimental Study on the Ethanol Ratio of Breath to Blood,* 37(6) Nihon hōigaku zasshi (Japanese J of Legal Med) 823 (1983)).

However, despite the arguable flaws in adopting one specific partition ratio for every person, the California State Legislature adopted the 2100:1 standard. The section of the California Code of Regulations governing the "Expression of Analytical Results" provides that all analytical results will be expressed by reference to the amount of alcohol concentration in the blood, based on grams of alcohol per 100 milliliters of blood. 17 Cal Code Regs §1220.4(a). See Polin, *Challenges to Use of Breath Tests for Drunk Drivers Based on Claim That Partition or Conversion Ratio Between Measured Breath Alcohol and Actual Blood Alcohol Is Inaccurate*, 190 ALR 4th 155 (1991).

The California Supreme Court, considering the legislative intent to discourage drunken driving and other issues of statutory construction, held that evidence of individual breath-to-blood partition ratios is irrelevant and inadmissible when a violation of Veh C §23152(b) is charged. *People v Bransford* (1994) 8 C4th 885, 35 CR2d 613. However, evidence of partition rate variability is relevant in a generic prosecution for DUI under Veh C §23152(a) to rebut the presumption of intoxication under Veh C §23610. *People v McNeal* (2009) 46 C4th 1183, 96 CR3d 261. The court noted that both personal and general partition ratio evidence could support an inference that an individual was not under the influence, despite a high breath test result.

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V. BLOOD TESTING

§6.43 A. Use of Blood Testing in Relation to Other Test Methods

Blood testing is the most accurate manner for determining a subject's blood alcohol concentration, as it is an actual direct determination of the alcohol content within the blood. Currently under DUI law, an arrestee has the choice of providing a sample of his or her blood or breath (an indirect measurement) if arrested for suspicion of driving under the influence of alcohol, and blood or urine if arrested for suspicion of driving under the influence of drugs. Veh C §23612; see §6.9.

Generally, people choose to provide a sample of their breath since acquisition of the sample is noninvasive and painless. If a subject chooses to provide a sample of his or her breath, he or she must be advised of the fact that a sample is not retained for retesting, and that he or she has the right to have a secondary blood draw so that he or she can have his or her breath test results validated.

A subject may choose a blood test when he or she (1) desires the most accurate test result, (2) wants a sample that may be retested by an independent laboratory, or (3) is otherwise unable to provide a breath test. Reasons that a person may be unable to provide a breath test include persons being treated at a hospital following an accident, persons being treated for emphysema, or persons with chronic obstructive pulmonary disease, asthma, or other serious breathing-related disorders; however, even chronic smokers typically experience no problems in providing a deep-lung air sample required for the breath test.

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B. Scientific Basis of Blood Testing

§6.44 1. Gas Chromatography as Underlying Scientific Basis

Currently, in California, forensic alcohol blood testing is almost universally performed by headspace gas chromatography. This method has emerged as the favored method because of the automated injection technique that eliminates some variance that manual injection is subject to. Gas chromatography is a separation technique whereby a sample of blood or urine, mixed with an internal reference material such a 1-propanol or MEK (methyl ethyl ketone), is heated to cause the volatile components of the sample to go into the vapor state and injected into a gas chromatograph. Some laboratories may still use injection techniques that involve injection of the blood or urine mixture directly (nonheadspace technique).

NOTE: Nonforensic blood alcohol testing, like the type performed in hospitals, is not covered in this discussion.

A chromatograph contains a thin tubular column, usually at least several feet long, the walls of which are coated with a chemical through which gas (usually nitrogen or helium) flows. The injected sample is carried through the column by this gas until it emerges from the end of the column into a detector. The interaction of the sample with the column chemical causes compounds to separate, thereby emerging at slightly different times. Different compounds can then be identified by their retention time. The detector is an electrical gap positioned behind a flame. When the compounds pass over the flame they become ionized, thereby carrying an electrical charge. These electrically charged particles then pass through the gap. The current generated is proportional to the number of molecules passing through the flame, which is then sent to a computer or plotter. The quantization is performed by comparing the response of the sample relative to the responses of the known standards. McNair & Bonelli, Basic Gas Chromatography (5th ed 1969).

Blanks, standards, and controls need to be run each day an analysis is done. On variations in results of blood alcohol testing despite the use of otherwise reliable equipment, see §6.50.

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§6.45 2. Use of Serum or Plasma Versus Whole Blood to Measure Alcohol Concentration

Serum and plasma are simply two different types of whole blood with the cells removed. Plasma is the remaining blood fluid after the cells are separated and removed from the plasma by a process called "centrifugation" of anticoagulated blood. Serum is the same substance as plasma, except that no anticoagulant has been mixed with the whole blood; therefore, the blood clots and clotting factors in the blood have been separated or removed through centrifugation.

The difference this may create in blood alcohol concentrations (BACs) is due to the increased water content of plasma or serum over the whole blood, which still contains the water-deficient red blood cells. Serum or plasma will then contain 12-35 percent higher BAC than its whole blood sister. Garriott, ed., *Medical-Legal Aspects of Alcohol,* chap 5, pp 151-152 (4th ed 2003). The variation or uncertainty of this conversion depends on the hematocrit (red blood cell percentage) of the individual's whole blood. Higher red blood cell percentages will result in higher BAC equivalents of the plasma or serum. The studies on alcohol driving impairment have typically been based on whole blood alcohol concentrations.

Plasma or serum alcohol analysis is common in clinical laboratories (hospitals) but not in forensic laboratories. Clinical laboratories commonly use different units of measurement as well. A milligrams per deciliter (mg/dl) report is common in clinical determinations where grams per 100 mls is the typical forensic report calculation, as mandated by Title 17. The conversion is simple: 100 mg/dl (clinical report) is equal to.100 percent (weight/volume, or w/v) (grams per 100 ml) for the forensic report. If a conversion from serum or plasma is also needed, divide the serum or plasma value by 1.15, then again by 1000. The 100 mg/dl serum result is then equal to approximately.087 percent (w/v) as a whole blood value.

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§6.46 C. Discovery in Blood Test Cases

For blood testing cases, the opponent of the blood or breath evidence, usually the defense, should request the following types of discovery:

- **Proficiency test results** before and after the date of the defendant's arrest. These can be obtained from the California Department of Public Health (CDPH) under the Freedom of Information Act. Many county laboratories or Department of Justice (DOJ) laboratories will provide copies of proficiency tests at the request of counsel.

- **Independent retesting** of the blood sample for alcohol and fluoride (preservative) should be done to protect the client from an analytical, clerical, or procedural error. A defendant has the right to retesting of a blood or urine sample by an independent laboratory. 17 Cal Code Regs §§1219.1(g)(2), 1219.2(c)(1).

NOTE: Most jurisdictions only require that defense counsel file an order for retesting. However, other jurisdictions require a motion accompanying the order and supporting documentation. Defense counsel should check local rules to determine what documentation is required for this request.

As part of any request to retest this evidence, it is good practice for defense counsel to specifically request a portion of the original blood (or urine) from the district attorney's lab, and to include a request to provide copies of the *original chain of custody envelope* and a copy of the *original label* on the tube (unless the original tube is being provided), which contains identifying information of the subject, the officer, the phlebotomist and the date and time of collection. Defense counsel should also request that if the original tube is not being provided, the "split" sample (or a portion for the original sample) be removed from the original tube and placed into a red-top tube (which contains no anticoagulants or preservatives) to preserve the original preservative concentration in the blood. Providing a sample of the blood to an independent laboratory can also provide for a scientific means of confirming identity either by DNA or ABO blood typing if the identity of the blood is disputed.

Discovery as to the qualifications or résumé of the expert witness should be requested, and copies of the laboratories' protocols (methods) approved for use in testing blood and breath can be obtained from the CDPH. Also, any correspondence between the laboratory and the CDPH regarding approval of their method or method changes can be obtained through the Freedom of Information Act.

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D. Challenging Blood Test Evidence

§6.47 1. Using Three-Prong Analysis to Challenge Evidence

Most defense attorneys believe that it is rare and extremely difficult to win an acquittal of a DUI case that is based on blood test evidence, even when the evidence otherwise supports an acquittal. A forensic toxicologist or criminalist typically will use a three-prong analysis to support his or her opinion of impairment or the lack thereof. This is different from the legal foundational requirements under *Adams* for the admissibility of evidence. *People v Adams* (1976) 59 CA3d 559, 131 CR 190. For discussion of *Adams*, see §6.8. Theoretically, the science of proof of alcohol impairment requires a three-prong analysis: (1) the reliability of the instrument used to take the test, (2) the proper administration of the test, and (3) the competence of the operator performing the test. *People v Williams* (2002) 28 C4th 408, 414, 121 CR2d 854; see also *People v Adams, supra*.

The three-prong scientific analysis includes:

- The presence of alcohol in sufficient quantity in the blood to impair;
- Evidence of impairment at the time of the event (driving observations by officer); and
- Physiological or physical symptoms that are consistent with the drugs or alcohol. This prong is often shown in a field sobriety test (FST). On FSTs, see §§6.11-6.23.

See National Highway Traffic Safety Administration (NHTSA), U.S. Dept. of Transp., DWI Detection and Standardized Field Sobriety Testing, Student Manual, *Session VII* (2006); for an online version of this manual, see http://breathtest.wsp.wa.gov/SupportDocs/DRE_Forms/Manuals/dwi/Student%20Manual%20-%20February%202006.pdf.

The absence of one or more of these prongs weakens the totality of the evidence for the prosecution to prove impairment.

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§6.48 2. Effect of Rising or Falling Blood Alcohol Levels Over Time

The first and second prongs of the analysis of alcohol impairment may be disputed by arguing that because alcohol levels can change rapidly, time is of the essence. Impairment may be present at the time of the field sobriety test (FST) but not present at the time of the prior driving. Similarly, the blood alcohol concentration (BAC) may be above.08 percent at the time of testing, but not at the time of driving. It is an experience common to any person who consumes alcohol or ingests anything that the effects of what has been consumed are not felt for some time after, whether it be a meal or an alcoholic beverage. However, at some point either during the ingestion or after the conclusion of the ingestion, the feeling will occur. In the case of food, a person may go from a feeling of fullness to a bloated feeling associated with overeating. Similarly, a person may go from a sober feeling to a feeling of intoxication (perhaps even gross intoxication) without being aware that he or she had ingested a sufficient quantity of alcohol to induce the feeling. It is, therefore, possible for a person to feel completely sober, or unimpaired, when initiating driving and subsequently feel the effects of the alcohol they have ingested. This, consequently, defines a "rising blood alcohol" defense. See, *e.g.*, *People v Beltran* (2007) 157 CA4th 235, 68 CR3d 489 (instructing jury with CALJIC 12.61.1 was constitutional error given evidence that defendant's BAC was rising from time he was stopped until Intoxilyzer tests were administered); *State v Drown* (Vt 1987) 532 A2d 575, 576 (defendant entitled to present defense that she was still in absorptive stage, with a lower BAC, when she actually was driving).

The testing uncertainties involved with blood testing, including the metabolic uncertainties (rising or falling of BAC over time), provide fertile ground for argument as to the BAC of a person at the time of driving. In addition, the question of tolerance is another arguable aspect that requires attention. Tolerance is a decreased response to a drug, such as alcohol, generally due to repeated exposure. A tolerant person requires larger doses to achieve the same effect. Some prosecution experts have opined that tolerance is nothing more than the ability to "mask" the effects of alcohol; in other words, the ability of a person who truly is impaired by alcohol to appear sober. This violates the principle of forensic science in which physical evidence is required to draw a conclusion. Many more experts, however, opine that varying levels of tolerance are real and scientifically provable. Some authors have put forth observations and documentation regarding the subject of alcohol tolerance that provides an in-depth insight into this phenomenon. See, *e.g.,* Chesher & Greeley, *Tolerance to the Effects of Alcohol,* 8(2) Alcohol, Drugs & Driving, pp 93-106 (1992) and DeLuca, *Alcohol Tolerance and Its Significance in Driving,* 18(1) Can Soc Forensic Sci J (1985). See also National Institute on Alcohol Abuse and Alcoholism (NIAAA), *Alcohol Alert No. 28: Alcohol and Tolerance, PH 356* (Apr. 1995); for an online version of this article go to http://pubs.niaaa.nih.gov/publications/aa28.htm.

The lack of physical evidence or, in the case of alcohol impairment, the lack of any observation of "bad" driving may be reasonably explained by the fact that perhaps the person is not impaired. This is not a novel concept. On the other hand, the prosecutor may argue that the lack of any observed bad driving does not exclude the possibility that the person was impaired. A defense attorney can argue that this idea violates the circumstantial evidence instruction, which requires the acceptance of that possibility that points to innocence when two reasonable and contrary possibilities exist.

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§6.49 3. Arterial Versus Venous Blood Measurement During Absorption

Another argument about the variance in blood alcohol levels involves the difference between arterial and venous blood measurement. During the absorptive phase, blood alcohol concentrations (BACs) can vary significantly from point to point within the body. The most significant differences are those between arterial and venous blood. What discrepancies occur is demonstrated between a breath measurement and a blood measurement during the absorptive phase. The breath measurement represents "arterial" blood and has been found to overstate the actual BAC (as measured by venous blood drawn from an extremity) by as much as 66 percent 15 minutes after ingestion and 23 percent 45 minutes after ingestion. Forney, Hughes, Harger & Richards, *Alcohol Distribution in the Vascular System,* 25 Q J Stud Alcohol, pp 205-217 (June 1964). One study has demonstrated an arterial BAC level to be 41 percent higher than that of a venous BAC measured 30 minutes after drinking, which is during the absorptive phase. Once absorption is complete, however, alcohol measurements are equal throughout the body. Saferstein, Criminalistics: An Introduction to Forensic Science, chap 10 (9th ed 2007). For a discussion of the absorptive stage of metabolism, see §6.3.

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§6.50 4. Special Factors Causing Variations in Test Results (Margin of Error)

Despite the use of otherwise reliable devices that employ gas chromatography technology to measure blood alcohol concentration (BAC), variations in test results can occur because of several factors, and these may potentially need to be raised to challenge blood test evidence. These factors include the following:

- **Pipetting technique.** This technique involves measuring devices (pipettes) used to remove a portion of the blood from the original tube or vial. This includes the pipette itself and the problems associated with the condition of the sample. Clotted samples or simply viscous blood samples can interfere with the measurement. Pipetting error can be 2-5 percent or more depending on the condition of the sample. See, *e.g., State v Russell* (Wash 1994) 882 P2d *747*, *767*, discussing avoidance of contamination of DNA sample due to proper pipette technique.

- **True accuracy of standard.** Standards are samples that have a known amount of alcohol and to which all other samples are compared. The analytical determination of this "known" concentration has an uncertainty of approximately 5 percent. Standard concentrations are determined by six replicate analyses using direct oxidation (a wet chemical method using the National Institute of Standards and Technology (NIST) traceable primary standards). See, *e.g., State v Benoit* (La App 1990) 570 So2d 490, 492, discussing implementation of revised laboratory procedures in Louisiana to ensure accurate blood alcohol gas chromatography, including calibration procedures using a sample standard, and finding them inadequate. In *State v Ketchersid* (Or App 1978) 586 P2d 119, 120, the court discusses sample standard calibration procedures and allows evidence of BAC despite the lack of a graph showing the gas chromatograph of the standard. See Marcelle, De Vos & Visser, *The preparation, Assay and Certification of Aqueous Ethanol Reference Solutions*, 12 Accred Qual Assur 188 (2007).

- **Day-to-day uncertainty.** This uncertainty is due to instrumental factors such as detector, injector, and/or temperature variations, which can effect accuracy and are independent of the uncertainty in determining the standard concentration. This uncertainty is reflected in the variance observed in the analysis of a known material analyzed regularly, such as a "control," which is typically 5 percent or less. Note that some experts may state that the uncertainty of an aqueous (water) control (known) material that is plotted day to day demonstrates the margin of error of the analysis. This may result in testimony that the "margin of error" is only 5 percent (or less). This would be ignoring the several factors that come into play in determining the margin of error in a human subject blood test such as the matrix uncertainty and the uncertainty in determining the standard concentration, which result in significantly higher margins of error.

Though it is possible for these errors to add up to more than 10 percent in any given case, it is probable that the error will be 10 percent or less if the sample (blood) matrix is uniform. However, it is wise in cases when the reported BAC is higher than expected based on the subjective evidence (*e.g.,* field sobriety tests) and BAC is measured near the per se value, or BAC is simply disputed by the client, that independent retesting of the blood sample be performed. This will ensure accuracy and protect the client from a human error (*e.g.,* sample mix-up, mislabeling during the analysis), which occasionally does happen. Retesting of the sample also allows the defense expert (scientist) to make observations regarding the condition or matrix of the blood that may cause errors in excess of 10 percent. The chain of custody documents can also be reviewed by the defense expert. Defense counsel should include a request that copies of the chain of custody documents and copies of the original vial labels be provided along with the sample to the defense lab. The defense is entitled to these documents. See 17 Cal Code Regs §1219.1(g)(2); *Parris v Zolin* (1996) 12 C4th 839, 853, 50 CR2d 109 (opportunity to cross-examine criminalist about chain of custody and methodology is relevant to defense).

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§6.51 5. Hearsay

California courts generally have considered forensic lab reports admissible under Evid C §1280's hearsay exception for records made by public employees if, among other requirements, "[t]he writing was made at or near the time of the act, condition, or event."

However, the United States Supreme Court, applying *Crawford v Washington* (2004) 541 US 36, 158 L Ed 2d 177, 124 S Ct 1354, to sworn "certificates of analysis" identifying a substance connected to the defendant as cocaine, noted that business and public records are generally admissible not because they qualify as hearsay exceptions but because they are "created for the administration of an entity's affairs and not for the purpose of establishing or proving some fact at trial." They are, therefore, not "testimonial." *Melendez-Diaz v Massachusetts* (2009) ___ US ___, 174 L Ed 2d 314, 329, 129 S Ct 2527. The Court held that regardless of whether or not the certificates of analysis could also qualify as business or public records, they were prepared for use against the defendant at trial and, therefore, were testimonial statements subject to the Sixth Amendment right of confrontation. Absent a showing of the analysts' unavailability to appear at trial and a prior opportunity for cross-examination, the defendant was entitled to confront the analysts through live testimony at trial. ___ US at ___, 174 L Ed 2d at 321. The *Melendez-Diaz* Court did not indicate whether the analysts who swore to the certificates were the same analysts who performed the forensic analysis at issue in the case.

NOTE: Subsequent to the decision in *Melendez-Diaz*, the California Supreme Court has granted review in a number of cases involving forensic lab reports, including a case involving the admission of a blood-alcohol report prepared by a technician who did not testify at trial. See *People v Lopez* (review granted Dec. 2, 2009, S177046; superseded opinion at 177 CA4th 202, 98 CR3d 825).

For additional discussion of *Melendez-Diaz,* see §§1.27, 5.38, 7.3, 8.66. For additional discussion of the Sixth Amendment right of confrontation under *Crawford*, see California Criminal Law Procedure and Practice (Cal CEB Annual).

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VI. URINE TESTING

§6.52 A. Test Rarely Used in California

Urine testing for blood alcohol is rarely used in California. The relationship of urine to blood alcohol is based on water content differences between the two fluids. Urine, as it passes through the kidneys and is separated from the blood, contains approximately 30 percent more alcohol than the blood. Garriott, ed., *Medical-Legal Aspects of Alcohol,* chap 5, pp 152-153 (4th ed 2003).

This is true at the moment of being deposited in the bladder. The problem arises in the collection of the urine. The net alcohol concentration of the urine residing in the bladder at any given point in time is an average of the blood concentration over the period of time the urine was deposited in the bladder. In an extreme example, if the individual has not voided the bladder for 8 hours, his or her blood concentration could drop from.16 percent to zero in that time. The urine, however, would contain an average value over time, very possibly over.08 percent. Therefore, urine samples should be collected only after a complete void of the bladder—20 minutes after a complete void as mandated in Title 17.

The necessity of a complete void is implicit in the requirement under 17 Cal Code Regs §1219.2(a) that urine be tested for alcohol only with "a sample collected no sooner than twenty minutes after first voiding the bladder." *Kessler v DMV* (1992) 9 CA4th 1134, 1137, 12 CR2d 46 ("underlying purpose" of §1219.2(a) is to ensure "the subject's bladder is void of urine before the subject provides the timed urine specimen").

Unfortunately, knowing that there is a complete void is impossible without catheterization, which, of course, is not a requirement. If it was, it would be unlikely anyone would consent to a urine collection. But see *People v Municipal Court (Sansone)* (1986) 184 CA3d 199, 201, 228 CR 798 (court upheld urine test to establish BAC and dismissed defendant's assertion that "one can never completely void one's bladder" because the "conversion ratio" takes that into account).

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§6.53 B. Challenging Urine Test Evidence

Many defense attorneys argue that urine samples are not reliable because the bladder was not properly voided. There is always an argument regarding whether or not a complete void was obtained prior to the test specimen even if the individual believes that he or she voided the bladder. The importance of the void cannot be overstated: if a person's bladder was partially full of urine prior to the initiation of the drinking session, the urine sample will be diluted and understate the amount of alcohol present in the subject; if the person had been drinking earlier then the sample may contain residual alcohol and will overstate the amount of alcohol present in the subject. There are other variables; however, it should be apparent that any failure to "void" the bladder will result in a potentially inaccurate result.

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VII. SAMPLE QUESTIONS

A. Questions for Proponent of Evidence

§6.54 1. Introducing Field Sobriety Tests (FSTs)

Ideally, the proponent, usually the prosecutor, will wish to establish a firm foundation for evidence and offer credible testimony from the expert (usually a law enforcement officer) to support a driving under the influence conviction. The following questions may help substantiate a violation:

Q: Please describe your DUI investigation training.

Q: Were you trained to observe things about a person's appearance that might indicate alcohol consumption or impairment?

Q: Were you trained to look for problems with balance, reflexes, or motor control?

Q: Were you trained to administer field sobriety tests?

Q: What are field sobriety tests?

Q: What are they used for?

Q: Did you receive any training in DUI investigation after you graduated from the academy?

Q: Following your classroom training, did you receive any additional training?

Q: Have you received any training since your initial training in DUI investigation?

Q: Have you ever participated in a correlation study?

Q: Have you ever participated in any study where the results of field tests were directly compared with specific blood alcohol concentrations?

Q: How many DUI investigations have you conducted or participated in?

Q: How many DUI arrests have you made as a result of your investigations?

Q: How many times have you had people perform field sobriety tests?

Q: Did you ask the defendant to perform FSTs?

Q: Why did you have the defendant perform field sobriety tests?

[*The inquiry should head into observations made while defendant is getting out of his or her car (the location for field sobriety tests) and into the actual performance of field sobriety tests.*]

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§6.55 2. Qualifying Expert

The following are suggested questions about the expert's (1) education and training, including professional certifications; (2) supervised work experience; (3) membership in professional organizations; and (4) experience as an expert witness:

Q: How long have you worked for the crime lab? What is your title?

Q: What training did you take to become a criminalist/forensic toxicologist?

Q: What are your qualifications?

Q: Do you have any specialized training or certification that you received from the State of California?

Q: What steps do you take to remain current on the science of forensic toxicology?

Q: Are you familiar with the equipment used to determine the blood alcohol concentration in this case?

Q: What special training have you taken in order to operate this equipment?

Q: Is this equipment commonly accepted within the scientific community for measuring blood alcohol concentrations?

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§6.56 3. Eliciting Expert Opinion

The following are suggested questions to elicit the expert's opinion and the basis for that opinion. The proponent will want to illustrate to the jury the credibility of his or her expert witness in order to support a conviction for driving under the influence.

- Ask questions about the basis for the expert's opinion:

Q: Can you tell whether the equipment was functioning properly at the time of the test in this case?

Q: How do you know that the equipment was working properly?

Q: Is there any reason that you would doubt the accuracy of the measurement in this case?

- Ask questions to elicit expert's opinion:

Q: Assuming that the defendant had fully absorbed the alcohol consumed at the time he or she was stopped, what would his or her blood alcohol concentration be at the time of driving?

Q: Are you familiar with the effects of alcohol on a subject's ability to operate a car?

Q: Do you have any special training with regard to the effects of alcohol on a subject's ability to operate a car?

Q: Based on your training and experience, do you have an opinion about the level at which all persons are impaired and unable to drive safely?

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§6.57 4. Breath Test-Related Questions

Following questions on qualifications, the attorney should ask questions that lead into the chemical test:

Q: Are you familiar with the instrument used to measure the breath alcohol concentration in this case?

Q: Can you describe the instrument?

Q: Can you briefly describe how the instrument works?

Q: Is this instrument commonly accepted within the scientific community for measuring breath alcohol concentrations?

Q: Was the instrument working properly at the time of the test?

Q: How do you know?

Q: Do you recognize this record? [*Showing the breath test record, as introduced in law enforcement officer's testimony.*]

Q: What is the name of the test subject?

Q: What are the results of the test?

Q: Do you have any reason to doubt the accuracy of the test result printed on that record?

Q: Does it show any problems or abnormalities with the test?

Q: Does it show any problems or abnormalities with the instrument at the time the test was taken?

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§6.58 5. Blood Test-Related Questions

The following inquiry assumes that the officer or phlebotomist (a blood-draw technician qualified under Veh C §23158(a)) has laid the foundation for the blood draw and the chain of custody to the crime laboratory:

Q: Are you familiar with the analysis of blood to determine blood alcohol concentration?

Q: Can you describe your training and experience relating to blood testing for alcohol?

Q: Do you recognize this vial?

Q: What was the condition of the blood sample? Was it clotted? Was it Viscous?

Q: Do you routinely look for abnormalities of the blood such as these?

Q: What method did you use to test the blood?

Q: Is that instrument or method commonly accepted within the scientific community to measure the amount of alcohol in a blood sample?

Q: Was the instrument working properly on the date the blood was tested?

Q: How do you know it was working properly?

Q: What were the results of your analysis?

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§6.59 B. Questions for Opponent of Evidence

It is recommended that when any party is attempting to introduce an expert witness that the opposing counsel take the opportunity to voir dire the witness prior to allowing the witness to be recognized as an expert. This questioning may relate to areas in which the opposing side's expert may have better qualifications, educational credentials, work experience, training, and so forth. It is rarely a good idea for opposing counsel to use it as an opportunity to demonstrate their superior knowledge, as this may backfire with the jury.

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§6.60 1. Regarding the Expert's Opinion

Often the prosecution's expert will state that he or she formed his or her opinion based on the expert's experience and training as well as the records relating to the equipment in the case. Defense counsel should ask that expert these questions:

Q: You work for the crime lab?

Q: How long have you worked there?

Q: Part of your job is to come to court and testify?

Q: In the time since you started, how many times have you testified?

Q: You regularly testify for the prosecution?

Q: How many times in the past year have you testified for the prosecution?

Q: How many times in the past year have you testified for the defense?

Once bias is established, the cross-examiner may choose to highlight educational shortcomings if the defense is calling an expert witness. Following cross-examination regarding bias and education, cross-examination may move into the areas that fit the defense theory. The theory should have some scientific support and counsel should have the articles supporting that theory available to use during both cross-examination and direct examination of any expert witness to be called for the defense. If the defense is calling an expert witness, any planned cross-examination of the prosecution's witness should be reviewed by the expert witness.

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§6.61 2. Relating to Field Sobriety Tests (FSTs)

The following are sample questions to challenge evidence produced during a field sobriety test. Defense counsel might ask these questions of the law enforcement officer who testified for the prosecution.

Q: What is a correlation or impairment study?

Q: Have you ever attended or conducted such a study?

Q: When correlation studies are done, isn't it true that the subject is asked to perform the test or driving-related tasks prior to drinking as well as after drinking?

Q: What is the purpose of having the participant perform the tasks before drinking?

Q: Is it true that two people at the same blood alcohol concentration can perform differently on a field sobriety test?

Q: What are the factors that can influence how a person performs on an field sobriety test?

Q: Earlier you stated that you had an opinion relating to a blood alcohol concentration at which everyone would be unable to safely operate a car. How did you reach that conclusion?

Q: What articles can you cite that document that particular opinion?

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7

Forensic Toxicology and the Use of Drug Evidence in the Courtroom

David J. Cohen, Lisa C. DewBerry, and Kali S. Grech
Judith L. Stewart, Senior Forensic Toxicologist

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I. ROLE OF EXPERT IN DRUG CASES

§7.1 A. Use of Expert Witnesses in Drug Cases

An expert who gives opinion testimony on drug evidence will either be an expert relying on scientific tests to render an opinion that a substance contains a controlled substance (such as a forensic toxicologist) or an expert (typically a law enforcement officer) who renders an opinion without relying on scientific tests.

The opinion evidence of an expert must (Evid C §801):

- Be on a subject sufficiently beyond common experience;
- Assist the trier of fact; and
- Be based on matter either perceived by the expert, known to the expert, or made known to the expert.

A person may qualify as an expert based on his or her special knowledge, skill, experience, training, or education. Evid C §720(a). A party may offer the expert's testimony without first offering the expert's qualifications *unless* the opposing party objects. Evid C §720(a); *People v Rodriquez* (1969) 274 CA2d 770, 775, 79 CR 240. However, it is considered better practice to introduce the expert's qualifications at or near the beginning of his or her testimony. Qualification of a witness as an expert and the proper subject matter of expert testimony are discussed in chap 3.

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B. Types of Experts

1. Forensic Toxicologist

§7.2 a. Role

The role of the forensic toxicologist is to analyze the samples provided and to interpret the results of that analysis to, for example, explain the effects of the analyzed substance on human behavior, discern the time elapsed since ingestion, or uncover the method or frequency of use. The methodology and role of the forensic toxicologist are discussed in §§7.16-7.49.

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§7.3 b. Laboratory Reports

Although at least one appellate court has concluded that laboratory reports prepared by publicly employed criminalists or laboratory personnel may be admitted under the official records hearsay exception Evid C §1280 (see *People v Parker* (1992) 8 CA4th 110, 116, 10 CR2d 38), the United States Supreme Court, applying *Crawford v Washington* (2004) 541 US 36, 158 L Ed 2d 177, 124 S Ct 1354, to sworn "certificates of analysis" identifying a substance connected to the defendant as cocaine, noted that business and public records are generally admissible not because they qualify as hearsay exceptions but because they are "created for the administration of an entity's affairs and not for the purpose of establishing or proving some fact at trial." They are not, therefore, "testimonial." *Melendez-Diaz v Massachusetts* (2009) ___ US ___, 174 L Ed 2d 314, 329, 129 S Ct 2527. The Court held that in its case, regardless of whether the lab analysts' certificates of analysis could also qualify as official or business records, they were prepared for use against the defendant at trial and, therefore, were testimonial statements subject to the Sixth Amendment right of confrontation. Absent a showing of the analysts' unavailability to appear at trial and a prior opportunity for cross-examination, the defendant was entitled to confront the analysts through live testimony at trial. *Melendez-Diaz,* ___ US at ___, 174 L Ed 2d at 321.

NOTE: The *Melendez-Diaz* Court did not indicate whether the analysts who swore to the certificates were the same analysts who performed the forensic analysis at issue in the case.

In a case decided before *Melendez-Diaz,* the California Supreme Court upheld the use of third party expert testimony regarding a DNA lab analyst's report on the grounds that the report was nontestimonial. See *People v Geier* (2007) 41 C4th 555, 607, 61 CR3d 580. *Geier* remains good law.

In the wake of *Melendez-Diaz*, however, the California Supreme Court has granted review in a number of cases that involve forensic lab reports. See, *e.g.*, *People v Dungo* (review granted Dec. 2, 2009, S176886; superseded opinion at 176 CA4th 1388, 98 CR3d 702) (testimony of forensic pathologist based on autopsy report prepared by another pathologist); *People v Gutierrez* (review granted Dec. 2, 2009, S176620; superseded opinion at 177 CA4th 654, 99 CR3d 369) (testimony of lead nurse practitioner concerning exam and report of non-testifying nurse practitioner); *People v Lopez* (review granted Dec. 2, 2009, S177046; superseded opinion at 177 CA4th 202, 98 CR3d 825) (admission of blood-alcohol test results and report prepared by non-testifying criminalist); *People v Rutterschmidt* (review granted Dec. 2, 2009, S176213; superseded opinion at 176 CA4th 1047, 98 CR3d 390) (testimony of supervising criminalist about results of drug tests and report prepared by another criminalist); *People v Benitez* (review granted May 12, 2010, S181137; superseded opinion at 182 CA4th 194, 106 CR3d 39) (acting supervisor of the county's crime laboratory testified, based on notes made by an analyst, that a substance in defendant's possession was methamphetamine); *People v Bowman* (review granted Jun. 9, 2010, S182172; superseded opinion at 182 CA4th 1616, 107 CR3d 156) (supervisor testified based on non-testifying analyst's notes).

For additional discussion of *Melendez-Diaz,* see §§1.27, 5.38. For additional discussion of the Sixth Amendment right of confrontation under *Crawford,* see California Criminal Law Procedure and Practice (Cal CEB Annual).

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2. Law Enforcement Officers

§7.4 a. Drug Recognition Evaluator

A police deputy, who was a drug recognition expert, was properly permitted to testify that a reasonable person would have believed that blotter papers, though fake, contained lysergic acid diethylamide (LSD). *In re Terry H.* (1995) 40 CA4th 1675, 47 CR2d 791.

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§7.5 b. Probable Cause to Arrest

An expert, such as a Drug Enforcement Administration (DEA) agent, may have specialized knowledge and experience in the detection of drug traffickers and qualify as an expert for the purpose of expressing an opinion on that issue. For example, based on the defendants' behavior at an airport, DEA agents had probable cause to arrest the defendants based on the belief that they were drug couriers. *People v Profit* (1986) 183 CA3d 849, 882, 229 CR 148.

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§7.6 c. Culpability in Conspiracy Case

In a drug conspiracy case, a law enforcement officer may testify as an expert regarding the various roles and levels of culpability manifested by each defendant. *People v Harvey* (1991) 233 CA3d 1206, 1226, 285 CR 158. For example, a trial court properly admitted a police officer's testimony regarding the significance of various activities and the role of each of three codefendants in the hierarchy of a Colombian cocaine distribution cell. *Harvey,* 233 CA3d at 1229.

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§7.7 d. Fortified Drug House

It is a felony to use a building, room, space, or enclosure specifically designed to avoid or block law enforcement entry so as to sell, manufacture, or possess for sale designated controlled substances. Health & S C §11366.6. Expert testimony may establish the maintenance of a fortified house for the purpose of manufacturing cocaine for sale and preventing official entry. *People v Green* (1988) 200 CA3d 538, 545, 246 CR 164.

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e. Possession, Use, and Trafficking

§7.8 (1) Proper Opinion Testimony

A law enforcement officer may qualify as an expert for the purpose of expressing an opinion as to whether a defendant possessed drugs for the purpose of sale. Experienced officers may testify that drugs were possessed for sale based on the quantity, packaging, and normal use of an individual. *People v Parra* (1999) 70 CA4th 222, 82 CR2d 541. For example, officers had sufficient experience to opine that cocaine was possessed for sale based on concealment of the cocaine in a secret compartment, the weight and packaging of the cocaine, and the lack of paraphernalia for immediate use. *People v Parra, supra*. The testimony is not objectionable merely because it is on an ultimate issue. See Evid C §805.

Other cases have held that law enforcement officers may testify as experts to the following:

- That the defendant possessed heroin in tinfoil for the purpose of sale. See *People v Martin* (1966) 247 CA2d 416, 420, 55 CR 629, disapproved on other grounds in *People v Charles* (1967) 66 C2d 330, 335 n4, 57 CR 745.
- That the defendant possessed benzedrine for sale based on the large quantity of drugs in individual packages found in the defendant's truck. *People v Allen* (1967) 254 CA2d 597, 602, 62 CR 235.
- Regarding balloon packaging and sale of heroin. *People v Rodriquez* (1969) 274 CA2d 770, 775, 79 CR 240.
- That a defendant possessed marijuana for sale based on hypothetical questions about packaging and weight of drug. *People v Douglas* (1987) 193 CA3d 1691, 1694, 239 CR 252.
- That a pharmacist, who ordered large quantities of rarely prescribed drugs, possessed them for purpose of illicit street sales. *People v Doss* (1992) 4 CA4th 1585, 1594, 6 CR2d 590.
- That a patient in a state hospital possessed drugs for sale based on large quantity, packaging, the way defendant received the drugs, and the large number of postage stamps in his possession (used by prisoners to buy drugs). *People v Harris* (2000) 83 CA4th 371, 373, 99 CR2d 618.

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§7.9 (2) Improper Opinion Testimony

In some circumstances involving an initially lawful possession of drugs, an officer may not qualify as an expert for purposes of expressing an opinion as to possession for sale, or the opinion may not constitute substantial evidence:

- A law enforcement officer's testimony regarding a typical heroin dealer profile as generally a "Hispanic male adult" was inherently prejudicial and not admissible. *People v Castaneda* (1997) 55 CA4th 1067, 1071, 64 CR2d 395.

- An officer's opinion that possession of lawfully prescribed drugs was for purposes of sale was worthy of little or no weight and should not constitute substantial evidence sufficient to sustain the conviction, absent "evidence of some circumstances not to be expected in connection with a patient lawfully using the drugs as medicine." *People v Hunt* (1971) 4 C3d 231, 238, 93 CR 197.

- An expert's opinion that defendant's needle marks were several days old was insufficient to prove defendant currently used and currently was addicted to heroin. *People v Velasquez* (1976) 54 CA3d 695, 699, 126 CR 656.

- An arresting officer who was familiar with unlawful possession of marijuana, but who had little experience with lawful possession of marijuana under the Compassionate Use Act of 1996, was not qualified to testify as to possession for sale of marijuana when the defendant had a prescription for medical marijuana. *People v Chakos* (2007) 158 CA4th 357, 363, 69 CR3d 667. But see *People v Dowl* (2010) 183 CA4th 702, 707, 107 CR3d 432 (police officer not required to additionally qualify as medical marijuana expert to render opinion that marijuana was possessed for sale simply because defendant presented some evidence raising compassionate use defense).

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§7.10 3. Drug Counselor

A drug counselor who uses generally accepted drug testing may testify as to the result of the test. *People v Nolan* (2002) 95 CA4th 1210, 116 CR2d 331.

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§7.11 4. Admitted Expert

The taped conversations of an informant who was working with a police officer to make a buy of heroin used the terms "piece" and "step on." "Admitted experts" were qualified to testify as to the meaning of that jargon or slang as used in drug transactions. *People v Velasquez* (1976) 54 CA3d 695, 699, 126 CR 656.

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§7.12 5. Controlled Substances Expert

The pattern jury instructions, which concern crimes involving the possession of more than $100,000 related to transactions involving controlled substances, instruct the jurors that they may consider, among other things, the opinion of a controlled substances expert on the source of the cash or negotiable instruments at issue. See CALCRIM 2430-2432. A court of appeal rejected a claim that a predecessor CALJIC instruction directed jurors to find that a large sum of cash in the defendant's possession was drug sale proceeds based on a drug expert's opinion. The court stated that the instruction merely indicated that jurors could consider the expert's opinion, but did not tell jury that it must accept the opinion, noting that the trial court also properly instructed the jury on guidelines for determining an expert's qualifications. *People v Mitchell* (1994) 30 CA4th 783, 804, 36 CR2d 150 (discussing CALJIC 12.37).

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C. Admissibility of Scientific Evidence Regarding Drugs

§7.13 1. Novel Scientific Technique, Procedure, or Device Must Meet *Kelly* Rule

The "*Kelly* rule" governs the admission of evidence of a new or novel scientific technique, procedure, or device. See *People v Kelly* (1976) 17 C3d 24, 30, 130 CR 144. The rule is "intended to forestall the jury's uncritical acceptance of scientific evidence or technology that is so foreign to everyday experience as to be unusually difficult for [a] layperson to evaluate." *People v Venegas* (1998) 18 C4th 47, 80, 74 CR2d 262. Because the *Kelly* rule applies only to *new* scientific tests or techniques, it does not apply when a test or technique has been generally accepted in the scientific community. *People v Kelly* (1976) 17 C3d 24, 32, 130 CR 144; *People v Nolan* (2002) 95 CA4th 1210, 1213, 116 CR2d 331. The *Kelly* rule was not abrogated by the U.S. Supreme Court's holding in *Daubert v Merrell Dow Pharms., Inc.* (1993) 509 US 579, 125 L Ed 2d 469, 113 S Ct 2786. *People v Leahy* (1994) 8 C4th 587, 591, 34 CR2d 663.

The *Kelly* rule requires an analysis of proffered evidence under a three-pronged test. The first prong requires that the "reliability" of a new scientific technique be established by showing that the technique has "gained general acceptance in the particular field to which it belongs." *People v Kelly* (1976) 17 C3d 24, 30, 130 CR 144, quoting *Frye v U.S.* (DC Cir 1923) 293 F 1013, 1014, superseded by Fed R Evid 702 as stated in *Primiano v Cook* (9th Cir 2010) 2010 US App Lexis 8859. The second prong requires that any witness testifying on general acceptance be properly qualified as an expert to give an opinion on the subject. *People v Kelly, supra*. The third prong of the test is that the proponent of the evidence must demonstrate that correct scientific procedures were used in the particular case. See *People v Venegas* (1998) 18 C4th 47, 78, 74 CR2d 262, quoting *People v Kelly*, *supra*.

The development and application of the *Kelly* rule are discussed in depth in chap 2.

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§7.14 2. Generally Accepted Tests Not Subject to *Kelly* Rule

The *Kelly* rule applies only to *new* scientific tests or techniques. Thus, where a test or technique has been generally accepted in the scientific community, the *Kelly* rule is inapplicable. For example, a defendant argued that a urinalysis performed by a probation officer did not meet the *Kelly* test. The court of appeal held that the *Kelly* rule did not apply because (1) urinalysis is not a new technique; (2) the acceptance of the scientific method does not depend on who operates the machinery; and (3) other jurisdictions have accepted the validity of the machinery. *People v Nolan* (2002) 95 CA4th 1210, 1213, 116 CR2d 331.

"Once a trial court has admitted evidence based upon a new scientific technique, and that decision is affirmed on appeal by a published appellate decision, the precedent so established may control subsequent trials, at least until new evidence is presented reflecting a change in the attitude of the scientific community." *People v Kelly* (1976) 17 C3d 24, 32, 130 CR 144.

Even out-of-state published opinions may be precedent for the introduction of otherwise "new scientific techniques." *People v Allen* (1999) 72 CA4th 1093, 1099, 85 CR2d 655.

When a scientific technique is accepted, courts permit less objective experts, such as police criminalists, to testify about the use of a technique. See *People v Smith* (1989) 215 CA3d 19, 27, 263 CR 678. Once it is shown that a new scientific technique is reliable and generally accepted within the relevant scientific community, it is then necessary that "the witness furnishing such testimony must be properly qualified as an expert to give an opinion on the subject." 215 CA3d at 23. In *Smith,* the defendant had full opportunity to cross-examine criminalist expert qualifications and methods and to present whatever evidence the defendant desired challenging them. On appeal, much of the defendant's argument was directed toward a perceived bias on the part of the expert as well as alleged careless testing procedures on the part of the police department laboratory. However, careless testing affects the weight of the evidence and not its admissibility, and it must be attacked on cross-examination or by other expert testimony. *People v Smith, supra*; *People v Farmer* (1989) 47 C3d 888, 913, 254 CR 508, overruled on other grounds in *People v Waidla* (2000) 22 C4th 690, 724 n6, 94 CR2d 396.

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§7.15 3. *Kelly* Rule Not Applicable to Objectively Verifiable Symptoms

Expert testimony concerning objectively verifiable physical or mental symptoms is not subject to the *Kelly* rule because it does not rely on new scientific techniques. *People v Mendibles* (1988) 199 CA3d 1277, 1293, 245 CR 553; *People v Thang Van Bui* (2001) 86 CA4th 1187, 1195, 103 CR2d 908. Testimony that depends on objectively verifiable physical or mental symptoms leading to a diagnosis has been characterized as "garden variety expert testimony." *Ramona v Superior Court* (1997) 57 CA4th 107, 121, 66 CR2d 766.

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II. FORENSIC TOXICOLOGIST'S PROCEDURES AND METHODOLOGY

§7.16 A. Role of Forensic Toxicologist

Toxicology is, broadly, the study of poisons. In forensic toxicology, that study is generally limited to drugs and alcohol analysis related to some legal purpose, such as helping law enforcement officers investigate a suspected driving under the influence case, helping a medical examiner determine a cause of death, or giving information to family court judges when a parent is suspected of using drugs.

The term *drugs* is broad and includes the common drugs of abuse listed as controlled substances as well as prescription drugs, poisons (such as strychnine or cyanide) that are considered a crossover between poisons and drugs, and even some gases such as carbon monoxide.

The kind of sample submitted determines what to test for and how to test for it. Specimens from medical examiners or coroners may require a broader approach than routine samples from law enforcement agencies. The role of the forensic toxicologist is not only to analyze the samples provided, but also to interpret the results of that analysis to, for example, explain the effects of the analyzed substance on human behavior, discern the time elapsed since ingestion, or uncover the method or frequency of use. Often, forensic toxicologists are asked if the analytical results are consistent with an individual's self-reported use.

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§7.17 B. Resources

The following texts are helpful in understanding forensic toxicology:

- Baselt, Disposition of Toxic Drugs and Chemicals in Man (7th ed 2004);
- Garriott, ed., Medical-Legal Aspects of Alcohol (4th ed 2003);
- Clarke's Isolation and Identification of Drugs in Pharmaceuticals, Body Fluids, and Post-Mortem Material (2d ed 1986);
- Moffat, Osselton & Widdop, Clarke's Analysis of Drugs and Poisons (3d ed 2004);
- Saferstein, Criminalistics: An Introduction to Forensic Science (9th ed 2007); and
- Saferstein, ed., Forensic Science Handbook (2d ed 2002).

In addition, the *Journal of Analytical Toxicology* is also an authoritative source.

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§7.18 C. Metabolism and Drug Characteristics

Metabolism, also referred to as biotransformation or metabolic transformation, is the process by which the body modifies a drug in an attempt to get rid of it. The main site of metabolism is the liver, although other tissues may also participate. Morgan, Mikhail & Murray, Clinical Anesthesiology, chap 8 (4th ed 2005). A drug's metabolite is the substance the drug produces or converts to during metabolism. Drugs that metabolize rapidly may be detectable in the blood for only a few hours after ingestion, but their metabolites may remain detectable for much longer. Because many drugs use the same pathway for metabolism, drugs may compete with each other for material to facilitate the metabolic process, therefore one drug may inhibit the metabolism of another.

The half-life of a drug can be used to estimate the quantity ingested. The half-life is the time required for a drug's concentration to decrease by half of its initial value. Wolff et al., *A Review of Biological Indicators of Illicit Drug Use, Practical Considerations and Clinical Usefulness,* 94(9) Addiction 1279, 1286 (Sept. 1999). For example, 50 nanograms per milliliter (ng/ml) of a drug with a 6-hour half-life will diminish to 25 ng/ml after 6 hours; that 25 ng/ml will diminish to 12.5 ng/ml after another 6 hours, and so on.

Changes in drug structure from the metabolic process are usually small. Moreover, because the differences between drugs within any given class are also very small, one drug can metabolize into a similar drug. For example, methamphetamine metabolizes in part to amphetamine, so even when the sample donor has only ingested methamphetamine, lab reports record the presence of both methamphetamine and amphetamine. Likewise, many drugs metabolize to other pharmacologically active drugs. For example, diazepam (Valium) metabolizes to temazepam (Restoril) and to n-desmethyldiazepam (which is also the active metabolite of clorazepate (Tranxene)); on top of that, both temazepam and n-desmethyldiazepam themselves metabolize to oxazepam (Serax). Therefore, if only oxazepam is detected in a blood analysis, the source could be a Serax dose, a Restoril dose, a Tranxene dose, a Valium dose, or any combination of those.

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D. Specific Drugs Subject to Testing

§7.19 1. Opiates

Opiate analgesics, also called narcotic analgesics, are a class of drugs that include heroin, morphine, codeine, hydrocodone, oxycodone, and hydromorphone. Their effects include analgesia (absence of sense of pain), drowsiness, mood change, respiratory depression, nausea, vomiting, and changes in the autonomic nervous system (ANS) that can lead to coma and death. The correlation of blood concentration of opiates and symptoms is complex, because of both the rapid onset of toxic manifestations and the presence of tolerance in addicted individuals.

The opiate analgesic morphine is a naturally occurring substance extracted from the seedpod of the poppy plant (*Papaver somniferum*). Lengthwise cuts on an unripe seedpod causes resin to flow, and the resin is collected and dried to make opium. Opium contains a number of alkaloids, including morphine. Heroin is produced by modifying morphine through a process called acetylation. Codeine also naturally occurs in the resin of the poppy plant. See National Institute on Drug Abuse (NIDA), *NIDA InfoFacts: Heroin* (updated Mar. 2010) at http://www.drugabuse.gov/PDF/Infofacts/Heroin10.pdf.

Hydrocodone, hydromorphone, and oxycodone are produced from naturally occurring substances—hydrocodone, for example, is made from codeine—and are considered semisynthetic narcotic analgesics. Each of these drugs has the same basic chemical structure. All of them provide relief from pain, and all (except heroin) are available by prescription. All of them are addictive.

Because they are so similar in structure, many opiates metabolize to each other. For example, heroin, which is made from morphine, metabolizes back to morphine very quickly. Wolff et al., *A Review of Biological Indicators of Illicit Drug Use, Practical Considerations and Clinical Usefulness,* 94(9) Addiction 1279, 1281 (Sept. 1999). Codeine also metabolizes to morphine, and hydrocodone metabolizes to small amounts of hydromorphone. This makes it complex to determine the origin of a drug. Relative concentrations of individual drugs and metabolites can help sort this out, as can documented circumstances such as the existence of drug paraphernalia or a prescription for an opiate medication.

The route of administration can be oral, such as with pharmaceutical tablets, or can be injection, inhalation, or smoking, such as with heroin. The effects of opiates depend heavily on the dose taken.

For further discussion of narcotics, including heroin and opium, see Saferstein, Criminalistics: An Introduction to Forensic Science, chap 9 (9th ed 2007).

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§7.20 2. Cocaine

Cocaine is a strong central nervous system (CNS) stimulant. Cocaine interferes with the reabsorption process of catecholamines, particularly the chemical messenger dopamine, which aids with the transmission of impulses across nerve synapses. Dopamine is a chemical associated with pleasure and movement. Cocaine prevents the reuptake of dopamine, which results in chronic stimulation of certain receptors and a euphoric rush. When dopamine levels eventually fall, users experience a crash. See National Institute on Drug Abuse (NIDA), *NIDA InfoFacts: Cocaine* (updated Mar. 2010) at http://www.drugabuse.gov/pdf/infofacts/Cocaine10.pdf.

Physical manifestations of cocaine use include dilated pupils, increased pulse, increased body temperature, and rapid speech. Users may also experience excessive activity and body tremors. The effects of cocaine use can be broken down into two phases. The early phase, close to ingestion, produces euphoria, excitation, general arousal, and motor restlessness. While low doses can be associated with increased focus or improved performance in some simple tasks, higher doses may be associated with confusion, psychosis, agitation, aggressive behavior, irritability, and antisocial behavior. The late phase, further away in time from dosing, can produce aggression, agitation, nervousness, CNS depression, fatigue, and insomnia. As the effects of cocaine wear off, users may experience fatigue, depression, and sleepiness. See *NIDA InfoFacts: Cocaine, supra*.

There are many ways to ingest cocaine, but injection, smoking, swallowing, and inhaling are the most common. Each method has a different absorption time, duration of effect, and intensity of effect. See *NIDA InfoFacts: Cocaine, supra*.

For further discussion of cocaine, see Saferstein, Criminalistics: An Introduction to Forensic Science, chap 9 (9th ed 2007).

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§7.21 3. Methamphetamine

Methamphetamine is a strong central nervous system (CNS) stimulant. Use in low doses has been associated with feelings of euphoria, excitation, and motor restlessness as well as mental clarity, increased focus and alertness, and decreased fatigue. In higher doses or with extended use, users may show aggressiveness, irritability, delusional behavior, patterns of psychosis, fear and paranoia, and disoriented or confused behavior. Physiological changes include increased heart rate and blood pressure, increased body temperature, dilated pupils, and increased light sensitivity. Rapid speech is also associated with the use of stimulants, such as methamphetamine. See National Institute on Drug Abuse (NIDA), *NIDA InfoFacts: Methamphetamine* (updated Mar. 2010) at http://www.drugabuse.gov/pdf/infofacts/Methamphetamine10.pdf.

Methamphetamine metabolizes to amphetamine, another CNS stimulant. Both methamphetamine and amphetamine remain detectable in the blood for about 10-12 hours after a 10 mg dose and in the urine for about 48 hours after a 20 mg dose.

Methylenedioxyamphetamine (MDA) and methylenedioxymethamphetamine (MDMA) are in the same class of drugs as methamphetamine and amphetamine. MDA and MDMA have more of a hallucinogenic effect than methamphetamine and amphetamine. Some over-the-counter drugs are also close structural relatives of methamphetamine and amphetamine. Because most screening tests cannot accurately distinguish over-the-counter drugs related to methamphetamine from illicit amphetamine-style drugs, a second confirmation test by the laboratory is required for any screen involving this class of drugs.

For further discussion of amphetamines, see Saferstein, Criminalistics: An Introduction to Forensic Science, chap 9 (9th ed 2007).

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§7.22 4. PCP

Phencyclidine (PCP) was once used as a surgical anesthetic, but it currently has no legitimate medical use in humans and is now limited to use as a veterinary anesthetic. PCP is used recreationally as a psychedelic and hallucinogen. It can be made in clandestine laboratories or diverted from veterinary sources. PCP can be taken as eye drops, smoked, injected intravenously, snorted, ingested orally, or absorbed transdermally. See National Institute on Drug Abuse (NIDA), *NIDA InfoFacts*: *Hallucinogens: LSD, Peyote, Psilocybin, and PCP* (July 2009) at http://www.drugabuse.gov/pdf/infofacts/Hallucinogens09.pdf.

There is no direct correlation between PCP concentrations and behavioral or physical symptoms. Blood levels peak 1-4 hours after ingestion, and PCP has been found in urine up to a week after cessation of use. Low blood concentrations have been associated with patients entering psychiatric hospital emergency rooms presenting associated clinical pictures with a wide range of psychotic behavior resembling mania, depression, or schizophrenia. The most common physical effects are combative and aggressive behavior, depressed levels of consciousness, hypertension, and tachycardia. See *NIDA InfoFacts: Hallucinogens: LSD, Peyote, Psilocybin, and PCP, supra*.

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§7.23 5. Marijuana (THC)

Marijuana is a mixture of shredded flowers and leaves of the hemp plant Cannabis sativa, and hashish is produced from dried resin secretions of the same plant. Marijuana is defined as (Health & S C §11018)

all parts of the plant Cannabis sativa L., whether growing or not; the seeds thereof; the resin extracted from any part of the plant; and every compound, manufacture, salt, derivative, mixture, or preparation of the plant, its seeds or resin.

The definition expressly excludes

the mature stalks of the plant, fiber produced from the stalks, oil or cake made from the seeds of the plant, any other compound, manufacture, salt, derivative, mixture, or preparation of the mature stalks (except the resin extracted therefrom), fiber, oil, or cake, or the sterilized seed of the plant which is incapable of germination.

Concentrated cannabis is defined as "the separated resin, whether crude or purified, obtained from marijuana." Health & S C §11006.5.

The chemical Δ^9 THC (Delta-9-tetrahydrocannabinol) is thought to be responsible for the psychoactive effects of marijuana and hashish. Saferstein, Criminalistics: An Introduction to Forensic Science, p 256 (9th ed 2007). Synthetic THC, known as Dronabinol, is marketed under the brand name Marinol®.

Marijuana is usually smoked. While marijuana can be orally ingested, as in cookies or brownies, oral ingestion is less effective than smoking for getting the drug into the blood for distribution throughout the body. Another mode of ingestion is vaporization, a technology designed to deliver inhaled cannabinoids while avoiding the respiratory hazards of smoking by heating cannabis to a temperature where therapeutically active cannabinoid vapors are produced, but below the point at which noxious pyrolytic byproducts are formed. See Gieringer et al., *Cannabis Vaporizer Combines Efficient Delivery of THC with Effective Suppression of Pyrolytic Compounds,* 4(1) J Cannabis Therapeutics (2004).

THC interferes with neurotransmitter functions involved in psychomotor and cognitive functions. Therefore, THC alters motor behavior, perception, cognition, memory, learning, endocrine function, hunger, and regulation of body temperature. Side effects of marijuana include fatigue, paranoia, psychosis, memory problems, mood alteration, poor motor coordination, lethargy, and slurred speech. Marijuana does not greatly impair sensory functions, but it does significantly impair perceptual functions. The marijuana user generally has problems with memory and learning, difficulty with problem solving, and difficulty with maintaining attention or altering attention to meet environmental demands. The addition of alcohol increases impairment. See Saferstein, Criminalistics, p 257.

Concentrations of THC and its metabolite are dependent on pattern as well as dose. Therefore, the interpretation of THC test results requires differentiating between chronic and occasional users. Moreover, it is possible for a person to be affected by THC blood concentrations that are below the limit of detection. The carboxy metabolite of THC—sometimes called Carboxy THC or Delta-9-Carboxy THC—is usually the drug that appears in urine of marijuana users. The Carboxy metabolite causes no direct impairment, but it is an indicator of past marijuana use. Carboxy THC can have a long window of detection in the urine. A novice user may excrete Carboxy THC for 24-36 hours after ingesting marijuana, but a chronic user stores the drug in body tissue and excretes the metabolite for several weeks after use.

For further discussion of marijuana, see Saferstein, Criminalistics, chap 9.

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§7.24 6. Alcohol

Alcohol is a broad term. Examples of alcohols relevant to forensic analysis are methyl alcohol, ethyl alcohol, and isopropyl alcohol. Alcoholic beverages contain ethyl alcohol, a central nervous system (CNS) depressant. Saferstein, Criminalistics: An Introduction to Forensic Science, chap 10 (9th ed 2007). The effects of ethyl alcohol are dose-dependent: as the dose increases, the effects increase. Ethyl alcohol can impair psychomotor skills, judgment, perception, and vision. In addition, reaction time and information processing slow and it takes longer to identify a stimulus, such as a stop sign, and to react appropriately to that stimulus. Ingestion of alcohol prevents "divided attention," which is the ability to monitor more than one task or stimulus simultaneously and is necessary to drive an automobile. Impairment of at least some skills and behaviors has been demonstrated at any measurable alcohol level. Moskowitz & Fiorentino, *A Review of the Literature on the Effects of Low Doses of Alcohol on Driving-Related Skills* (Apr. 2000) at http://www.nhtsa.dot.gov; please search for article title. For discussion of evidence of alcohol intoxication, see chap 6.

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§7.25 7. Other Drugs

Other drugs frequently used recreationally include the muscle relaxants carisoprodol (Soma) and cyclobenzaprine (Flexeril), sleep aids such as zolpidem (Ambien), zaleplon (Sonata), and eszopiclone (Lunesta), and various tranquilizing benzodiazepines, such as diazepam (Valium). These drugs are considered hypnotic sedatives that can cause drowsiness, inattention, and confusion. Other drugs in the benzodiazepine class, by generic and trade name, include alprazolam (Xanax), chlordiazepoxide (Librium), clonazepam (Klonopin), clorazepate (Tranxene), estazolam (ProSom), flunitrazepam (Rohypnol) lorazepam (Ativan), midazolam (Midazolam), oxazepam (Serax), temazepam (Restoril), and triazolam (Halcion). These examples of drugs in the benzodiazepine class are those available by prescription in the United States. There are at least 32 additional benzodiazepine drugs either currently or historically available throughout the world. See National Institute on Drug Abuse (NIDA), *NIDA InfoFacts: Prescription and Over-the-Counter Medications* (July 2009) at http://www.drugabuse.gov/PDF/Infofacts/PainMed09.pdf.

The benzodiazepines have varying half-lives. Triazolam, alprazolam, and midazolam are examples of benzodiazepines with short half-lives of less than 6 hours. Temazepam, oxazepam, and lorazepam are examples of benzodiazepines with moderate half-lives of 6-20 hours. Diazepam, chlordiazepoxide, and clorazepate are examples of benzodiazepines with long half-lives of greater than 20 hours.

The potency of the different benzodiazepines also varies greatly. Some benzodiazepines, such as diazepam, require a larger dose to be effective, and others, such as alprazolam, require a smaller dose to cause a pharmacologic effect. The effective therapeutic concentration of Valium is 0.5-2.5 microgram per milliliter (mcg/ml), while the therapeutic range for alprazolam is 0.005-0.035 mcg/ml. For this reason, the interpretation of blood concentrations of Valium at.02 mcg/ml and Xanax at.02 mcg/ml is very different: at these levels, the Valium would be subtherapeutic by a factor of 25, and the Xanax would be considered within the therapeutic range.

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E. Samples for Testing

§7.26 1. Utility of Sample Types

The typical specimens submitted for forensic toxicology analysis are blood, urine, breath, and tissue samples. In addition to these typical specimens, oral fluid, sweat, and hair are not widely used in forensic toxicology analysis, but they are used in pre-employment testing and tests ordered by family courts and probation officers. Wolff et al., *A Review of Biological Indicators of Illicit Drug Use, Practical Considerations and Clinical Usefulness*, 94(9) Addiction 1279 (Sept. 1999).

An issue with drug analysis is how long after ingestion a drug can be detected in a collected sample. In blood and oral fluid, drugs typically have a relatively short detectable life span, as short as a few hours. In urine, most drugs can be detected for several days, if not longer, after use. Hair testing can determine past drug use for a relatively long time, because drugs become trapped in the hair upon use. If someone is to be tested for acute drug use, blood is the most useful specimen to collect, and hair is the least helpful. On the other hand, if the purpose of testing is to determine historic drug use, hair is the most useful specimen and blood the least useful. Wolff et al., 94(9) Addiction 1279, 1281 (Sept. 1999).

All forensic toxicology results require integration with other information for the best possible interpretation. Urine sample analysis by itself will not contribute much beyond indication of past drug use. However, if that information is combined with a report from other parties, such as observations of a police officer or medical personnel, revealing actions consistent with drugs found by the laboratory, then there could be a much stronger finding, for example, of impairment caused by the particular drug found. Saferstein, Criminalistics: An Introduction to Forensic Science, chap 10 (9th ed 2007).

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§7.27 2. Timing of Sample Collection

Once the decision is made to collect a sample for toxicological analysis, the type of sample to be collected must be determined. For example, drugs typically remain detectable in the blood for relatively short periods of time and many drugs are no longer detectable in the blood a few hours after ingestion. On the other hand, drugs can generally be detected in urine samples for longer periods of time. Farrell, Kerrigan & Logan, *Recommendations for Toxicological Investigation of Drug Impaired Driving,* 52(5) J Forensic Sci 1214-1215 (Sept. 2007). Therefore, if more than several hours have elapsed between possible ingestion and when a sample can be collected, urine should be collected. If one or more drugs are reported from a urine sample, the interpretation is that the drugs found in the urine were used in the recent past.

Cocaine analysis can be used to illustrate the difference between blood and urine in relationship to detecting the drug in each sample type. Cocaine can be detected in urine long after the drug has cleared from the blood and it is capable of exerting a pharmacological effect on the user. A single ingestion of 20 mg of cocaine is detectable in the blood for 3-4 hours. Cocaine's main metabolite, benzoylecgonine, is detectable in the blood for about 10-12 hours after ingestion. Cocaine remains detectable in a urine sample for about 24 hours, while its metabolite benzoylecgonine is detectable for up to 72 hours after ingestion.

NOTE: Blood tests yield good information only if the sample is collected soon after drugs are ingested. But another problem can arise with blood samples, because all of the studies on blood concentrations of drugs have only used low doses of drugs. Individuals who use drugs recreationally, either prescription or illicit, use higher doses and dose more frequently than most studies have addressed.

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§7.28 3. Preparation of Samples for Testing

Most powders can be suspended in methanol or some other organic solvent prior to chromatographic analysis. Plant materials, such as marijuana and psilocybin mushrooms, require extraction of the drug before analysis.

Analysis by immunoassay (see §7.44) is usually performed directly on blood and urine samples. Saferstein, Criminalistics: An Introduction to Forensic Science, p 350 (9th ed 2007). Other samples may require treatment before analysis. For example, a hair sample must be washed to remove any contaminants external to the hair instead of in the hair; after washing, the hair must be processed to remove any drugs for testing. Gaulier et al., *Identification of Acepromazine in Hair: An Illustration of the Difficulties Encountered in Investigating Drug-Facilitated Crimes,* 53(3) J Forensic Sci 755-756 (May 2008).

All of the chromatography techniques (from thin layer chromatography to gas chromatography to high performance liquid chromatography) require the laboratory to manipulate biological samples to extract or remove for testing any drugs that might be contained in the sample. Part of the extraction process is to remove the drugs from the sample to get them in a form that can be successfully used for chromatography. The second part of the extraction process is to reduce the volume of the sample size, so that the drugs are present in a more concentrated form. The extraction process will use the chemical basis of the drugs to facilitate the extraction. Acidic drugs like barbiturates are extracted under different conditions than basic drugs like methamphetamine. Drugs are extracted from biological samples with organic solvents, which can be evaporated after the drug removal process is complete to leave behind only a residue containing the drug. A very small amount of solvent is used to resuspend the residue and then the combination of solvent and residue is transferred either to a thin layer plate or to a vial for analysis by one of the chromatographic instruments. See Gaulier et al., 53(3) J Forensic Sci 755-756.

The laboratory will extract a series of drug standards in known concentrations to be compared with the unknown samples if quantitative results are requested. The standards should be subjected to the same conditions that the unknown samples (casework samples) are subjected.

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4. Treatment of Sample Types

§7.29 a. Blood

Blood samples are generally collected from living individuals using venopuncture, in which a needle is used to puncture a vein, usually in the crook of the elbow. The needle is attached to a specialized tube, called a vacutainer tube, that uses very slight vacuum pressure to aid in drawing blood. When collecting blood for forensic purposes, nonalcohol disinfectants such as benzalkonium chloride should be used to clean the area from which blood is drawn, because isopropyl alcohol (isopropanol, or rubbing alcohol) disinfectants can transfer to the needle used to draw the blood and contaminate the blood sample. While forensic analyses should be able to differentiate isopropyl alcohol from ethyl alcohol, it is still good practice to use a nonalcohol disinfectant to prevent the possibility of error.

NOTE: Blood can also be collected postmortem, usually from the heart area or from peripheral veins. The site of the postmortem blood draw must be documented with the specimen because each area that blood can be taken from contains different concentrations of drugs or alcohol, due to the phenomenon of postmortem redistribution. Cook, Braithwaite & Hale, *Estimating Antemortem Drug Concentrations From Postmortem Blood Samples: The Influence of Postmortem Redistribution*, 53(4) J Clin Pathol 282 (Apr. 2000).

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§7.30 (1) Personnel

The only medical personnel authorized to draw blood for alcohol testing are licensed physicians and surgeons, registered nurses, licensed vocational nurses, licensed clinical laboratory technologists or bioanalysts, unlicensed laboratory personnel regulated under the Business and Professions Code (Bus & P C §§1242, 1242.5, and 1246), and certified paramedics (if requested by a peace officer to draw blood and if approved by the paramedic's employer). Veh C §23158(a).

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§7.31 (2) Tubes for Collection

The tubes in which the samples are collected contain either a specific preservative or no preservative at all, and the tubes have color-coded stoppers for quick identification of their precollection contents. Tubes used for nonforensic clinical purposes include those with red stoppers (which contain no preservative or anticoagulant); those with purple stoppers (which contain ethylenediaminetetraacetic acid (EDTA) as the preservative); and those with the yellow stoppers (which contain citrate).

Gray-stopper tubes are those generally used in forensic toxicology for collection from live individuals and contain the preservative sodium fluoride and the anticoagulant potassium oxalate. The sodium fluoride preservative prevents in vitro formation of ethyl alcohol by killing bacteria capable of reacting with excess sugar in the blood to ferment into ethyl alcohol. Because diabetes can cause high levels of circulating blood sugar, this is a particular risk when the person giving the blood sample is diabetic and has blood bacteria that are capable of fermenting to yield ethyl alcohol. While a person with a systemic bacterial infection is generally so ill that he or she would be hospitalized, the sodium fluoride preservative should still be present as a precaution against bacteria from the environment, such as the skin, being driven into the tube upon collection. Nonetheless, the odds of in vitro fermentation are not high: not all bacteria can ferment to produce ethyl alcohol, the amount of excess sugar required for fermentation is high, and the blood sample needs to be kept at a temperature conducive to ethyl alcohol fermentation. Fermentation is much more likely to occur in postmortem blood samples than in samples taken from living individuals.

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§7.32 (3) Labeling of Tubes and Envelope or Container

Each tube of drawn blood must be properly labeled. The Uniform Standards for Withdrawal, Handling, and Preservation of Blood Samples for Forensic Alcohol Analysis, a joint document from the California Department of Highway Patrol, Department of Health, and Department of Justice (July 1998) (available at http://www.cci.ca.gov/Reference/peb/peb2.pdf) lists requirements for collecting samples and maintaining the identity and integrity of each sample as well as the container enclosing the sample. As provided by this document, the label must specify the following:

- Full name of the person giving blood or subject;
- Date and time the blood was drawn;
- Initials of the person drawing the blood; and
- Initials of the officer who witnessed draw.

In addition, the minimum documentation for the evidence envelope or container is the following:

- Full name of the subject, and his or her driver's license number;
- Submitting agency;
- Geographical location where the blood sample was drawn: *i.e.,* name and address of hospital, jail, or other facility;
- Name of the person drawing the blood;
- Date the blood sample was drawn;
- Time the blood sample was drawn;
- Signature of the witnessing officer;
- Details or form showing the complete chain of possession for all persons handling the sample; and
- Optional: from where, anatomically, blood was drawn; whether subject was alive or dead; and indication of any offense charged.

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§7.33 b. Urine

Urine collection is less invasive than blood collection and can be done in almost any secure facility. Urine collection is not limited to certified personnel. Some viewing restrictions or facilities modification may be required to ensure that the specimen provided actually comes from the individual in question. Some jurisdictions require that the collection be observed by designated personnel, while other jurisdictions allow private collection as long as the restroom has blue toilet water and all water sources can be turned off during the time of collection. The scope of potential problems is clear from the number of Internet sites that sell pills, dips, and even drug-free urine to help users pass urine drug tests.

For workplace drug testing, the laboratory commonly tests for adulterants an employee may have added to a urine sample to mask drug use. The most common adulterants are oxidants, nitrates, and halides (bleach, iodine, and fluoride). If a test comes back positive for adulterants, the sample is considered invalid. In addition to adulterants, laboratories test for specific gravity and the acidity of the urine. Once again, there is an acceptable range for those tests, and if the urine sample in question is outside of the expected ranges, the sample is reported as invalid. Urine samples in the forensic arena are not generally screened for adulterants, because a person asked to provide a forensic urine sample is usually unprepared and lacks time to plan adulteration of the sample.

A urine sample may or may not have a preservative added to the collection bottle. In years past, the presence of a preservative would have interfered with some screening test results, but testing procedures have evolved, and each laboratory should be able to confirm that a preservative used in a urine sample does not interfere with analysis.

Requirements for labeling samples and evidence containers, described in the discussion on blood in §7.32, are germane to urine samples as well.

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§7.34 c. Body Tissue

Body tissue testing is often done postmortem to try to find out what happened to a deceased individual who may have engaged in excessive drug or alcohol use. By testing different tissues, it may be possible to determine facts such as whether an overdose was accidental or willful or how long the deceased had been taking a medication. While a pathologist can detect changes of color, size, or other physical presentations to internal organs, only a toxicologist can determine if drugs caused the phenomena being observed.

Drugs can be found in brain, liver, and kidney tissues. Vitreous fluid from the eye is also revealing, especially for alcohol use. Typically, blood (both peripheral and central), kidney, liver, and gastric contents are submitted for analysis. Bile and vitreous fluid also can be readily collected and are useful for the analysis of some drugs. There are many other less common requests. For example, a laboratory may receive a lung sealed in a can for testing of a gas such as nitrous oxide, or an injection site may be excised and sent to the lab for analysis.

The pathologist must correctly label each sample and document from where each sample was collected. Tissue concentration can vary from one location to another, so it is important to know, for example, not only that the liver was analyzed, but which lobe and what portion of the lobe was removed for testing.

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§7.35 d. Hair

Hair can be tested for drugs when a relatively long time has elapsed between exposure and testing. Drugs bind to head hair through the follicle at the scalp. Hair grows at a rate of approximately 1-1.5 centimeters per month. As the hair grows longer, any drugs ingested remain bound to hair at the site on the hair shaft where they first attached. The position in relationship to the scalp constantly changes as the hair grows, but the drug can be detected until the hair is cut above the location where it bound to the shaft. Wolff et al., *A Review of Biological Indicators of Illicit Drug Use, Practical Considerations and Clinical Usefulness*, 94(9) Addiction 1279, 1289 (Sept. 1999).

If a drug is used a single time, the drug will only be detected in a piece of hair that was growing from the scalp at the time the drug was used. If an individual chronically ingested drugs, the drugs would be detectable over a longer hair shaft length. The laboratory typically segments hair samples into short 1-centimeter lengths for testing. If all segments test positive for drugs, the drug has been ingested over the time it took the tested hair shaft to grow. If the drug is detected in only one hair segment, the laboratory, knowing the approximate rate of the hair growth, can use the distance of the segment from the scalp to estimate when the drug was last used. Wolff et al., 94(9) Addiction 1279, 1290; Gaulier et al., *Identification of Acepromazine in Hair: An Illustration of the Difficulties Encountered in Investigating Drug-Facilitated Crimes*, 53(3) J Forensic Sci 755, 758 (May 2008).

Hair cut for testing is clipped close to the scalp, then bundled in a way that makes it easy for the laboratory to determine which end of the sample was closest to the scalp. The laboratory might cut a hair into segments to assess the regularity of drug use. Alternatively, the laboratory may use the entire length of hair for an initial test since a positive finding on an entire shaft is sufficient to identify the donor as one who has used drugs in the past, and do a second, segmental analysis only if more information about the regularity of the donor's drug use is needed. Hair testing can be performed using immunoassays or mass spectrometry. See Wolff et al., 94(9) Addiction 1279, 1290; Gaulier et al., 53(3) J Forensic Sci 756. For discussion of immunoassay testing, see §7.44. For discussion of mass spectrometry, see §7.49.

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§7.36 e. Oral Fluid

Oral fluid testing is noninvasive, demands limited collection monitoring, and closely reflects the concentration of drugs in blood. However, the limited sample volume typically provided proves to be a forensic challenge. Wolff et al., *A Review of Biological Indicators of Illicit Drug Use, Practical Considerations and Clinical Usefulness*, 94(9) Addiction 1279, 1286 (Sept. 1999). Commercial test kits, which are available for oral fluid collection, provide the toxicologist with between 1-2 ml and 4 ml of specimen with which to work. This is a very limited volume of sample provided compared with, for example, blood which may involve two 10 ml tubes of blood, or urine, which typically involves a 30 ml sample. See Fisher, Techniques of Crime Scene Investigation, chap 12 (7th ed 2003).

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§7.37 f. Solid Dose

Solid dose specimens come from nonhuman sources and can include powder, pills, plants, syringes, and fluids. Most of these samples have high drug concentrations, if they contain a drug at all. Even if the percentage of drug in a solid dose sample is low, the concentration is typically high, relative to biological specimens. For example, typical concentrations of illicit drugs found in urine are reported in micrograms per milliliter (mcg/ml), similar to parts per million; blood concentrations of illicit drugs are typically reported as nanograms per milliliter (ng/ml), similar to parts per billion. On the other hand, a confiscated powder may weigh roughly 50 mg and, with a concentration of 20 percent, would contain 10 mg of drug. For comparison, a therapeutic dose of methamphetamine is 5-10 mg.

Syringes are commonly sent for analysis of their contents or residue adhering to the walls of the syringe barrel. Other drug paraphernalia, such as scales, pipes, money, and spoons (used to "cook" drugs), can also be analyzed, as can clothing. Toxicologists have been asked to analyze unusual types of material, such as a dirt sample someone urinated on. Some items to be analyzed, like the syringe, are closed systems—in other words, it would be difficult to easily contaminate them. Other items, such as clothing, are not closed items, and external contamination from contact with other contaminated items or persons is always possible; in that case, the actual analysis may be simpler than the interpretation.

Analysis of solid dose items can be accomplished in many ways, including thin layer chromatography (see §7.43), gas chromatography (see §7.47), and mass spectrometry (see §7.49).

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§7.38 g. Breath

While breath testing is generally associated with breath alcohol testing, breath can also be tested for other volatile compounds.

NOTE: The term *alcohol* usually refers to ethyl alcohol (ethanol), the intoxicating substance in alcoholic beverages, but scientifically, it refers to numerous other compounds, including methyl alcohol (methanol), butyl alcohol (butanol), and isopropyl alcohol (isopropanol).

A number of approved devices exist to test breath for alcohol consumption, including Dräeger's Alcotest 7410 Plus, which is often used to test breath alcohol for forensic purposes (see §6.31).

The Alcotest 7410 Plus uses two independent measuring technologies: infrared energy and an electrochemical cell; if both do not read within a preset tolerance, the test is marked invalid. The instrument sends infrared energy, the part of the invisible light spectrum that spans to the red end of the visible light, through a breath sample. Any alcohol in the sample absorbs the infrared energy, and a detector measures the resulting drop in overall infrared energy. The electrochemical cell is a porous membrane laminated between two platinum black plates, each of which have an electric wire attached. The entire assembly sits inside a sealed housing with a small hole for test takers to breathe into. Ethyl alcohol in the breath sample causes a chemical reaction with one of the platinum plates, which sends a measurable electrical current to the other plate. The increased voltage from the electrical current is directly proportional to the amount of alcohol present in the breath sample.

For an in-depth history and discussion of breath testing, see Garriott, ed., Medical-Legal Aspects of Alcohol (4th ed 2003).

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F. Screening and Confirmation

§7.39 1. Two-Step Protocol

Forensic toxicology requires that drug identification be made beyond a reasonable scientific doubt. While forensic toxicology has no mandatory protocols for testing processes, formalized guidelines outline good practice. It is a long-established guideline that good practice requires the use of two tests based on different physical and chemical principles. This guideline has been formalized in the *SOFT/AAFS Forensic Toxicology Laboratory Guidelines* (2006) by Society of Forensic Toxicologists, Inc. and the American Academy of Forensic Sciences (Toxicology Section); for the online version of these guidelines, go to http://www.soft-tox.org/docs/Guidelines%202006%20Final.pdf. Identification of a drug by the use of two similar methods is not acceptable because, for example, two different immunoassays may have antibodies with similar crossreactivities or artifact susceptibilities, each of which could generate the same incorrect result. The combination of an immunoassay screen and confirmation through gas chromatography (GC), high performance liquid chromatography (HPLC), or mass spectrometry (MS) meets the requirement of using two different techniques for forensic drug identification. See Wolff et al., *A Review of Biological Indicators of Illicit Drug Use, Practical Considerations and Clinical Usefulness*, 94(9) Addiction 1279-1280 (Sept. 1999).

Forensic drug identification is generally conducted in two steps: a screening test and a confirmation test. The screening test enables the laboratory to quickly determine whether a sample is negative or presumptively positive for a given drug or drug class. If a screening test shows that a sample is negative for a specific drug, the analyst can have a high degree of confidence that there is none of that specific drug in the sample. If the screen is positive, however, the analyst must conduct a confirmation test.

A confirmation test should be designed for specificity—once the screen is positive, the confirmation test should help the analyst identify which drug within the class is present, and how much of that drug there is. Confirmation tests are also used to ensure that a screen did not produce a false positive. False positives can occur when something other than the drug being tested for, such as an over-the-counter product or prescribed medicine, causes the screen to trigger positive. For example, a false positive for methamphetamine can be generated when the sample donor has taken pseudoephedrine, a legal, over-the-counter medicine that is structurally similar to methamphetamine. Wolff et al., 94(9) Addiction 1279, 1281.

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2. Screening Tests

§7.40 a. Description

Screening techniques vary from low-tech color tests to high-tech immunoassays. Some tests are very discrete, reacting only to one specific drug, and others are considered broad spectrum tests, because they look for numerous drugs from various classes. When a laboratory is asked to perform an analysis for a single drug, it may skip the screening test and go directly to one of the confirmation tests. See §7.45 for discussion of confirmation tests.

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§7.41 b. Directed Analysis

A laboratory asked to analyze a sample for a single drug can conduct that analysis even if no screen is performed. This kind of analysis is called directed analysis. The difference between directed analysis and the other analyses discussed is that both the lab and the party requesting the test are looking for one specific drug while ignoring instances of all others.

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§7.42 c. Color Tests

Color tests can be used to detect the presence of a single drug or a member of a class of drugs in some biological and solid samples. When various chemicals are added to a test sample, the color produced may be representative of a single drug or a member of a class of drugs. Color tests are used in hospital laboratories for quick assessment of a sample. Color tests for salicylates (aspirin) and acetaminophen (Tylenol), for example, can quickly provide information when an overdose of over-the-counter medicine is suspected. Forensic laboratories may use color tests for solid forms of drugs or to screen biological samples. Laboratories may also use color tests for some drugs that are not routinely screened for by other methods, such as chloral hydrate (a "Mickey Finn" is a drink laced with chloral hydrate). Although color tests were designed for use with a white tile background for classic color test applications, many of the reagents may also be used as visualizing sprays in combination with thin layer chromatography.

For further discussion of color tests, see Saferstein, Criminalistics: An Introduction to Forensic Science, chap 9 (9th ed 2007).

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d. Broad Spectrum Screens

§7.43 (1) Thin Layer Chromatography (TLC)

Chromatography is the separation of different compounds; different kinds of chromatography use different separation techniques. In thin layer chromatography (TLC), separation is accomplished by applying the extracted sample to a gel that has been coated onto a glass plate. The plate is then placed into a tank containing an organic solvent or solvent mixture with enough fluid volume to touch the plate along the bottom edge. Once the tank is sealed, the solvent slowly rises up through the gel coating on the plate, much like water moves up through a paper towel whose tip is dipped into water. Drugs within the sample move up the plate as the solvent rises and stop migrating at different heights depending on their unique chemical properties. The plate is allowed to develop for a set period of time, usually indicated by a line marked a specific distance up the plate from the site of sample application. Drugs can be identified by their response factor (Rf). The Rf is the distance that a drug travels from the origin divided by the distance that the solvent travels from the origin, which is where the samples were applied to the plate. See Saferstein, Criminalistics: An Introduction to Forensic Science, chap 5 (9th ed 2007).

In TLC, the lab generally applies a known drug to each plate, to be subjected to the same conditions as the samples. The relative response factor (RRf) is a measure of the response of the sample substances being analyzed, as compared with the response of the known reference drugs. Knowing the RRf allows the lab to normalize for minor variations and determine the concentrations of substances in the analyzed sample.

The separation in TLC is caused by the interaction of the drug in the sample, the mobile phase (the solvent), and the solid stationary phase (the gel applied to the plate). The TLC process has the advantage of allowing for changes. For example, the solid stationary phase can be changed, and that in turn will cause the drugs to separate differently. More commonly, the solvents used as the mobile phase are changed. The flexibility in the choice of solid stationary phase and mobile phase, along with the low cost and simplicity of use, keeps TLC a popular screening technique.

Once drugs have been separated using TLC, the plate is removed from the tank containing the mobile phase solvent, but the plate retains the white appearance of its solid stationary phase gel covering. To see the separation of the drugs, scientists apply visualizing sprays or color reagents to the plate. Specific sprays can be used for specific drugs, but it is common to use a reagent such as iodoplatinate that has a very nonspecific reaction, so that many different types of drugs can be visualized at once. Drugs generally appear as roundish spots on the plate, and many of the drugs important to forensic toxicology appear in various shades of the color purple using the iodoplatinate reagent. The spots can be physically cut from the plate and extracted for other analyses, including mass spectrometry. For discussion of mass spectrometry, see §7.49.

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§7.44 (2) Immunoassay

Immunoassays are rapid sensitive screens usually reserved for biological specimens. Immunoassays use the reaction of antibodies (proteins used to identify and neutralize foreign substances in the body) to antigens (substances that trigger an immune system response) to measure the concentration of drugs or alcohol in a sample. Saferstein, Criminalistics: An Introduction to Forensic Science, chap 10 (9th ed 2007). Immunoassays for drugs use an antibody that has been specifically created for either a single drug or class of drugs. In clinical labs, immunoassays can be used to quantitate some prescription drugs; however, in forensic labs, immunoassays should be used only to separate negative from positive samples.

Many different types of commercial immunoassay screens are available to forensic toxicologists. Some use radioactive isotopes, some use enzymes, and some use tubes pre-coated with a substance. Whatever format is used, all immunoassays are based on the same principle: competition of antigen to antibody sites. The Enzyme-Linked ImmunoSorbent Assay (ELISA) and the Enzyme Immunoassay (EIA) are both competitive binding immunoassays, but EIA immunoassays use labeled antigens, and ELISA immunoassays use labeled antibodies. Labels can be radioactive isotopes (as in Radio Immunoassay (RIA)), enzymes (as in Enzyme-Multiplied Immunoassay Technique (EMIT)), or, less frequently, chemoluminescent and fluorescent substances. See Saferstein, Criminalistics, chap 12.

A common competitive immunoassay technique forces an unknown antigen in a collected sample to compete with a known, labeled antigen for the chance to bind with antibodies. A measurement is made by comparing a calibration curve of known drug concentration response with the response from the tested sample. Specifically, labs can measure how much of the known, labeled antigen bonded with the antibodies—the more the known antigens bond with the antibody, the lower the concentration of unknown antigens in the collected sample. To avoid ambiguous test results, immunoassay tests often introduce antibodies that bind to one site of a particular antigen molecule and that strongly attract the antigen in question.

Antibodies are proteins produced in response to antigens or to immune-response triggers such as flu shots. Drug molecules are too small to induce an immune system response on their own, so they are coupled with larger carrier proteins that do react with antibodies. Antibodies used in testing usually come from rabbits, sheep, or goats. See Saferstein, Criminalistics, chap 12.

Some antibodies used in testing react only to one drug (and its metabolites), while others react to a broad class of drugs (and their metabolites). Many immunoassays for opiate drugs use antibodies that combine these features, reacting specifically with morphine and codeine and only in a limited way to other opiate drugs, such as oxycodone, hydrocodone, and hydromorphone.

No immunoassay can test for all drugs within any given class, but some are more inclusive than others. Some analyses require that a immunoassay specific to a single drug be used, rather than an immunoassay that can detect many drugs in a class. For example, the drug flunitrazepam (Rohypnol) is not detected by any benzodiazepine immunoassays on the market, but a specific screen for this one drug is available from some manufacturers.

A typical ELISA immunoassay requires the tester to add a sample to small wells on a plate pre-coated with antibody for a specific drug, add the sample to the wells, and then add an enzyme-labeled antigen to the wells. After the drug in the sample competes with the enzyme-labeled drug antigen, the well is washed with water, flushing away all antigen and antibody material that failed to bind. A chromogenic substrate is added to the bound enzyme that remains behind, and the reaction causes color to develop; the addition of a stop solution causes a second color to develop. Since the drug in the sample always wins the competition for binding sites, there will be less color detected in the wells with samples that contain drugs. Samples with no drug in them have more color, because there are bound enzymes left to react with the chromogenic reagent; samples with drugs in them cause the enzyme-labeled antigen to be displaced and removed in washing, so less color develops. While color intensity is an indication of the amount of drug present, further analysis is required to determine which drug within the class is present, and how much of that drug there is. In EMIT and ELISA, measurements are based on color intensities of specific wavelengths. These techniques are sensitive and require no extraction of the sample prior to analysis.

When a radioactive isotope is used in an immunoassay, the immunoassay is heterogeneous. In a heterogeneous immunoassay, labeled antigens or antibodies that have been left behind after the binding process are separated from the bound antigens and antibodies. To do this, the lab adds a reagent that causes the leftover antigens or antibodies to clump together in a precipitate, then runs everything through a centrifuge to separate the precipitate clump from the bound material. The amount of radioactivity in the clump is inversely proportional to the amount of drug in the sample. A sample with no drug present will have a higher radioactivity reading than a sample with a specific drug present.

When a sample drug is labeled with an enzyme or a fluorescent substance for the immunoassay, measurements are generally based on optical changes such as ultraviolet absorption, fluorescence, or luminescence. Because each drug produces unique optical signals, these immunoassays do not need to separate the free drug from the bound, labeled drug before analysis. These kinds of immunoassays are referred to as homogenous immunoassays.

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3. Confirmation Tests

§7.45 a. Purpose of Test

Screening tools such as color tests and immunoassay tests must be accompanied by confirmation tests performed using an alternate technology. Confirmation tests should identify and quantify specific drugs in a sample to confirm the results of a positive screening test. The task of the confirmation test is to determine if a positive screen was a true indication of the presence of a drug within a class, or if the positive screen was a false positive.

Confirmation tests should be designed to identify specific drugs and should also be designed to provide a quantitative result. An example of this is to confirm for a positive screening test for amphetamines. The task of the confirmation test is to determine if the screen was an indication of the presence of a drug within this class, or to determine if the positive screen was due to a false positive. The next part of the confirmation is to determine what drugs within the class are present. There can be numerous drugs that cause a positive response for some screening tests that are innocuous, legal, or otherwise not of great interest. The confirmation test should be able to differentiate between the different drugs within a class and unequivocally identify and differentiate them from each other. It is important that the confirmation test be able to differentiate between pseudoephedrine (which is an over-the-counter nonprescription medication) and methamphetamine. Wolff et al., *A Review of Biological Indicators of Illicit Drug Use, Practical Considerations and Clinical Usefulness*, 94(9) Addiction 1279, 1281 (Sept. 1999); Saferstein, Criminalistics: An Introduction to Forensic Science, chap 10 (9th ed 2007).

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b. Chromatography

§7.46 (1) Chromatographic Process

Chromatography separates different chemical compounds that may be in a sample in order to determine their contents.

In forensic drug testing, the chromatography can be simple, like thin layer chromatography (TLC) (see §7.43) or sophisticated mass spectrometry (see §7.49). The process is generally the same. There is a mobile phase, a solid phase, and some kind of detection mechanism.

For further discussion of chromatography, see Saferstein, Criminalistics: An Introduction to Forensic Science, chap 5 (9th ed 2007).

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§7.47 (2) Gas Chromatography (GC)

Gas chromatography (GC), like other chromatographic applications, identifies compounds through separation. The mobile phase is an inert carrier gas that continuously flows through a column containing the stationary phase. Saferstein, Criminalistics: An Introduction to Forensic Science, chap 5 (9th ed 2007). The oven that houses the column may be temperature-programmed or run at a constant temperature, known as isothermal temperature. The instrument consists of an inlet to allow for application of the sample onto the column. This is generally performed by injecting the sample into the column with a syringe. The far end of the column is connected to an outlet, which is known as the detector.

The sample of interest is injected into the inlet and onto the column. As the carrier gas mixes with the sample and pushes it through the column, there is interaction between the sample components and the column. Molecules that have a higher affinity for the column, the stationary phase, will remain attached to the column longer than molecules with a low affinity for the column. It will take the molecules that have a high affinity to the column longer to reach the detector than those with a low affinity. As the sample parts attach and are coaxed from the column by the carrier gas, only to reattach again and be coaxed off again, the different compounds that make up the sample are separated from one another. Each substance will have a characteristic time that it takes to make its way through a column. The process of moving along the column is known as elution, and the time that it takes for the substance to go through the column is known as the retention time. The retention time is the interval of time between injection and detection.

Components of GC that can be controlled are the rate of the carrier gas flow, the oven temperature, the kind of detector used, and the type of column. Some columns are specific to certain kinds of compounds while others have much broader uses. An example of this selectivity is that some columns may be specific for alcohols. Alcohol is a broad term meaning that the compound has a unique chemical structure as part of the make up of that compound. Examples of alcohols relevant to forensic analysis are methyl alcohol, ethyl alcohol, and isopropyl alcohol. There are also many more compounds that are alcohols. Columns also come in many different configurations. Some columns consist of inert material that has been coated with another chemical, and then this combined material is packed into a small tube of either glass or stainless steel. These are appropriately known as packed columns. Some columns have no packing in the tube, but have a proprietary coat on the inside of a very small flexible tube. The process is somewhat the same for either the packed or nonpacked column in that the drug molecules within the sample that have a high affinity for the active sites of either format will bind to that site, then are coaxed off the site by the carrier gas only to bond a little further down the column, then are coaxed off again and again along the length of the column until the molecule is ultimately pushed through the column and into the detector.

Numerous detectors can be used with forensic gas chromatography. The flame ionization detector (FID) is the least specific of the detectors and responds to nearly all classes of compounds. The FID has a small jet, known as the flame tip, that sits within the detector unit. A mixture of air and hydrogen mixes with the inert carrier gas, an ignition source is applied, and the air and hydrogen form a small flame that is regulated by the flame tip jet. Electrodes monitor a current coming from the flame tip. When the sample elutes from the column into the detector, the sample will burn in the flame, creating ions that change the current monitored by the electrode. The change in current is usually recorded as a peak by some type of monitoring system. Other types of detectors are the nitrogen phosphorous detector (NPD), which uses a rubidium bead instead of a flame to enhance its response to compounds that contain nitrogen and phosphorous, and the electron capture detector (ECD), which has a chamber that houses a pair of electrodes and a radioactive source that is placed close to the cathode to ionize the carrier gas. In an ECD, as the sample elutes from the column, electron-capturing solutions remove some of the electrons that have formed, causing a change in the background current. The change in electric current registers as a loss of signal, rather than as an increase in signal as it does in the FID and NPD. The ECD is sensitive to compounds that contain chloride, bromide, or fluoride molecules. The ECD can be easily contaminated, however, and maintenance is more difficult and time-consuming than with an FID or NPD.

For further discussion of gas chromatography, see Saferstein, Criminalistics: An Introduction to Forensic Science, chap 5 (9th ed 2007).

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§7.48 (3) High Performance Liquid Chromatography (HPLC)

In high performance liquid chromatography (HPLC), an extracted sample is dissolved in a liquid mobile phase and forced to flow under high pressure through a column. The solid stationary phase (often a silica gel) packed inside the column causes the molecules to separate before being sent to the detector. Both reverse phase HPLC and normal phase HPLC use polarity to separate the contents of samples. Reverse phase HPLC uses a polar mobile phase and a nonpolar stationary phase, while normal phase HPLC, which is far less common than reverse phase HPLC, uses a nonpolar mobile phase and a polar stationary phase.

Unlike gas chromatography (GC) columns, HPLC columns are usually surrounded by ambient air. The stationary phase silica in an HPLC column can be manipulated to influence the pore size, which, in turn, influences the surface area of the material. Substances can be added to the silica that will change the polarity of the material within the column. This, in turn, will affect the affinity of the drug within the sample for the column material. By changing the polarity of the column material, one can change how the sample elutes from the column.

The mobile phase in HPLC is generally a buffered solution with an added organic solvent such as methanol or acetonitrile. Changes to drug elution can be made by changing the percentage of the organic solvent, the kind of organic solvent used, or the pH of the mobile phase. In gradient elution, the mobile phase is modified over the course of the separation process by changing the individual rates of two separate pressurized flows while maintaining an overall constant flow rate. When this is done, care must be used to ensure that the column is conditioned back to the original mobile phase before starting the next analysis.

The most common HPLC detectors are optical detectors, in which a beam of light passes through a flow cell. As the sample flows through the detector, variations in light intensity occur. These variations can be from ultraviolet absorption, fluorescence emission, or refractive index changes. The change in light intensity is monitored by a device such as a strip chart recorder, an integrator, or some sort of computer system. The simplest optical detector is the fixed wavelength detector, which monitors light at only a certain wavelength. The fixed wavelength is usually 254 nanometers (nm), because many organic compounds absorb at 254 nm. Using a variable-wavelength detector increases the sensitivity of the instrument by using the wavelength of maximum absorption for a specific compound. Because different drugs have different wavelengths of maximum absorption, the detector can be set up to maximize the response for either a specific drug or a class of drugs.

The photodiode array detector is also commonly used in HPLC. This detector uses two light sources, depending on the wavelength to be monitored. The diode array detector offers the advantage of being able to eliminate interfering substances by manipulating the optic response. Other types of detectors used include refractive index detectors, fluorescence detectors, and electrochemical detectors.

HPLC can also use the mass spectrometer as a detector. For a discussion of mass spectrometry, see §7.49.

For further discussion of high performance liquid chromatography, see Saferstein, Criminalistics: An Introduction to Forensic Science, chap 5 (9th ed 2007).

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§7.49 (4) Mass Spectrometry (MS)

Mass spectrometry (MS) uses a gas chromatograph or high-performance liquid chromatograph with a mass spectrometer detector.

Mass spectrometers work by ionizing molecules, then sorting and organizing them. A mass spectrometer's ion source generates the ions, and its mass analyzer sorts them. Different ion sources are suitable for different classes of compounds, and the laboratory configures the equipment to best suit its needs.

In the most common MS technique, electron impact (EI), the mass spectrometer bombards the sample with electrons as it leaves the stationary phase column, causing the sample to ionize and fragment in a characteristic and reproducible manner. See Saferstein, Criminalistics: An Introduction to Forensic Science, chap 5 (9th ed 2007). The ions released by the sample are focused and accelerated into a mass filter that allows fragments of sequentially increasing mass (molecular weight and makeup) to enter the detector. Charting the abundance of each mass at a given scan time produces a mass spectrum, which can give a total picture, called an ion chromatogram, of the fragments.

The process used for MS with HPLC is atmospheric pressure ionization (API), which ionizes molecules at atmospheric pressure before separating them from neutral molecules. The ionization can be performed using electrospray ionization (ESI), atmospheric pressure chemical ionization (APCI), or atmospheric pressure photo ionization (APPI). Some of the different mass analyzers available are quadrapole, triple quadrapole, ion trap, and time-of-flight.

An advantage of MS is that not only does the analysis generate a standard chromatogram in much the same way that standard GC or HPLC does, but also it generates a picture of the mass spectra for the drug of interest. Under the proper conditions, a particular drug will show a unique, individual fragmentation pattern. Saferstein, Criminalistics, chap 5. The mass analyzer in combination with other standard chromatographic instruments generates two kinds of reports instead of the one.

For further discussion of mass spectrometry, see Saferstein, Criminalistics, chap 5.

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III. DISCOVERY ISSUES

§7.50 A. Constitutional Discovery: *Brady*

The prosecutorial discovery obligation derives from two sources: constitutional and statutory. The Penal Code discovery provisions are discussed in §§7.51-7.53. The constitutional mandate was set forth in *Brady v Maryland* (1963) 373 US 83, 87, 10 L Ed 2d 215, 218, 83 S Ct 1194, which holds that "the suppression by the prosecution of evidence favorable to an accused … violates due process where the evidence is material either to guilt or to punishment, irrespective of the good faith or bad faith of the prosecution."

To trigger the prosecution's *Brady* obligation, the information must be "evidence," it must be "favorable" to an accused, and it must be "material." If these components exist, then the prosecutor has a duty to turn over evidence, voluntarily, to the defense. Prosecutors must voluntarily produce such evidence, even in the absence of a request for discovery from the defense. The court held "if the evidence is so clearly supportive of a claim of innocence that it gives the prosecution notice of a duty to produce, the duty should equally arise even if no request is made." *U.S. v Agurs* (1976) 427 US 97, 107, 49 L Ed 2d 342, 352, 96 S Ct 2392.

The California Supreme Court has set forth similar obligations: the prosecution must voluntarily and without request disclose to the defense substantial material evidence favorable to the accused. *City of Los Angeles v Superior Court* (2002) 29 C4th 1, 8, 124 CR2d 202; *In re Ferguson* (1971) 5 C3d 525, 532, 96 CR 594. The prosecution's duty is to disclose all substantial material evidence favorable to an accused, whether that "evidence relates directly to the question of guilt, to matters relevant to punishment, or to the credibility of a material witness." *People v Ruthford* (1975) 14 C3d 399, 406, 121 CR 261, overruled on other grounds in *In re Sassounian* (1995) 9 C4th 535, 545 n7, 37 CR2d 446. The prosecution, however, has no general duty to seek out information from other agencies or sources that might be beneficial to the defense, except for information that is reasonably accessible to the prosecution and not to the defendant. *Teal v Superior Court* (2004) 117 CA4th 488, 491, 11 CR3d 784; *People v Superior Court (Barrett)* (2000) 80 CA4th 1305, 1318, 96 CR2d 264. See also *In re Littlefield* (1993) 5 C4th 122, 135, 136, 19 CR2d 248.

This prosecutorial duty does not depend on the good or bad faith of the prosecutor. A violation will always result where material exculpatory evidence is not provided to a defendant. There is no good faith or inadvertence defense within the constitutional *Brady* discovery obligation. *Giglio v U.S.* (1972) 405 US 150, 153, 31 L Ed 2d 104, 108, 92 S Ct 763.

The material, exculpatory evidence must be provided "before trial." *U.S. v Nagra* (9th Cir 1998) 147 F3d 875, 881. California courts have held this to mean that the *Brady* evidence must be turned over to the defendant at a time that enables the defendant to use the disclosed material effectively in preparing and presenting his or her case. See *Roland v Superior Court* (2004) 124 CA4th 154, 162, 21 CR3d 151. If the prosecution delays in turning over the evidence, and the defendant is then not able to meaningfully use the evidence to prepare for trial, courts have held that delay to equate, in practical effect, to not turning over the discovery at all—a discovery violation. *U.S. v Zuno-Arce* (9th Cir 1995) 44 F3d 1420, 1427. The determination of whether or not the disclosure was timely will depend in part on the volume of materials disclosed. *U.S. v Gil* (2d Cir 2002) 297 F3d 93, 106.

The key element is whether or not the disclosure enables the defendant to make use of the material, exculpatory evidence that is turned over, in preparation for trial. When the prosecution discloses exculpatory favorable and material evidence to the defendant, in time for the defendant to make effective use of such evidence at trial, there is no *Brady* disclosure violation, even if the defendant would have liked to receive such evidence earlier. *U.S. v Anderson* (9th Cir 2004) 391 F3d 970, 976. The burden is on the defendant to prove that the untimely disclosure of *Brady* evidence, shortly before or at trial, has prejudiced the defendant, in that the defense was not able to effectively use the evidence in preparing for trial. See *U.S. v Jones* (8th Cir 1996) 101 F3d 1263, 1272. To assert prejudice, however, the defendant must have first sought a continuance from the trial court in order to prepare or use that evidence. If the defendant does not request a continuance of the trial, even when there is late production of *Brady* evidence, the court will not find prejudice because the court will assume that the defendant did not need additional time to make effective use of that evidence, and therefore the late disclosure was "timely."

The *Brady* prosecutorial discovery obligation continues through trial, such that material, exculpatory evidence must be disclosed immediately to the defendant during trial. *Gantt v Roe* (9th Cir 2004) 389 F3d 908, 912.

Although there is a constitutional due process mandate for prosecutors to supply defendants with material, exculpatory evidence, practitioners must keep in mind that there is no general constitutional right to discovery. Both the United States and California Supreme Courts have confirmed that outside the *Brady* duty to disclose material, exculpatory evidence, pretrial criminal discovery rules are *not* based on due process requirements. *Weatherford v Bursey* (1977) 429 US 545, 559, 51 L Ed 2d 30, 42, 97 S Ct 837; *People v Gonzalez* (1990) 51 C3d 1179, 1258, 275 CR 729, superseded by statute on other grounds as stated in *In re Steele* (2004) 32 C4th 682, 691, 10 CR3d 536.

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Source: Criminal Law/Scientific Evidence in California Criminal Cases/7 Forensic Toxicology and the Use of Drug Evidence in the Courtroom/ B. Statutory Discovery/§7.51 1. Proposition 115

B. Statutory Discovery

§7.51 1. Proposition 115

Proposition 115 was passed in June 1990. Proposition 115 (also known as the Crime Victims' Justice Reform Act) added both constitutional and statutory language authorizing reciprocal discovery in criminal cases. See Cal Const Art I, §30(c); Pen C §§1054-1054.7. The extent and manner of discovery in criminal cases is now governed by a statutory procedure, rather than left to the courts as it was before Proposition 115. Discovery occurs in criminal cases only as provided by statute, or as mandated by the Constitution of the United States. Pen C §1054(e). To accomplish this, Pen C §1054.5(a) provides:

No order requiring discovery shall be made in criminal cases except as provided in this chapter. This chapter shall be the only means by which the defendant may compel the disclosure or production of information from prosecuting attorneys, law enforcement agencies which investigated or prepared the case against the defendant, or any other persons or agencies which the prosecuting attorney or investigating agency may have employed to assist them in performing their duties.

The scope of discovery under the Penal Code is much broader than that found under the due process requirements set forth in *Brady*. Under the Penal Code, the prosecution must disclose all relevant real evidence seized or obtained as part of the investigation of the charged offenses, without regard to whether the prosecution intends to use the evidence in trial. Pen C §1054.1(c).

The Penal Code chapter on discovery added by Proposition 115 consists of the following:

- Section 1054.1, providing for defense discovery;
- Section 1054.3, providing for prosecutorial discovery;
- Section 1054.5, providing a mechanism for compelled discovery;
- Section 1054.6, providing that discovery shall not be required of work product or otherwise privileged information; and
- Section 1054.7, requiring disclosure at least 30 days prior to trial, placing a continuing duty to disclose on both prosecution and defense, and providing for denial of disclosure on a showing of "good cause."

Subsequently added sections concern protection of a victim or witness (Pen C §1054.8), discovery in aid of a postconviction writ of habeas corpus or motion to vacate judgment involving a sentence of death or life imprisonment (§1054.9), and disclosure of child pornography evidence (§1054.10).

The timing of discovery is set forth in Pen C §1054.7. Disclosures must be made at least 30 days before trial. When there is newly discovered evidence, disclosure must be made "immediately" if information or material becomes known or possessed within that 30-day period. If there is a discovery violation, a party may not request formal enforcement of discovery unless the opposing party has failed to provide discovery within 15 days after an informal request for discovery has been made of opposing counsel. Pen C §1054.5(b).

Proposition 115 also affected discovery at the preliminary hearing stage of criminal proceedings by amending Pen C §866 to provide that preliminary examinations are not be used for the purposes of discovery, adding Evid C §1203.1 to allow the finding of probable cause at a preliminary hearing to be based on hearsay testimony, and amending Pen C §872 to state that the probable cause finding may be based on the testimony of certain qualified law enforcement officers regarding the out-of-court statements by the declarant. Courts have been quick to clarify that this hearsay testimony cannot be "reader" testimony, it can only come from officers with certain training and experience. *Whitman v Superior Court* (1991) 54 C3d 1063, 1070, 2 CR2d 160. These changes expressly limit the defendant's ability to use a preliminary examination as a discovery device. Pen C §866(b); *Correa v Superior Court* (2002) 27 C4th 444, 452, 117 CR2d 27. See *People v Eid* (1994) 31 CA4th 114, 129, 36 CR2d 835.

All other discovery statutes, which were not specifically repealed by Proposition 115, remain viable law. *Albritton v Superior Court* (1990) 225 CA3d 961, 963, 275 CR 314.

The discovery statutes are limited in scope: they only apply to disclosure of materials between the prosecution and defense; they do not regulate discovery from third parties. *People v Superior Court (Barrett)* (2000) 80 CA4th 1305, 1313, 96 CR2d 264. Documents and records in the possession of nonparty witnesses and government agencies other than agents or employees of the prosecutor are obtainable by subpoena duces tecum. Penal Code §§1326-1327 set forth the procedure for either the prosecutor or defendant to obtain discovery records possessed by third parties. "A subpoena duces tecum does not require the party subpoenaed to provide the defendant with a copy of the materials sought, but does require that person or entity to produce the information in court for the defendant's inspection." 80 CA4th at 1315. Investigatory agencies that work on the case are considered part of the prosecution team. *Teal v Superior Court* (2004) 117 CA4th 488, 491, 11 CR3d 784; *Pacific Lighting Leasing Co. v Superior Court* (1976) 60 CA3d 552, 560, 131 CR 559.

The right of discovery in criminal cases is not absolute. Courts retain wide discretion to protect against the disclosure of information that might unduly hamper the prosecution or violate some other legitimate governmental interest. *People v Avila* (2006) 38 C4th 491, 606, 43 CR3d 1; *Pacific Lighting Leasing Co. v Superior Court* (1976) 60 CA3d 552, 560, 131 CR 559. For example, a public agency has a right to prevent disclosure of "official information" under Evid C §1040; however, when the Penal Code does not entitle a defendant to discover materials, it does not preclude a defendant from discovering materials through other means.

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§7.52 2. Prosecutorial Discovery Obligation

The prosecutor has a duty to disclose (Pen C §1054.1):

- Names and addresses of prosecution trial witnesses;
- All defendants' statements;
- All relevant real evidence seized or obtained in the investigation of charged offenses;
- Felony convictions of material witnesses whose credibility is likely to be critical to the outcome of the trial;
- Exculpatory evidence;
- Relevant written or recorded statements of prosecution trial witnesses;
- Reports of statements of prosecution trial witnesses;
- Names and addresses of prosecution trial expert witnesses;
- Reports or statements of prosecution trial expert witnesses; and
- Results of physical or mental examinations, scientific tests, experiments, or comparisons which the prosecution intends to offer at trial.

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§7.53 3. Defense Discovery Obligation

The defense's discovery obligation is set forth in Pen C §1054.3, and it is much more narrow than the prosecution's discovery obligation. *Hines v Superior Court* (1993) 20 CA4th 1818, 1824, 25 CR2d 712. The defense must disclose the names and addresses of persons, other than the defendant, who will be called to testify at trial. Pen C §1054.3(a)(1). Also the defendant must disclose any relevant written or recorded statements of intended witnesses (or reports of the statements of those persons), including any reports or statements of experts made about the case, including the results of physical or mental examinations, scientific tests, experiments, or comparisons that the defendant intends to offer in evidence at trial. The defendant must also disclose any real evidence that he or she intends to offer in evidence at the trial. Pen C §1054.3(a)(2). "Real" evidence is "testimony, writings, material objects, or other things presented to the senses that are offered to prove the existence or nonexistence of a fact." Evid C §140. Lastly, a defendant who places his or her mental state at issue in a case may be ordered to submit to a court-ordered mental examination at the request of the prosecution. Pen C §1054.3(b).

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§7.54 C. Prosecutor's Duty to Collect and Preserve Evidence

The prosecution has a due process duty to preserve material evidence that might give criminal defendants a meaningful opportunity to present a complete defense. Material evidence is defined as that evidence that might be expected to play a significant role in the defense. *California v Trombetta* (1984) 467 US 479, 488, 81 L Ed 2d 413, 422, 104 S Ct 2528.

Under *Trombetta,* there is a two-pronged materiality test. The first prong is that the evidence must have an exculpatory value that was apparent before the evidence was destroyed or discarded. The second prong requires that the defendant could not obtain comparable evidence by other reasonably available means. For evidence to be found constitutionally material, so that its destruction would be a due process violation, both elements of the *Trombetta* test must be met. *People v Von Villas* (1992) 10 CA4th 201, 240, 13 CR2d 62.

Even when evidence is material, its loss or destruction violates due process only when the prosecution, or those authorities working on behalf of the prosecution, could have expected that the evidence would have played a significant exculpatory role for the defense. A finding of bad faith is essential for a due process violation when the exculpatory value of the evidence is not apparent; bad faith can be found by actual knowledge of the expected role the exculpatory evidence would have played. *Arizona v Youngblood* (1988) 488 US 51, 57, 102 L Ed 2d 281, 289, 109 S Ct 333; *California v Trombetta* (1984) 467 US 479, 488, 81 L Ed 2d 413, 104 S Ct 2528. See *People v Johnson* (1989) 47 C3d 1194, 1233, 255 CR 569 (adopting *Trombetta*); *People v Cooper* (1991) 53 C3d 771, 810, 281 CR 90 (adopting *Youngblood*).

Under this standard, loss or destruction of known exculpatory evidence constitutes bad faith. When the exculpatory value of evidence is not known, the evidence is only potentially exculpatory and, thus, its loss or destruction does not constitute bad faith, nor does it violate the defendant's due process rights. *People v Cooper, supra.*

The prosecution does not have a due process duty to collect or seize potential evidence; the police and prosecution do not have a constitutional duty to conduct an investigation, collect evidence from a crime scene, collect evidence from a suspect, conduct witness interviews, or determine the identity of witnesses. See *People v Bradley* (1984) 159 CA3d 399, 405, 205 CR 485.

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§7.55 D. Discovery of Identification and Writings of Expert Witnesses

Expert witnesses are common to cases involving drug evidence. The disclosure of an expert's resource materials before trial is not constitutionally compelled; however, the Penal Code requires that the prosecution disclose to the defendant the names and addresses of all persons the prosecution intends to call as witnesses at trial, including the names and addresses of all trial expert witnesses. Pen C §1054.1(a). Further, the prosecution must disclose to the defendant "any reports or statements of experts made in conjunction with the case, including the results of physical or mental examinations, scientific tests, experiments, or comparisons which the prosecutor intends to offer in evidence at the trial." Pen C §1054.1(f).

PRACTICE TIP: Under Pen C §1054.1(f), it is not necessary that the reports or statements of expert witnesses be written or recorded for their disclosure to be required.

If a witness has used a writing to refresh his or her memory while testifying, or before testifying, the writing must be produced at the hearing at the request of the opposing party, who then has a right to inspect the writing. Evid C §771(a)-(b). Refusal to produce the writing of a testifying witness gives the court authority to preclude the witness from testifying, unless the inability to produce the material is not the expert's fault. Evid C §771(a), (c). See *People v Parham* (1963) 60 C2d 378, 381, 33 CR 497; *People v Young* (1970) 9 CA3d 106, 87 CR 767. This is limited to experts' reports and writings, though, because (except for the resource materials specifically listed in Pen C §1054.1(f)) any other resource materials used by an expert to reach conclusions are not subject to a pretrial order for discovery. In construing Pen C §1054.3 concerning the discovery obligation of the defense, the court of appeal held that resource materials such as professional texts, treatises, and scientific journal articles are *not* "reports or statements of experts made in connection with the case" and, thus, do not have to be turned over prior to trial. *Hines v Superior Court* (1993) 20 CA4th 1818, 1823, 25 CR2d 712. However, *Hines* further held that the disclosure required by Pen C §1054.3 "reasonably should include the original documentation of the examinations, tests, etc. [by experts]. Original documentation, including handwritten notes if that be the case, would seem often to be the best evidence of the test, experiment or examination." 20 CA4th at 1822. Further, "[a]n expert should not be permitted to insulate such evidence from discovery by refining, retyping, or otherwise reducing the original documentation to some other form." 20 CA4th at 1822.

PRACTICE TIP: Generally speaking, a discovery order for expert witness information will be found to fit within the statutory limitations and not be considered overbroad, so long as the order does not require disclosure of all random notes in the expert's file. A discovery order for reports on "findings" means the factual determinations of the expert from observations made during an examination, and such an order would not violate the terms of Pen C §1054.3. *Hines v Superior Court,* 20 CA4th at 1823.

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E. Sealed Affidavits and Confidential Informants

§7.56 1. Privilege for Identity of Confidential Informant

A public entity has a privilege to protect the identity of a person who has supplied information in confidence, directly or indirectly, to a law enforcement officer or an administrative agency enforcement official. Evid C §1041. Such a person is called either an "informer" or a "confidential informant." *People v Lanfrey* (1988) 204 CA3d 491, 497, 251 CR 189. Because the main justification for the privilege is the public interest in protecting the flow of information to law enforcement, the test for confidentiality in a particular case is not whether the subject informant demanded confidentiality or would be in physical danger if his or her identity was disclosed, but whether the "investigation is of such a type that disclosure.... would cause the public interest to suffer." *People v Otte* (1989) 214 CA3d 1522, 1532, 263 CR 393, quoting *Jessup v Superior Court* (1957) 151 CA2d 102, 108, 311 P2d 177.

The statutory privilege of nondisclosure does not apply to every informer. It applies only if (Evid C §1041(a)-(b)):

- The information is furnished in confidence to specified persons;
- An authorized person claims the privilege; or
- Disclosure is either prohibited by federal or state law or is against the public interest.

There is no requirement that the information be furnished as part of an ongoing relationship with authorities or in exchange for some benefit. *People v Lanfrey* (1988) 204 CA3d 491, 498, 251 CR 189.

To discover the identity of a confidential informant, there must first be a prima facie showing of materiality. A defendant seeking to discover the identity of an informant bears the burden of demonstrating that the informer would be a material witness on the issue of guilt, and that nondisclosure of his or her identity would deprive the defendant of a fair trial. *People v Garcia* (1967) 67 C2d 830, 839, 64 CR 110. That burden is met with a showing of a reasonable possibility that the anonymous informant whose identity is sought could give evidence on the issue of guilt that might result in the defendant's exoneration. *People v Lanfrey* (1988) 204 CA3d 491, 498, 251 CR 189. See *Honore v Superior Court* (1969) 70 C2d 162, 168, 74 CR 233.

Once a defendant has established a prima facie showing of materiality that would require the disclosure of the identity of the informant, the court must hold an in camera hearing (excluding defendant and counsel) on the issue if requested to do so by the prosecution. Evid C §1042(d). At the in camera hearing, the prosecution may offer evidence to aid the court in making its determination on whether there is a reasonable possibility that nondisclosure might deprive the defendant of a fair trial. Evid C §1042(d). If the court determines that an unfair trial might result, a hearing must be held including defendant and counsel. Based on the evidence presented at a hearing and the evidence presented at the in camera hearing, if the court concludes that there is a reasonable possibility that nondisclosure might deprive the defendant of a fair trial, the court may then order disclosure, strike the testimony of the witness who invokes the privilege, or dismiss the criminal proceeding. Evid C §1042(d).

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§7.57 2. Probable Cause Requirement

A defendant has no right to discover an informant's identity solely to attack a facially valid search warrant affidavit. The right arises only when the defendant shows a reasonable possibility that the informant is a witness to guilt or innocence. *People v Kurland* (1980) 28 C3d 376, 387, 168 CR 667.

Both the federal and state constitutions proscribe the issuance of a warrant without probable cause. US Const amends IV, XIV; Cal Const, art I, §13. A warrant is issued without probable cause when the supporting affidavit contains no competent evidence sufficient to support the magistrate's findings. *People v Campa* (1984) 36 C3d 870, 879, 206 CR 114; *People v Scoma* (1969) 71 C2d 332, 336, 78 CR 491. A motion to quash the search warrant is proper when the search or seizure was unreasonable because there was not probable cause underlying the issuance of the warrant. Pen C §1538.5(a)(2).

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§7.58 3. Evaluation of Sufficiency of Probable Cause

The criteria for determining the constitutional sufficiency of an affidavit in support of a search warrant is articulated in *Illinois v Gates* (1983) 462 US 213, 232, 76 L Ed 2d 527, 103 S Ct 2317. The court examines the "totality-of-the-circumstances" to determine the sufficiency of probable cause from an informant's tip. *Illinois v Gates,* 462 US at 230. Since veracity, reliability, and basis of knowledge are all intertwined and relevant, a deficiency in one may be compensated for by a strong showing as to the other, or by some other indicia of reliability. *Illinois v Gates* (1983) 462 US 213, 233, 76 L Ed 2d 527, 103 S Ct 2317; *People v Luttenberger* (1990) 50 C3d 1, 23, 265 CR 690.

Courts emphasize the need for independent police work to corroborate an informant's tip. See *Illinois v Gates* (1983) 462 US 213, 241, 76 L Ed 2d 527, 103 S Ct 2317; *Bailey v Superior Court* (1992) 11 CA4th 1107, 1113, 15 CR2d 17; *People v Mikesell* (1996) 46 CA4th 1711, 1716, 54 CR2d 708. This need for independent corroboration is even more important when the informer is a criminal "cooperating" with the police for pay or for consideration in a pending criminal case. *People v Smith* (1976) 17 C3d 845, 850, 132 CR 397; *People v Schmidt* (1980) 102 CA3d 172, 178, 162 CR 171. This type of information must be viewed with caution. *People v Rivas* (1985) 170 CA3d 312, 321, 216 CR 477, disapproved on other grounds in *People v Hobbs* (1994) 7 C4th 948, 955, 30 CR2d 651. An affidavit which relies on information from such a tipster must set forth underlying facts justifying the conclusion that the source is reliable or the information itself is credible. *People v Kurland* (1980) 28 C3d 376, 392, 168 CR 667. The credibility of a criminal informant may be shown by either reliable information given in the past with regard to criminal activity or the corroboration of the information presently given. *People v Schmidt,* 102 CA3d at 178. When an informant is untested, the corroboration must be of "criminal activity" and not of innocent activity or information of a general nature. 102 CA3d at 179. For example, when the incriminating evidence emanated from anonymous sources and the police investigation revealed only easily obtained facts and conditions existing at the time of the tip, probable cause did not exist. *Higgason v Superior Court* (1985) 170 CA3d 929, 938, 216 CR 817.

When a challenge to the finding of probable cause is brought, that finding is accorded great deference. A reviewing court will only inquire as to whether there was a substantial basis to conclude that the warrant would uncover evidence of crime. *Illinois v Gates* (1983) 462 US 213, 236, 76 L Ed 2d 527, 547, 103 S Ct 2317. Courts consider not only the facts known to the police, but also the reasonable inferences that can be drawn from the facts (*People v Superior Court (Haflich)* (1986) 180 CA3d 759, 766, 225 CR 762), and the fact that more than one reasonable inference could be drawn from the affidavit will not defeat the finding of probable cause. *People v Stanley* (1999) 72 CA4th 1547, 86 CR2d 89.

Challenges to a finding of probable cause are discussed in detail in California Criminal Law Procedure and Practice, chap 16 (Cal CEB Annual).

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IV. ADMITTING AND CHALLENGING DRUG EVIDENCE

A. Admitting Drug Evidence

§7.59 1. Possession

Unlawful possession of a controlled substance is established by proof that the defendant (1) exercised dominion and control over the substance, (2) knew of its presence, and (3) knew that the material was a controlled substance. *People v Groom* (1964) 60 C2d 694, 696, 36 CR 327. See CALCRIM 2304. These three elements may be established by circumstantial evidence and any reasonable inferences drawn from that evidence. *People v Groom* (1964) 60 C2d 694, 696, 36 CR 327; *People v Jackson* (1961) 198 CA2d 698, 704, 18 CR 214.

Possession may be actual physical possession or constructive possession. *People v Francis* (1969) 71 C2d 66, 75 CR 199. A defendant has constructive possession when he or she maintains control or a right to control the substance. A defendant also has constructive possession of a controlled substance that is in the physical possession of his or her agent or of any other person when the defendant has an immediate right to exercise dominion and control over the substance. Possession may be imputed when the substance is found in a location that is immediately and exclusively accessible to the defendant and subject to the defendant's dominion and control, or that is subject to the joint dominion and control of the defendant and another. 71 C2d at 71. Even if a defendant does not have exclusive control of the hiding place, possession may be imputed if the defendant has not abandoned the substance and no other person has obtained possession. *People v Showers* (1968) 68 C2d 639, 644, 68 CR 459.

Case law has also helped to clarify precisely what conduct is required to support a conviction for sale of a controlled substance. "Sell" means to transfer to another for a price. *People v Daniels* (1975) 14 C3d 857, 861, 122 CR 872. Therefore, evidence supporting a conviction for sale of a controlled substance is not limited to an exchange for cash. *People v Lazenby* (1992) 6 CA4th 1842, 1845, 8 CR2d 541.

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§7.60 2. Usable Quantity

It is well established that evidence of useless traces or residue of a controlled substance does not constitute sufficient evidence to sustain a conviction for possession of that substance. *People v Rubacalba* (1993) 6 C4th 62, 64, 23 CR2d 628; *People v Leal* (1966) 64 C2d 504, 512, 50 CR 777. This principle is limited to substances useless both in form and quantity. However, there is no requirement that any particular purity or potential narcotic effect be proven. *People v Rubacalba,* 6 C4th at 65.

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§7.61 3. Knowledge

To convict a person of any of the crimes related to controlled substances, the prosecution must show that the defendant had knowledge both of the character of the controlled substance and of its presence. *People v Daniels* (1975) 14 C3d 857, 860, 122 CR 872; *People v Francis* (1969) 71 C2d 66, 73, 75 CR 199; *People v Tripp* (2007) 151 CA4th 951, 957, 60 CR3d 534 (when evidence showed nothing other than spilled powder about size of the head of a pen on nightstand, this was insufficient to support knowledge of methamphetamine's presence). The knowledge element required for a possession charge has also been interpreted very broadly. See, *e.g.*, *People v Groom* (1964) 60 C2d 694, 696, 36 CR 327 (defendant's knowledge of narcotic character of cigarette inferred from his use of common slang words such as "joint" and his statement that if he was "just carrying one joint he would swallow it"). A defendant's false or misleading statements regarding incriminating circumstances also constitute evidence that may support an inference of consciousness of guilt, which would support a finding that the defendant knew about the presence and character of the substance. *People v Showers* (1968) 68 C2d 639, 643, 68 CR 459; *People v Redrick* (1961) 55 C2d 282, 288, 10 CR 823.

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§7.62 4. Intent

The charge of selling a controlled substance (Health & S C §11352) is a general intent crime and does not require proof of any specific mental state for a guilty verdict. It is sufficient for a conviction that the defendant intentionally did the act that the law declares to be a crime. No proof that the defendant intended to violate the law is required. *People v Daniels* (1975) 14 C3d 857, 861, 122 CR 872.

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§7.63 5. Aiding and Abetting

For a defendant to be found guilty of aiding and abetting a controlled substance crime, someone other than the defendant (the direct perpetrator) must be proven to have attempted or committed the subject crime. Accomplice liability is derivative; it arises only from an act by the perpetrator to which the defendant contributed. *People v Prettyman* (1996) 14 C4th 248, 259, 58 CR2d 827. Without proof of the predicate offense, a conviction on an aiding and abetting theory cannot be upheld. *People v Perez* (2005) 35 C4th 1219, 1225, 29 CR3d 423. Therefore, evidence of three elements must be found to prove aider and abettor liability (*People v Perez* (2005) 35 C4th 1219, 1225, 29 CR3d 423; *People v McCoy* (2001) 25 C4th 1111, 1117, 108 CR2d 188):

- The direct perpetrator's criminal act or omission (actus reus);
- The aider and abettor's mens rea, which is his or her knowledge of the direct perpetrator's criminal intent and an intent to assist in achieving that crime; and
- The aider and abettor's actus reus, which is conduct by the aider and abettor who actually assists the achievement of the criminal act.

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§7.64 6. Chemical Testing

When the indictment charges a controlled substance offense, proof of the identity of the substance is an essential element of the offense. The prosecution must not only prove that the substance is a controlled one, but it must also establish that it is the specific substance charged in the complaint. Despite this requirement, expert testimony, chemical analysis, or, in the case of plants, taxonomical examination is not required as a matter of law. Convictions for controlled substance offenses have been upheld when the identification of the substance was based solely on circumstantial evidence, such as in a case in which the substance was not recovered and therefore could not be analyzed. *People v Winston* (1956) 46 C2d 151, 155, 293 P2d 40; *People v Rios* (1954) 127 CA2d 620, 621, 274 P2d 163; *People v Candalaria* (1953) 121 CA2d 686, 689, 264 P2d 71.

As a general rule, proof of the corpus delicti or the crime itself may be by circumstantial evidence. *People v Alvarez* (2002) 27 C4th 1161, 1170, 119 CR2d 903; *People v Cullen* (1951) 37 C2d 614, 624, 234 P2d 1. Therefore, identification by chemical analysis of a controlled substance that has become unavailable at the time of trial is not required. *People v Winston* (1956) 46 C2d 151, 293 P2d 40; *People v Rios* (1954) 127 CA2d 620, 621, 274 P2d 163; *People v Candalaria* (1953) 121 CA2d 686, 689, 264 P2d 71. It is also not required that the identity of an entire substance in gross be established by chemical analysis; the identity of the substance in gross can be established by the identity of a sample. *People v Ibm* (1966) 247 CA2d 388, 392, 55 CR 599.

The general rule is that nonconsensual chemical testing does not violate any constitutional rights, so long as probable cause exists that the individual from whom the sample is taken has committed the offense of driving under the influence of alcohol, drugs, or a combination of both. Thus, chemical testing can be performed without a search warrant if the search is incident to an arrest, but the facts must clearly indicate that the incriminating evidence will be found and the chemical test or search must be performed in a reasonable manner. *Schmerber v California* (1966) 384 US 757, 764, 16 L Ed 2d 908, 916, 86 S Ct 1826.

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§7.65 7. Manufacturing

Under the statute prohibiting the manufacture of methamphetamine (Health & S C §11379.6), courts have held that the prosecution is not required to prove that the process was either completed or presently in progress. *People v Coria* (1999) 21 C4th 868, 874, 89 CR2d 650; *People v Hard* (2003) 112 CA4th 272, 278, 5 CR3d 107; *People v Lancellotti* (1993) 19 CA4th 809, 813, 23 CR2d 640. Therefore, evidence of the existence of methamphetamine is unnecessary. Likewise, under the statute proscribing the possession of a precursor with the intent to manufacture methamphetamine (Health & S C §11383.5(b)(2)), a defendant must possess the precursor to methamphetamine with the intent to participate personally in the manufacture of methamphetamine. The statute requires the person to have the "intent to manufacture methamphetamine," not the "intent that methamphetamine be manufactured." *People v Perez* (2005) 35 C4th 1219, 1228, 29 CR3d 423. However, to be guilty of manufacturing a precursor of methamphetamine, the precursor must be shown to be a substance specifically listed in Health & S C §11055(f).

In a case in which the defendant challenged his conviction for manufacturing phencyclidine (PCP) on the basis that the evidence only proved that he participated in the production of piperidine, a precursor to PCP, the court of appeal upheld the conviction. *People v Stone* (1999) 75 CA4th 707, 712, 89 CR2d 401. The court pointed out that the record clearly reflected that the defendant was engaged in the process of manufacturing piperidine as an intermediate step in his manufacture of PCP. When the evidence shows that a precursor was possessed or manufactured for the ultimate manufacture of an end product that is a controlled substance, the defendant can be convicted on that basis. 75 CA4th at 713.

However, in a case in which the defendant challenged his conviction for attempting to manufacture hashish under Health & S C §11379.6(a), the court reversed. See *People v Luna* (2009) 170 CA4th 535, 87 CR3d 781. The court found not even a slight act on the part of the defendant that went beyond preparation that could be regarded as the start of the commission of the intended crime. To begin manufacturing hashish, the defendant still had many steps to accomplish, including assembling the components of the manufacturing device and obtaining marijuana, the key ingredient. 170 CA4th at 543.

NOTE: When a chemical, such as butane, was used to extract marijuana resin for the manufacture of concentrated cannabis, Health & S C §11379.6(a), which proscribes the chemical extraction of a substance in the manufacturing of a controlled substance, applies over Health & S C §11358, a more general statute that punishes marijuana cultivation, harvesting, or processing. *People v Bergen* (2008) 166 CA4th 161, 82 CR3d 577.

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§7.66 8. Transportation

A conviction for transporting a controlled substance requires a showing that the controlled substance was moved from one location to another. *People v Rogers* (1971) 5 C3d 129, 133, 95 CR 601. However, evidence of only *minimal* movement while the substance is under the defendant's control is sufficient. *People v Ormiston* (2003) 105 CA4th 676, 682, 129 CR2d 567; *People v Emmal* (1998) 68 CA4th 1313, 1317, 80 CR2d 907.

It is not necessary that the defendant have had possession of the substance itself; a defendant may be convicted of constructively transporting a substance that remained in the exclusive possession of an agent. *People v Morante* (1999) 20 C4th 403, 417, 84 CR2d 665. The essential element of the offense of transportation is knowledge by the defendant of both the presence of the controlled substance and its character as a controlled substance. *People v Rogers* (1971) 5 C3d 129, 133, 95 CR 601. Although possession is commonly a circumstance tending to prove transportation, it is not an essential element of that offense and one may transport a controlled substance that is in the "exclusive possession of another," as long as defendant maintains some control over or right to control the substance. *People v Rogers* (1971) 5 C3d 129, 134, 95 CR 601.

Note that the Medical Marijuana Program provides an affirmative defense to the transportation of marijuana for those individuals entitled to the protections of the Compassionate Use Act (see §7.74). Health & S C 11362.765(b)(1); *People v Wright* (2006) 40 C4th 81, 85, 51 CR3d 80. See also *People v Trippet* (1997) 56 CA4th 1532, 1550, 66 CR2d 559 (the CUA provides an implied defense to the transportation of marijuana when the quantity transported and the method, timing, and distance of the transportation are reasonably related to the patient's current medical needs. See *City of Garden Grove v Superior Court* (2007) 157 CA4th 355, 68 CR3d 656 (due process requires return of medical marijuana after criminal offense of transportation dismissed).

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§7.67 9. Under the Influence

Being under the influence, under the California Vehicle Code, requires that the alcohol or drug affect the driver's nervous system, brain, or muscles, to appreciably impair his or her ability to drive a vehicle in a manner like that of an ordinarily prudent and cautious person in full possession of his or her faculties who is using care in driving under similar road conditions. Veh C §§23152-23153. See *People v Canty* (2004) 32 C4th 1266, 1278, 14 CR3d 1; *People v Torres* (2009) 173 CA4th 977, 982, 93 CR3d 303. Being under the influence of a controlled substance for the purposes other than the Vehicle Code offenses requires only a "detectable" affect; there need be no demonstrable impairment of physical or mental ability. *People v Canty*, *supra*.

Note that medical marijuana patients are not entitled to drive under the influence, and there is no affirmative defense to such charges. An officer has the power to detain a person when there is suspicion of being under the influence, issue field sobriety tests, and subjectively determine whether the detainee is under the influence. Any blood or urine test will determine the presence, but not the quantity, of THC present in a person's system.

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B. Challenging Drug Evidence

§7.68 1. Motions to Suppress

Both the federal and state constitutions proscribe the issuance of a warrant without probable cause. US Const amends IV, XIV; Cal Const, art I, §13. Penal Code §1538.5 provides the mechanism for a defendant to move to suppress evidence, tangible or intangible, obtained as a result of either an unreasonable warrantless search or seizure, or a search or seizure with a warrant that was unreasonable either in the manner in which the warrant was obtained or in the execution of the warrant. Motions to suppress are discussed in detail in California Criminal Law Procedure and Practice, chap 16 (Cal CEB Annual).

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§7.69 2. Challenging the Warrant

Any of the following may be grounds for challenging a warrant as unreasonable: (1) it is insufficient on its face; (2) the property or evidence obtained is not that described in the warrant; (3) no probable cause existed for the issuance of the warrant; (4) the method of execution of the warrant violated federal or state constitutional standards; or (5) there was any other violation of federal or state constitutional standards.

When a warrant is insufficient on its face, challenges based on lack of particularity can be brought. Under the Fourth Amendment, a warrant must particularly describe the place to be searched and the persons or things to be seized. This requires the warrant to be particular about both the place and the items, and, if it is not, a challenge can be brought based on the unreasonableness of the warrant. Cal Const art I, §13; Pen C §§1528(a), 1529.

A warrant lacking in probable cause can also be challenged. Probable cause exists when the information on which the warrant is based is such that a reasonable person would believe that what is being sought will be found in the location to be searched. *Wimberly v Superior Court* (1976) 16 C3d 557, 564, 128 CR 641. Under this standard, a nexus between the thing to be seized and the place to be searched must be shown in the affidavit for the court to find probable cause for issuing a search warrant. *People v Garcia* (2003) 111 CA4th 715, 721, 3 CR3d 895. In assessing probable cause, the court evaluates the totality of the circumstances set out in the affidavit. See §7.58 on evaluating probable cause. However, even when an affidavit supporting a warrant does not contain sufficient facts to establish probable cause, the evidence is *still admissible,* so long as the affidavit is not so wholly lacking in indicia of probable cause as to render the officer's belief in its existence entirely unreasonable. *Rodriguez v Superior Court* (1988) 199 CA3d 1453, 1463, 245 CR 617.

A warrant can also be attacked when the information in the affidavit is stale, rendering the warrant invalid. *People v Hirata* (2009) 175 CA4th 1499, 1504, 96 CR3d 918; *People v Hulland* (2003) 110 CA4th 1646, 1652, 2 CR3d 919. Long delays are justified only when there is evidence of an activity continuing over a long period of time, or the nature of the activity is such as to justify the inference that it will continue until the time of the search. *People v Medina* (1985) 165 CA3d 11, 20, 211 CR 216.

Affidavits of probable cause can also be challenged when the evidence contained in the affidavit was obtained from a prior illegal search (*People v Cook* (1978) 22 C3d 67, 78, 148 CR 605), or when the issuing magistrate was not neutral and detached (*Johnson v U.S.* (1948) 333 US 10, 13, 92 L Ed 436, 440, 68 S Ct 367).

An otherwise facially valid search warrant affidavit may be attacked on the ground that it contains deliberate or negligent misstatements. However, the Fourth Amendment does not compel exclusion of evidence obtained under a search warrant based on an affiant's deliberate falsehood. Rather, the deliberate falsehoods should be excised from the affidavit, and the affidavit retested. Only if the remaining content is insufficient to establish probable cause must the search warrant be voided and the fruits of the search excluded. If the warrant still establishes probable cause for the search after the improprieties have been excised, then the warrant will stand and the evidence need not be excluded. *Franks v Delaware* (1978) 438 US 154, 170, 57 L Ed 2d 667, 681, 98 S Ct 2674. See *People v Truer* (1985) 168 CA3d 437, 214 CR 869.

If it is determined that the warrant was flawed, it is not automatic that the evidence must be suppressed, as there are exceptions to the warrant requirement, including consent searches, car searches, and exigent circumstances. See California Judges Benchbook: Search and Seizure, chap 5 (2d ed CJER-CEB 2002). When the warrant is flawed and there are *no* exceptions to the warrant requirement present, there may still be an exception to the exclusionary rule so that the evidence seized will not be suppressed. Exceptions to the exclusionary rule include the attenuation doctrine, independent source doctrine, inevitable discovery rule, and the good faith exception. See, *e.g., Herring v U.S.* (2009) ___ US ___, 172 L Ed 2d 496, 129 S Ct 695 (negligent police error not enough in itself to require exclusion; police acted in good faith reliance on previously rescinded warrant). See Search and Seizure Benchbook, chap 1 (2d ed CJER-CEB 2002).

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§7.70 3. Challenging Execution of the Warrant

Even when the warrant is valid, the defense may challenge the search based on the execution of the search warrant. Possible bases for challenging the way police carried out the search include the following:

- Carrying out the search in a harassing manner;
- Police delay;
- Method of entry;
- Improper detentions or searches of persons on the premises;
- Seizure of items not named in the warrant; or
- Searching areas not authorized by the warrant.

Challenges based on the execution of a warrant are discussed in detail in California Criminal Law Procedure and Practice, chap 16 (Cal CEB Annual).

Police officers must "knock and announce" before entering the place to be searched, even when they have a warrant to search. *U.S. v Banks* (2003) 540 US 31, 157 L Ed 2d 343, 124 S Ct 521; *People v Mays* (1998) 67 CA4th 969, 973, 79 CR2d 519. However there are exceptions to this requirement when exigent circumstances exist, *i.e.,* the possibility of destruction of evidence or harm to officers and when the occupants are already aware of the police presence. *People v Gonzalez* (1989) 211 CA3d 1043, 1048, 259 CR 846; *People v Montenegro* (1985) 173 CA3d 983, 988, 219 CR 331. Further, the remedy for a knock-notice violation, when the search is conducted pursuant to an otherwise lawful warrant, is not exclusion of the evidence, but rather only a civil suit. *Hudson v Michigan* (2006) 547 US 586, 593, 165 L Ed 2d 56, 65, 126 S Ct 2159.

A search may be challenged when there is an improper use of force in executing the warrant. Under the Fourth Amendment, the test of the propriety of a search is whether it is reasonable. On that basis, any use of force will be evaluated under the circumstances to determine whether or not it was reasonable in the given situation. See California Judges Benchbook: Search and Seizure, chap 4 (2d ed CJER-CEB 2002).

The execution of a warrant may also be challenged when officers exceed the scope of the warrant because they either search for items not listed in the warrant or search places not particularly described in the warrant. While, generally, police may only do what the warrant authorizes, there are exceptions that permit police to seize items not named in the warrant, such as the plain view doctrine. The plain view doctrine permits seizure of items not named in the warrant if the incriminating nature of the item is readily apparent and if the item is in plain view. *Horton v California* (1990) 496 US 128, 133, 110 L Ed 2d 112, 110 S Ct 2301. See Search and Seizure Benchbook, chap 2 (2d ed CJER-CEB 2002).

NOTE: For a discussion of the execution of warrants and the application of the plain view doctrine for electronically stored information, see *U.S. v Comprehensive Drug Testing, Inc.* (9th Cir 2009) 579 F3d 989 (involving drug testing records) (see §14.57).

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C. Defenses to Drug Charges

§7.71 1. Defendant Has Lawful Prescription

If a defendant has a lawfully issued prescription, it is a complete defense to a charge of possessing, using, or transporting a controlled substance. See Health & S C §§11377(a), 11379(a). Anyone else who is properly in the chain of legal distribution of a controlled substance may also possess, use, transport, or furnish a substance for any legal purpose. The prescription defense must be pleaded and proven by the defendant. *People v Wallace* (1952) 109 CA2d 676, 679, 241 P2d 264. This will not suffice as a defense when the defendant has a prescription but is charged with selling to another who does not possess a prescription. *People v Hunt* (1971) 4 C3d 231, 235, 93 CR 197. But if the defendant lawfully obtained a controlled substance by prescription, more evidence is required to show possession for sale than if the substance had been obtained illegally. See, *e.g., People v Hunt, supra*. A physician who prescribes and furnishes a controlled substance to a patient without a legitimate medical purpose may also be prosecuted under the general sales statutes. A physician is not immune from prosecution, but may assert as defense that the prescription was given for a legitimate medical purpose. See Health & S C §11153. See also *People v Gandotra* (1992) 11 CA4th 1355, 1363, 14 CR2d 896. For physician-approved use of medical marijuana, see §7.74.

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§7.72 2. Momentary or Transitory Possession

A defendant may claim an affirmative defense of momentary or transitory possession, coupled with intent to dispose of the contraband. See *People v Martin* (2001) 25 C4th 1180, 108 CR2d 599. This is an affirmative defense to a possession charge that applies when the defendant has physical control over an illegal substance for only a momentary fleeting period of time for the purpose of throwing away or destroying the substance upon discovery of its true nature. 25 C4th at 1185. "Fleeting possession" is to be strictly construed, though, and will only apply where the possession is momentary or transitory and coupled with an intent to dispose. See *People v Paz* (2010) 181 CA4th 1413, 105 CR3d 556. There is no requirement that the defendant specifically intend to end someone else's unlawful possession of the contraband or prevent someone else from obtaining the contraband. See Bench Notes to CALCRIM 2305. This defense is covered in CALCRIM 2305 and, when raised, must be coupled with an instruction from the trial court that the defense has a preponderance of the evidence burden of proof for any affirmative defense raised. *People v Martin*, 25 C4th at 1192 n10.

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§7.73 3. Status as Person Addicted to Controlled Substance

Criminal penalties cannot be imposed on a defendant for nothing more than his or her status as a person addicted to a controlled substance. A state law that punishes a person afflicted with drug addiction as a criminal inflicts cruel and unusual punishment in violation of the Fourteenth Amendment. *Robinson v California* (1962) 370 US 660, 667, 8 L Ed 2d 758, 763, 82 S Ct 1417.

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Source: Criminal Law/Scientific Evidence in California Criminal Cases/7 Forensic Toxicology and the Use of Drug Evidence in the Courtroom/§7.74 4. Use of Medical Marijuana

§7.74 4. Use of Medical Marijuana

The use of medical marijuana in California was approved by the Compassionate Use Act of 1996 (CUA) codified in Health & S C §11362.5. The Act provides to "qualified patients" and their "primary caregivers" an affirmative defense to prosecution under California law for the possession and cultivation of marijuana. However, federally, marijuana is a controlled substance, schedule I drug. The federal government continues to prohibit the manufacture, distribution, and possession of marijuana, even for medical purposes, pursuant to its powers under the Commerce Clause of the U.S. Constitution (US Const art 1, §8, cl 3) in the federal Controlled Substances Act. *Gonzales v Raich* (2005) 545 US 1, 162 L Ed 2d 1, 125 S Ct 2195. The California medical marijuana provision is not a defense to federal marijuana charges. *Raich v Gonzales* (9th Cir 2007) 500 F3d 850, 860.

NOTE: On October 19, 2009 United States Attorney General Eric Holder issued a directive, handed down from President Obama, setting forth the opinion that patients in medical marijuana states, who are compliant with their state's laws, should not be federally prosecuted. However, this is not law, and is unenforceable in court. It is merely a suggestion from the Chief prosecutor of the nation.

The medical marijuana exemption applies to a patient with any condition for which marijuana provides relief and to such a patient's primary caregiver who possesses or cultivates marijuana for the personal medical needs of the patient on the oral or written recommendation or approval of a physician. See Health & S C §11362.5(d). Concentrated cannabis or hashish is included within the meaning of "marijuana" as that term is used in the CUA. 86 Ops Cal Atty Gen 180 (2003). The amount of marijuana that may be possessed or cultivated by a qualified patient or primary caregiver under the CUA is that amount that is "reasonably related to meet the patient's current medical needs." *People v Kelly* (2010) 47 C4th 1008, 1013, 103 CR3d 733; *People v Trippet* (1997) 56 CA4th 1532, 1549, 66 CR2d 559.

A physician gives "approval" for a patient's marijuana use within the meaning of the CUA if he or she expresses a favorable opinion of the use of marijuana for the treatment of the patient's illness. *People v Jones* (2003) 112 CA4th 341, 344, 4 CR3d 916 (defendant's testimony that doctor had told him that use of marijuana for migraine headaches "might help, go ahead" was sufficient to permit defendant to present a defense under CUA).

To assert primary caregiver status, a defendant "must prove at a minimum that he or she (1) consistently provided care, (2) independent of any assistance with the administration of medical marijuana, and (3) that the caregiving relationship arose at or before the time he or she assumed responsibility for assisting with medical marijuana." *People v Mentch* (2008) 45 C4th 274, 283, 85 CR3d 480 (defendant could not qualify as primary caregiver when caregiving consisted primarily of providing marijuana and instruction on its use). See also *People v Hochanadel* (2009) 176 CA4th 997, 1015, 98 CR3d 347 (storefront dispensary that merely provides walk-in customers with medical marijuana does not have type of "consistent" relationship necessary for primary caregiver status); *People v Windus* (2008) 165 CA4th 634, 643, 81 CR3d 227 (one who merely supplies patient with marijuana has no primary caregiver defense under CUA).

Qualified patients and their primary caregivers may associate in order to collectively or cooperatively cultivate marijuana for medical purposes. Health & S C §11362.775. See *People v Hochanadel* (2009) 176 CA4th 997, 1011, 98 CR3d 347 (Health & S C §11362.775 did not unconstitutionally amend CUA).

NOTE: In 2008, Attorney General Jerry Brown issued guidelines for the lawful operation of collectives and cooperatives organized to facilitate the collaborative efforts of patients and caregivers. The guidelines are available online at http://ag.ca.gov/cms_attachments/press/pdfs/n1601_medicalmarijuanaguidelines.pdf. While the guidelines do not have the force of law, they do represent the policy of the state's highest ranking law enforcement officer regarding the rights and responsibilities of patients and caregivers.

The CUA provides only an affirmative defense against *prosecution*, however, patients and caregivers can shield themselves from *arrest* for possession or cultivation of marijuana by participation in the voluntary medical marijuana identification card scheme created by the Medical Marijuana Program (MMP) of 2003. See Health & S C §11362.71.

NOTE: The MMP extended the availability of an affirmative defense to marijuana offenses that had not been previously specified in the CUA including Health & S C §11359 (possession for sale); §11360 (transportation); §11366 (maintaining a place for the sale, giving away or use of marijuana); §11366.5 (making available premises for the manufacture, storage or distribution of controlled substances); and §11570 (abatement of nuisance created by premises used for manufacture, storage or distribution of controlled substance). Health & S C §11362.765(a); *People v Wright* (2006) 40 C4th 81, 93, 51 CR3d 80.

The MMP established quantitative limits on the amount of marijuana a patient or primary caregiver can possess or cultivate unless a doctor specifically recommends that the limits do not meet the patient's needs or a city or county enacts guidelines permitting patients or primary caregivers to exceed the limits. Health & S C §113362.77(a)-(c). To the extent the MMP deprives people—who meet the definition of qualified patient and primary caregiver under the CUA—of the defense that he or she possessed or cultivated marijuana in an amount reasonably related to meet his or her current medical needs, it has been invalidated. *People v Kelly* (2010) 47 C4th 1008, 1049, 103 CR3d 733.

"Only the dried mature processed flowers of female cannabis plant or plant conversion shall be considered when determining allowable quantities of marijuana." Health & S C §11362.77(d). That is, the weight of leaves, roots, and stems is not considered under Health & S C §11362.77.

NOTE: When police seize an amount of marijuana possessed by a qualified patient in excess of the patient's medical needs, the patient is not entitled to a return of any of the marijuana, even if the patient is not convicted of a marijuana offense. *Chavez v Superior Court* (2004) 123 CA4th 104, 110, 20 CR3d 21. The patient, under those circumstances, does not possess that excess amount lawfully. On the other hand, when a patient is in lawful possession of the marijuana, he or she is entitled to the return of that marijuana once criminal charges have been dismissed. *City of Garden Grove v Superior Court* (2007) 157 CA4th 355, 388, 68 CR3d 656. If a judge denies the request for the return of the marijuana, the proper avenue of redress is through a writ of mandate, not appeal. *People v Hopkins* (2009) 171 CA4th 305, 308, 89 CR3d 744.

NOTE: Criminal defendants and probationers may request court approval to use medical marijuana while they are released on bail or probation. The court's decision and reasoning must be stated on the record and in the minutes of the court. Likewise, parolees who are eligible to use medical marijuana may request that they be allowed to continue such use during the period of parole. The written conditions of parole must reflect whether the request was granted or denied. Health & S C §11362.795.

It is not necessary for a person to obtain an identification card to claim the protections of the Compassionate Use Act of 1996; a patient or his or her primary caregiver may possess or cultivate marijuana for the personal medical purposes of the patient on solely the written or oral recommendation or approval of a physician, without being subjected to criminal liability under Health & S C §§11357-11358. Health & S C §11362.5(d). A physician's authorization to use marijuana for medical purposes can occur contemporaneously with possession, or even subsequent to possession but before use, if exigent circumstances are present. The protections of Health & S C §11362.5(d), however, do not extend to a physician's post-arrest ratification of the defendant's self-medication. See *People v Rigo* (1999) 69 CA4th 409, 81 CR2d 624.

A physician's recommendation or approval of the use of medical marijuana must be obtained before the defendant's arrest. A defendant may present to the jury a defense under the Compassionate Use Act notwithstanding the fact that the recommendation does not specify an approved dosage or amount of marijuana that the defendant may possess. The defendant may proffer at trial the opinion of a doctor that the amount of marijuana possessed meets his or her personal medical needs. *People v Windus* (2008) 165 CA4th 634, 81 CR3d 227.

With only a physician's recommendation and without an identification card, the defendant does not have immunity from arrest (nor the right to force an officer to cease execution of a search warrant). See Health & S C §11362.71(e). Instead, the patient has limited immunity from prosecution and would be allowed to raise his or her status as a qualified patient or primary caregiver as a defense at the preliminary hearing, in a pretrial Pen C §995 motion to dismiss or at trial. *People v Mower* (2002) 28 C4th 457, 473, 122 CR2d 326. The defense may also informally suggest that the court consider dismissal on the court's own motion in furtherance of justice under Pen C §1385. *People v Konow* (2004) 32 C4th 995, 1025, 12 CR3d 301.

NOTE: In a case brought by two California counties, the court rejected claims that California's statutory scheme governing identification cards is preempted by the federal Controlled Substances Act (21 USC §§801-904) and is invalid under the California Constitution. See *County of San Diego v San Diego NORML* (2008) 165 CA4th 798, 81 CR3d 461.

Doctors are also protected under the Compassionate Use Act of 1996. No physician in California may be punished or denied any right or privilege for having recommended marijuana to a patient for medical purposes. Health & S C §11362.5(c). As to caregivers, no professional licensing board may impose a civil penalty or take disciplinary action against a licensee based solely on the fact that the licensee has taken steps necessary to carry out the licensee's role as a designated primary caregiver to a person who is a qualified patient. Health & S C §11362.8.

NOTE: Nothing in its text or history suggests that voters intended the Compassionate Use Act to address the rights and duties of employers and employees. And further, California law permits an employer to require preemployment drug tests and to consider illegal drug use in making employment decisions. Thus, a plaintiff who was fired when a preemployment drug test revealed his physician-recommended use of marijuana for chronic pain could not state a cause of action against the employer for disability-based discrimination under the California Fair Employment and Housing Act (Govt C §§12900-12996) or for wrongful termination based on public policy. *Ross v RagingWire Telecommunications, Inc.* (2008) 42 C4th 920, 70 CR3d 382. Similarly, parents in dependency actions do not necessarily have to forego the use of medical marijuana; however, if the manner in which a parent uses medical marijuana represents a threat to the physical and emotional health and safety of the children, Child Protective Services can order drug counseling as part of the reunification plan. See *In re Alexis E.* (2009) 171 CA4th 438, 90 CR3d 44.

NOTE: On civil actions for the violation of the constitutional rights of a qualified medical marijuana patient, see *County of Butte v Superior Court* (2009) 175 CA4th 729, 96 CR3d 421.

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V. SENTENCING AND OTHER CONSEQUENCES OF CONVICTION

§7.75 A. Probation or Conditional Release

The purpose of probation is to rehabilitate the defendant. *People v Allen* (1975) 46 CA3d 583, 589, 120 CR 127, disapproved on other grounds by *People v Segura* (2008) 44 C4th 921, 935, 80 CR3d 715. Probation is not a defendant's right; rather, it is an option that rests within the sole discretion of the court. *People v Aubrey* (1998) 65 CA4th 279, 282, 76 CR2d 378; *People v Phillips* (1977) 76 CA3d 207, 213, 142 CR 658.

Probation is the suspension of the imposition or execution of a sentence and the order of conditional and revocable release of a convicted defendant from custody under the supervision of a probation officer. Pen C §1203(a). A "conditional sentence" means the suspension of the imposition or execution of a sentence and the order of revocable release of a convicted defendant into the community subject to the conditions established by the court without the supervision of a probation officer. Pen C §1203(a). Both a conditional sentence and probation are authorized whenever probation is authorized as a sentencing option for infractions or misdemeanors. Pen C §1203(a). After a felony conviction and before judgment is pronounced, if the defendant is eligible for probation, the matter will be referred to a probation officer who will report his or her recommendations as to the granting or denying of probation and the conditions of probation, if granted. Pen C §1203(b)(1)-(2).

A convicted defendant is eligible for probation unless a statute prohibits probation. See, *e.g.*, Pen C §§1203(e), 1203.07 (controlled substance offenses); Health & S C §11370 (controlled substance convictions). The court is required to make a finding to determine whether a defendant is eligible for probation. Some of the factors regarding the crime that courts will consider in making this finding include the following:

- The nature and seriousness of the crime;
- Whether the defendant was armed or used a weapon;
- The vulnerability of the victim;
- Whether the defendant inflicted physical or emotional injury;
- The degree of monetary loss to the victim;
- Whether the defendant was an active or passive participant;
- Whether the crime was committed because of an unusual circumstance, such as provocation, and whether that circumstance is likely to reoccur;
- Whether the manner in which the crime was carried out demonstrated criminal sophistication on the part of the defendant; and
- Whether the defendant took advantage of a position of trust or confidence to commit the crime.

Courts will also consider factors relating to the defendant, including the following:

- The defendant's prior record of criminal conduct;
- Prior performance on probation or parole as well as present parole or probation status;
- Willingness to participate and comply with probation;
- Family background and employment as well as the likely effect of imprisonment on the defendant and any dependants;
- The adverse collateral consequences on the defendant's life;
- Whether the defendant is remorseful;
- The likelihood that the defendant will be a danger to others if not incarcerated; and
- The extent to which the defendant has or has attempted to pay restitution to any victim.

When a defendant is charged with a specified controlled substance offense (see Pen C §1203.07(a)), the information or indictment must allege the existence of any fact that would make the defendant ineligible for probation, and this fact or issue must be either admitted by the defendant in open court or be found to be true by the jury trying the issue of guilt, or by the court when

guilt is established by a plea of guilty or nolo contendere, or by a trial by the court sitting without a jury. Pen C §1203.07(b). A sentencing court may grant probation to a defendant convicted of certain controlled substances felony offenses only in an unusual case when the interest of justice would best be served, but the court must specify on the record and enter into the minutes the circumstances of why the interests of justice would best be served by the grant of probation. Pen C §1203.073. When granting or denying probation, the judge must give his or her reasons for the sentencing choice. Cal Rules of Ct 4.406(b).

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§7.76 B. Proposition 36 Probation

On November 7, 2000, California voters approved Proposition 36, the Substance Abuse and Crime Prevention Act of 2000. Proposition 36 is intended to require probation with community-based substance abuse treatment for a defendant convicted of a nonviolent drug possession offense as opposed to incarceration. *People v Superior Court (Jefferson)* (2002) 97 CA4th 530, 118 CR2d 529. See also *People v Harris* (2009) 171 CA4th 1488, 1495, 91 CR3d 205. Proposition 36 overrides the court's traditional discretion in sentencing. *In re Taylor* (2003) 105 CA4th 1394, 1399, 130 CR2d 554.

With certain exceptions related to prior offenses (see Pen C §1210.1(b)), a defendant convicted of a "nonviolent drug possession offense" must receive probation conditioned on participation in and completion of an appropriate drug treatment program. Pen C §1210.1(a). A nonviolent drug offense is defined as the unlawful personal use, possession for personal use, or transportation for personal use of any controlled substance identified in Health & S C §§11054-11058, or the offense of being under the influence of a controlled substance in violation of Health & S C §11550. It does not include the possession for sale, production, or manufacturing of any controlled substance. Pen C §1210(a). While a defendant who is on probation for a nondrug offense may be eligible for Proposition 36 probation for a nonviolent drug possession offense committed while on that previously imposed probation (*People v Superior Court (Edwards)* (2007) 146 CA4th 518, 522, 52 CR3d 889), Proposition 36 will not prevent the revocation of that prior probation (*People v Guzman* (2005) 35 C4th 577, 25 CR3d 761). Proposition 36 does, however, provide for parolees—by prohibiting suspension or revocation of parole for committing a nonviolent drug possession offense while on parole. Pen C §3063.1.

NOTE: The authorized use of medical marijuana cannot, as a matter of law, support a finding of unamenability to drug treatment under Proposition 36. *People v Beaty* (2010) 181 CA4th 644, 659, 105 CR3d 76.

Proposition 36 is discussed in California Criminal Law Procedure and Practice, chap 38 (Cal CEB Annual).

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§7.77 C. Pretrial Diversion/Deferred Entry of Judgment

Pretrial diversion, also known as deferred entry of judgment (DEJ), is available as a sentencing alternative for certain controlled substance violations. See Pen C §1000(a). This program authorizes courts to divert a defendant from the normal criminal process when that defendant is charged with first-time drug possession, has not yet gone to trial, and is found to be suitable for treatment and rehabilitation at the local level. *People v Superior Court (On Tai Ho)* (1974) 11 C3d 59, 61, 113 CR 21. After DEJ is granted, the charges against the defendant will be dismissed if he or she successfully completes the treatment program during the period in which DEJ was granted. Pen C §1000.3. See *People v Popular* (2006) 146 CA4th 479, 484, 52 CR3d 708 (mere passage of time, without successful completion of treatment program, does not trigger dismissal of charges).

In addition to the requirement that the defendant have committed one of the eligible offenses, the court must also find that (Pen C §1000(a)(1)-(6)):

- The defendant does not have any prior controlled substance offenses (see *People v Ochoa* (2009) 175 CA4th 859, 96 CR3d 376 (error to find conviction for Health & S C §11357(b) rendered defendant ineligible for DEJ; record should have been destroyed after 2 years and could not be considered by court or prosecution for any purpose));
- The offense charged did not involve a crime of violence or threatened violence;
- There is no evidence of an offense relating to narcotics or restricted dangerous drugs other than the charged eligible offenses;
- The defendant's record does not indicate that probation or parole was ever revoked prior to completion or that he or she previously ever completed or was terminated from diversion or DEJ within 5 years before the alleged commission of the charged offense; and
- The defendant has no prior felony conviction within 5 years before the alleged commission of the charged offense.

After charges are filed, the prosecuting attorney must file a declaration in writing or state on the record his or her determination that the defendant is eligible or ineligible for DEJ and the reasons for that determination. Pen C §1000(b). The sole remedy for a defendant found ineligible for DEJ is a postconviction appeal. Pen C §1000(b); *Butler v Superior Court* (1998) 63 CA4th 64, 73 CR2d 504. The trial court has no power to conduct a judicial review of the determination or to "overrule" the prosecuting attorney's determination whether a defendant is eligible for pretrial diversion. *People v Sturiale* (2000) 82 CA4th 1308, 98 CR2d 865.

Diversion is not available where the offense charged involves a crime of violence or threatened violence, nor for a person who has been convicted of possession for sale, even of a small quantity. *Harvey v Superior Court* (1974) 43 CA3d 66, 117 CR 383, *People v Edwards* (1991) 235 CA3d 1700, 1707, 1 CR2d 631.

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Source: Criminal Law/Scientific Evidence in California Criminal Cases/7 Forensic Toxicology and the Use of Drug Evidence in the Courtroom/§7.78 D. Immigration Consequences

§7.78 D. Immigration Consequences

Criminal charges can have dire immigration consequences including deportation and inadmissibility for a noncitizen residing within California. When this is an issue, guidance should be sought from immigration attorneys experienced in these matters. Becoming deportable will subject noncitizen lawful permanent residents and others with ongoing lawful status, such as asylees or refugees or those persons here on professional work or school visas, to removal proceedings. The only available alternative for a noncitizen who is deemed deportable is to seek cancellation of removal under 8 USC §1229b(a) or to pursue reimmigration through a close citizen or permanent resident family member. To be eligible for cancellation of removal, the person must have resided in the United States for 7 years after admission in any status, must have been a permanent resident for 5 years, and must not have been convicted of an aggravated felony. 8 USC §1229b(a). The consequence of inadmissibility following a criminal conviction will hurt a person who is applying for some status or benefit from the government. However, a permanent resident who becomes inadmissible, but not deportable, is safe provided that he or she does not leave the United States, since one's status as inadmissable would bar reentry into the United States. Also, an inadmissible permanent resident cannot apply for naturalization to U.S. citizenship for 5 years. See 8 USC §1427.

With respect to controlled substance offenses, a conviction of any offense "relating to" controlled substances or attempt or conspiracy to commit such an offense causes deportability under 8 USC §1227(a)(2)(B)(I). See *Mielewczyk v Holder* (9th Cir 2009) 575 F3d 992, 996. A noncitizen who has been a drug addict or abuser since admission into the United States is deportable under 8 USC §1227(a)(2)(B)(ii) regardless of whether there is a conviction. Conviction of any offense "relating to" controlled substances or attempt or conspiracy to commit such an offense causes inadmissibility as well under 8 USC §1182(a)(2)(A)(i)(II). See *Hernandez-Aguilar v Holder* (9th Cir 2010) 594 F3d 1069, 1072. Drug addicts are inadmissible under 8 USC §1182(a)(1)(A)(iv). A noncitizen is inadmissible if immigration authorities have probative and substantial reason to believe that the person has been or has assisted a drug trafficker in trafficking activities, or if he or she is the spouse or child of a trafficker who knowingly (or reasonably should have known he or she) benefited from trafficking within the last 5 years. 8 USC §§1182(a)(2)(C). See *Bustamante v Mukasey* (9th Cir 2008) 531 F3d 1059, 1062. A noncitizen will also be inadmissible if he or she formally admits to all of the elements of a controlled substance conviction. 8 USC §1182(a)(2)(A)(i)(II).

A conviction for even a minor offense relating to a controlled substance (such as a charge of simple possession, being under the influence, or possession of paraphernalia) will make a noncitizen deportable and inadmissible, even if it is not an aggravated felony. See 8 USC §§1182(a)(2)(A), 1227(a)(2)(B)(ii). There is an exception, for one conviction of simple possession of less than 30 grams of marijuana or hashish, or being under the influence of those drugs. In such a case, the person is not deportable and a waiver of inadmissibility under 8 USC §1182(h) might be available. A first simple possession conviction, regardless of whether it is a felony or misdemeanor, is not considered an aggravated felony for the purpose of immigration proceedings. *Lopez v Gonzales* (2006) 549 US 47, 166 L Ed 2d 462, 471, 127 S Ct 625. However, an exception exists for possession of more than 5 grams of cocaine base (crack). *Lopez*, 166 L Ed 2d at 471 n4.

If the defendant has no prior controlled substance convictions, then a first conviction for simple possession (felony or misdemeanor) that is eliminated under rehabilitative provisions such as deferred entry of judgment (see Pen C §1000), Proposition 36 (see Pen C §1210.1), or Pen C §1203.4 is also eliminated for immigration purposes. *Lujan-Armendariz v INS* (9th Cir 2000) 222 F3d 728, 735. See also *Romero v Holder* (9th Cir 2009) 568 F3d 1054 (allowing guilty plea that preceded expungement to act as admission barring finding of good moral character contrary to reasoning of *Lujan-Armendariz*). The same applies when the first conviction is for an offense less serious than simple possession that does not have a federal analogue, such as being under the influence or possessing paraphernalia or for giving away a small amount of marijuana. *Jimenez Rice v Holder* (9th Cir 2010) 597 F3d 952, 956; *Cardenas-Uriarte v INS* (9th Cir 2000) 227 F3d 1132, 1136.

Offering to sell a controlled substance is not an aggravated felony drug-trafficking offense, but the actual sale of a controlled substance is an aggravated felony. Offenses such as convictions for violating Health & S C §11352(a), §11360(a), or §11379(a) are convictions under divisible statutes containing both offenses that are and are not a drug or drug-trafficking aggravated felony. If the record of conviction leaves open the possibility that the conviction was for offering, then the conviction is not considered an aggravated felony. *U.S. v Rivera-Sanchez* (9th Cir 2001) 247 F3d 905, 908. Therefore, defense attorneys should aim for the record of conviction to contain general language (and the plea should be phrased in the disjunctive so that it includes an offer to sell, distribute, and transport) in order to prevent the conviction from being considered an aggravated felony. However, "offering to sell" is not a good plea for an undocumented person, as opposed to a documented noncitizen, as it will make it almost impossible for the person to ever obtain lawful immigration status. Note also that while solicitation offenses are excluded from the definition of aggravated felony, they can nonetheless subject the person to removal for a conviction "related to" a controlled substance. See *Mielewczyk v Holder* (9th Cir 2009) 575 F3d 992, 996 (removal based on conviction for offering to transport heroin under Health & S C §11352(a) (distinguishing *Rivera-Sanchez*)). See also *Hernandez-Aguilar v Holder* (9th Cir 2010) 594 F3d 1069, 1072 (conviction under Health & S C §11379(a) qualified as basis for removal under 8 USC §1182(a)(2)(A)(i)(II) (following *Mielewczyk*)).

Transportation for personal use is included in Health and S C §§11352(a), 11360(a), and 1379(a), and it should not be found to be an aggravated felony for immigration purposes, since it does not involve trafficking and is not analogous to a listed federal offense. See *U.S. v Casarez-Bravo* (9th Cir 1999) 181 F3d 1074, 1077. Regardless, such a conviction will make the person inadmissible and deportable, so all pleas to a violation of these sections should be in the disjunctive. Possession for sale under

California law is an aggravated felony and is a deportable and inadmissible offense. *U.S. v Martinez-Rodriguez* (9th Cir 2007) 472 F3d 1087, 1094. Counsel should seek an alternate plea, such as pleading to a misdemeanor simple possession or under-the-influence charge. A charge of accessory after the fact can be a good alternate to pleading a noncitizen client to a drug offense. Being an accessory to a drug offense is not considered an offense relating to a controlled substance and, thus, does not make the noncitizen deportable or inadmissible on that basis. *In re Batista-Hernandez* (BIA 1997) 21 I&N Dec 955. It is also not considered an aggravated felony charge, provided the sentence is less than a year.

NOTE: Under Pen C §1016.5, a court may vacate a conviction only if the *trial court* failed to advise a defendant of potential adverse immigration consequences at the time of a plea of guilty or nolo contendere. A defendant may not use the statutory motion under Pen C §1016.5 to claim *defense counsel's* failure to provide adequate representation regarding immigration consequences. *People v Chien* (2008) 159 CA4th 1283, 72 CR3d 448. Defense counsel's duty to advise a defendant of the adverse immigration consequences of a plea fall within the ambit of the Sixth Amendment right to counsel. *Padilla v Kentucky* (2010) 559 US ___, 176 L Ed 2d 284, 130 Sp Ct 1473. When the law is not clear, counsel need do no more than advise the defendant that the charges may carry a risk of adverse immigration consequences but when the consequence is clear, counsel has a duty to give the correct advice.

Sentencing consequences for noncitizen defendants are discussed in California Criminal Law Procedure and Practice, chap 52 (Cal CEB Annual). See also Brady, Tooby, Mehr & Junck, Defending Immigrants in the Ninth Circuit: Impact of Crimes Under California and Other State Laws, chap 11 (10th ed 2007).

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E. Forfeiture

§7.79 1. Federal Forfeiture

Forfeiture is defined as government confiscation of property that was used to violate the law. *U.S. v Bajakajian* (1998) 524 US 321, 328, 141 L Ed 2d 314, 118 S Ct 2028. There are four types of forfeiture: (1) summary, (2) administrative, (3) criminal, and (4) civil judicial. Summary and administrative forfeiture are both nonjudicial, civil actions, meaning that they occur without the necessity of going to court. Summary forfeiture involves property to which no one can have a legal right, *i.e.,* illegal drugs. After the illegal drugs are seized and used as evidence, they are summarily forfeited to the state and destroyed. Administrative forfeiture is carried out by a government agency. Notice is given of the intent to forfeit the property to the government, and if no one comes forward to oppose the forfeiture, the property is automatically forfeited. See *U.S. v Cretacci* (9th Cir 1995) 62 F3d 307, 310. If someone opposes the forfeiture, it becomes a judicial forfeiture action. *Taylor v U.S.* (5th Cir 2007) 483 F3d 385, 387.

Criminal forfeiture can occur only after conviction. See 21 USC §853. Criminal forfeiture is "imposed at the culmination of a criminal proceeding and requires conviction of an underlying felony." 524 US at 328. Federal criminal forfeiture is a part of the sentence, and since it is punitive, it is subject to the Eighth Amendment prohibition on excessive fines. *U.S. v Bajakajian*, 524 US at 327, 141 L Ed 2d at 325. Unlike in civil forfeiture, the government can only seek forfeiture of the defendant's interest in the property. *U.S. v Certain Real Property Located at 2525 Leroy Lane* (6th Cir 1990) 910 F2d 343, 346. Civil forfeiture is an action against the property itself, and it is not conditioned on a criminal conviction.

Forfeitures are not punishment for the purpose of the Fifth Amendment double jeopardy clause, despite the fact that they are considered punishment subject to scrutiny under the Eighth Amendment. *U.S. v Ursery* (1996) 518 US 267, 286, 135 L Ed 2d 549, 567, 116 S Ct 2135. For purposes of the Excessive Fines clause of the Eighth Amendment, "the question is not … whether forfeiture … is civil or criminal, but rather whether it is punishment." *Austin v U.S.* (1993) 509 US 602, 610, 125 L Ed 2d 488, 498, 113 S Ct 2801. Under *Austin,* the prohibition of the Excessive Fines clause applies to both in rem civil forfeiture proceedings and to criminal forfeiture proceedings.

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§7.80 2. State Forfeiture

California provides for several types of forfeiture, civil in rem (Health & S C §§11469-11495), administrative (Health & S C §11488.4(j)), and criminal (Pen C §§186-186.8). In California, criminal forfeiture must be proved beyond a reasonable doubt. Pen C §186.5(d). Forfeiture under state law is discussed in California Criminal Law Procedure and Practice, chap 57 (Cal CEB Annual).

Law enforcement is the principal objective of civil in rem forfeiture under the Health and Safety Code. Potential revenue must not be allowed to jeopardize the effective investigation and prosecution of criminal offences, officer safety, the integrity of ongoing investigations, or the due process rights of citizens. Health & S C §11469(a). Under the guidelines set forth in the statute, law enforcement is required to seek to protect the interests of innocent property owners, guarantee adequate notice and due process to property owners, and ensure that forfeiture serves the remedial purpose of the law. Health & S C §11469(d), (j). A seizing agency must avoid any appearance of impropriety in the sale or acquisition of forfeited property. Health & S C §11469(f).

Whenever appropriate, prosecutors must seek criminal sanctions as to the underlying criminal acts that give rise to the forfeiture action. Health & S C §11469(c). Under the forfeiture provisions of the Health and Safety Code, the interest of an owner cannot be terminated unless the property in question was used for the unlawful purpose with his or her knowledge and consent. The burden of proof is on the state to establish beyond a reasonable doubt that the owner knowingly consented to the unlawful use. Health & S C §§11488.4(i), 11488.5(d)(1), (e). No forfeiture of seized property can be ordered unless and until there is a conviction for a specified offense. Health & S C §11488.5(e). Forfeitable assets are listed in Health & S C §11470.

A peace officer may also seize property without a warrant or other process when (Health & S C §11471):

- The seizure is incident to arrest;
- The property is seized during the course of a search pursuant to a search warrant;
- The property is subject to a prior judgment of forfeiture;
- There is probable cause to believe that the property is directly or indirectly dangerous to health or safety; or
- There is probable cause to believe that the property was used or intended to be used in violation of the Controlled Substances Act.

Additionally, any peace officer making or attempting to make an arrest for a violation of a Health and Safety Code section relating to the manufacture, sale or possession for sale, or offer or conspiracy to commit manufacturing crimes may seize all money and all other items of value that the officer believes are forfeitable under Health & S C §11470(a)-(f). Health & S C §11488.

If forfeiture proceedings are not initiated within 15 days after seizure, and the property is not being held for evidence, the property must be returned to the person designated in the property receipt. If the property is a vehicle, boat, or aircraft, it is returned to the registered owner. Health & S C §11488.2. A defendant may move for the return of seized property under Pen C §1538.5, which sets forth the procedure for doing so. The defendant may move for the return of seized property prior to, or at, the preliminary examination on the ground that there is no probable cause to believe the property is forfeitable under Health & S C §11470.

If the defendant's motion for return of property is granted, the state has 15 days to challenge the court's ruling by filing a petition for a writ of mandate or prohibition. Health & S C §11488.4(h). If the defendant is found guilty of the underlying offense, the issue of forfeiture is tried by the same judge or jury that decided the underlying criminal case. At the forfeiture trial, the state has the burden of proving beyond a reasonable doubt that the assets in question are subject to forfeiture. Health & S C §11488.4(i). See *People v $10,153.38 in U.S. Currency* (2009) 179 CA4th 1520, 1525, 102 CR3d 584 (when value of property is less than $25,000 and conviction in underlying criminal case is required for forfeiture, Health & S C §11488.4(i)(3) and (5), require trial of forfeiture issue in conjunction with trial of underlying criminal case).

If a person other than the defendant claims an interest in seized property, he or she must file a verified claim to the property in the superior court where the underlying criminal action is pending. The notice must be filed within 30 days of the first publication of the notice of seizure, if that person was not personally served or served by mail, or within 30 days after receipt of actual notice. Health & S C §11488.5(a)(1). If no claims of interest are filed within the prescribed time period, and the defendant is convicted of any of the offenses providing for forfeiture, then the court, on motion by the state, must declare the seized property forfeited. Health & S C §11488.5(b).

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8

Trace Evidence and Gunshot Residue

Judge Gregory A. Dohi, Los Angeles Superior Court

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I. DEFINITIONS AND BASIC ISSUES

§8.1 A. Trace Evidence Defined

Every time a criminal steps into a room, picks up an object, or comes into contact with a victim, he or she inevitably leaves a trace. The French criminalist Edmond Locard, director of the first modern crime lab, put forward the Locard Exchange Principle: "Whenever two objects come into contact, they exchange material." Thornton & Peterson, *The General Assumptions and Rationale of Forensic Identification,* in Faigman, Kaye, Saks, Sanders & Cheng, Modern Scientific Evidence: Forensics (2006). The great American forensic scientist Paul L. Kirk vividly restated Locard's principle: "Wherever he steps, whatever he touches, whatever he leaves, even unconsciously, will serve as a silent witness against him. Not only his fingerprints or his footprints, but his hair, the fibers from his clothes, the glass he breaks, the tool mark he leaves, the paint he scratches, the blood or semen he deposits or collects. All of these, and more, bear mute witness against him." Kirk, Crime Investigation (2d ed 1974).

Criminalists use the term *trace evidence* to refer to evidence that is small in size, particularly evidence that requires the use of a microscope for analysis. Typical items of trace evidence are hairs, fibers, glass fragments, soil, and plant material. The term is something of a catchall for types of evidence that don't fall into more specific classifications. For example, a smudge of paint from a suspect's shoe is considered trace evidence, but the shoeprint itself is classified as impression evidence; the shaft of a suspect's hair is trace evidence, but DNA from the hair root is DNA evidence.

As DNA detection becomes more sensitive, criminalists will increasingly turn to trace evidence samples as potential sources of DNA evidence. For example, the small boxes used to hold trace evidence scraped off clothing can often contain enough cellular material for DNA analysis. Stouder, Reubush, Hobson & Smith, *Trace Evidence Scrapings: A Valuable Source of DNA?,* 3 (4) Forensic Sci Comm (Oct. 2001). For discussion of DNA evidence, see chap 5.

The key issue with trace evidence is whether the evidence in question reveals links between people, places, and things. To establish those links, criminalists compare materials found at a crime scene with known samples to determine whether they are—to use an expression commonly found in criminalists' reports—"consistent with having a common origin."

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§8.2 B. Recurring Themes in Analysis

Although the term *trace evidence* applies to a wide range of items, from microscopic gunshot residue particles to broken glass, certain themes recur in the forensic analysis of trace evidence.

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§8.3 1. Absence of Impressive Numbers

Lay people presented with scientific evidence may expect "matches" expressed in the type of mind-boggling statistical terms associated with DNA evidence. See, *e.g., McGrew v State* (Ind 1997) 682 NE2d 1289, 1291 ("The defendant then questioned the analyst about the statistical error ratio for hair comparison as compared to the statistical error ratio for blood/DNA typing").

Trace evidence simply does not lend itself to the same mathematical expression or degree of certainty. Unlike DNA evidence, which comes from a unique source, trace evidence—even human hair—comes from items that are mass-produced. As former FBI criminalist Max M. Houck notes, "The ability to individualize, that is, reduce the membership of a set to one unique object, rarely happens in trace evidence." Houck, *Statistics and Trace Evidence: The Tyranny of Numbers,* 1(3) Forensic Sci Comm (Oct. 1999). (This article can be viewed online at http://www.au.af.mil/au/awc/awcgate/fbi/houck.htm.) As a result, trace evidence specialists must express their conclusions in less-than-definitive terms. The most that can be said after microscopic examination of a head hair found at a crime scene, for example, is that it is "consistent with" a suspect's hair.

Overzealous lawyers have been known to press their criminalist witnesses to state conclusions regarding trace evidence in more definitive terms than the science supports. See, *e.g., McCarty v State* (Okla Crim App 1988) 765 P2d 1215, 1219 n1 (prosecutor quoted as having said that an expert "is not a whole lot of value to you… if he's not willing to say, 'After examining all of the evidence, in my opinion, these hairs came from this man,' or 'Yes, this man was present'"); see also *Troedel v Wainwright* (SD Fla 1986) 667 F Supp 1456, 1459 (gunshot residue expert admitted that he was "pushed" further in his analysis at defendant's trial than at codefendant's trial).

But the inability to express findings in terms of probabilities in the quintillions does not rob trace evidence of its value. Trace evidence can help explain the mechanics of how a crime was committed and can corroborate other kinds of evidence, such as eyewitness accounts or motive evidence. As Max M. Houck argues (Houck, *Statistics and Trace Evidence: The Tyranny of Numbers*, 1(3) Forensic Sci Comm (Oct. 1999) at http://www.au.af.mil/au/awc/awcgate/fbi/houck.htm):

[T]race evidence can rarely tell us *who* definitively, but often it can answer something much more helpful: How. Knowing, for example, that the red carpet fibers found in the stolen white vehicle are consistent with the carpeting in the subject's car and that the white paint from the stolen vehicle is consistent with the paint found on the clothing of the hit-and-run victim whose clothing produced a fabric imprint in the stolen vehicle's hood provides a clear series of events that can be checked against witness descriptions. Cross-transfers … additionally cement the relationship between two or more people, places, or things. This accumulation of independent transfers of paint, glass, hairs, and fibers makes intuitive sense to a jury, just as it does to trace analysts.

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§8.4 2. Detection

By definition, trace evidence involves small particles—in many cases, microscopic particles—that are easy to miss. It would be virtually impossible, for example, to check every inch of a cluttered three-bedroom house for hairs and fibers, especially given the extremely limited resources that most overburdened police crime labs can bring to bear on any single crime scene. Generally speaking, the inability of a criminalist to find meaningful trace evidence is not evidence that a particular event did not happen. In the words of astronomer Carl Sagan, "Absence of evidence is not evidence of absence."

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§8.5 3. Reproducibility

A vast array of factors can affect the way in which extremely small particles are transferred in uncontrolled environments. The number of gunshot residue (GSR) particles detected on a suspect's shirt, for example, can depend on factors such as the precise amount of primer in a particular cartridge; the size of the apertures in a specific gun; the humidity, wind, and temperature; the angle at which the gun was pointed; the weave of the shirt fabric; the way in which the shirt was folded; the amount of time between the shooting and the GSR sampling; the manner in which police sampled the shirt; and the stickiness of the "stub" used to sample the shirt. No laboratory, no matter how well equipped, can duplicate all conditions. The sheer number of variables involved in particle transfer can make it virtually impossible for a trace evidence specialist to design experiments that re-create exactly the circumstances of a crime. As a consequence, trace evidence experts can rarely prove any hypothesis to an absolute certainty through experimentation.

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§8.6 4. Contamination

The small particles involved in trace evidence can be easy to lose and easy to transfer. A patrol officer might walk through a crime scene and accidentally leave behind soil from the soles of her shoes, distorting the value of any soil evidence recovered from the scene. A paramedic might accidentally crush glass shards at a crash site, making it difficult to match the glass fragments from the scene to a suspect's broken headlamp. A detective might handle a pair of pants with his bare hands and inadvertently transfer gunshot residue particles from his own recently test-fired weapon. Evidence can get contaminated when an officer transports it in a patrol car, when a property officer books it into evidence at the station, or when a criminalist tests it at the lab. The possibility of contamination makes conclusions regarding trace evidence particularly vulnerable to attack.

Evidence gatherers such as police officers and crime scene technicians must take extreme care in protecting crime scenes, collecting the evidence, and packaging the evidence appropriately. For example, when gathering clothing, police should require a suspect to undress while standing on clean wrapping paper, and the clothing should be stored in paper bags because the use of plastic bags may result in mildew. Fisher, Techniques of Crime Scene Investigation (7th ed 2003).

Evidence testers must scrupulously follow protocols for examining and storing evidence and clearly document the chain of custody. Failure to follow protocols can result not only in the contamination of evidence, but also in its outright destruction. If, for example, detectives send a gun for fingerprint testing before it is examined for trace evidence, then any trace evidence that could have been found on the gun, such as fibers or blood spatter, will probably be lost in the course of the fingerprint processing. See Fisher, Crime Scene Investigation; see also Scientific Working Group on Materials Analysis (SWGMAT) Evidence Committee, *Trace Evidence Recovery Guielines*, Rev Jan. 1998, 1 (3) Forensic Sci Comm (Oct. 1999) (available online at http://www.fbi.gov/hq/lab/fsc/backissu/oct1999/trace.htm.) Most evidence collection protocols are recommendations; the failure to follow protocol generally goes to the weight, not the admissibility, of the collected evidence. *People v Williams* (2002) 28 C4th 408, 414, 121 CR2d 854.

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§8.7 5. Observation Versus Interpretation

Lay people often associate science with objectivity and certainty. But the examination of trace evidence, which ultimately concerns itself with a conclusion as to whether two or more objects share a common origin, by necessity involves a subjective aspect—a judgment call. Like the fingerprint expert, the trace evidence specialist is called on not just to observe objective phenomena, but to provide a subjective opinion about it: to make or disprove a match. A glass expert, for example, can testify about objective facts revealed by her examination of bits of glass found in a suspect's hair—that the glass had a certain shape, a certain color, and a certain refractive index—but the jury really wants to know whether *in her opinion* those bits of glass match the broken window pane from the victim's house. The element of subjectivity means that it is possible for two experts to examine the same items and come to different conclusions.

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II. BASIC TOOLS

A. Microscopes

§8.8 1. Stereomicroscope and Compound Microscope

Almost by definition, trace evidence analysis involves the use of microscopes.

Once an item potentially bearing trace evidence, such as a swatch of fabric or a piece of carpet, has been delivered to a crime laboratory, the criminalist's first step might be to look at the item with a *stereomicroscope.* The stereomicroscope is essentially two microscopes, one for each eyepiece; the two light paths produce a three-dimensional image of the observed object, which can be helpful when trying to tease out a single fiber or hair from a carpet swatch. Stereomicroscopes usually have low magnification (16-25 times) and a wide field of vision.

If the criminalist finds something of interest with a stereomicroscope, the next step is often to inspect the item with a more powerful *compound microscope,* similar to the kind used in college science labs. Compound microscopes feature two or more magnifying lenses and come with a variety of features, such as rotating lenses on a circular nosepiece, filters, different light sources, and ultraviolet light. Among the different types of illumination used with compound microscopes are *bright field* (*i.e.,* illumination from below with white light) and *reflected light.*

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§8.9 2. Comparison Microscope

The *comparison microscope* is essentially two compound microscopes connected by an optical bridge. A comparison microscope allows the viewer to compare two different samples simultaneously at a magnification of 50-400 times. When the observer looks into the binocular eyepiece, he or she will see a "split screen," and will be able to examine two items—the unknown and the known items—in one field.

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§8.10 3. Polarized Light Microscope (PLM)

Polarized light microscopes (PLMs) are compound microscopes with two polarizing lenses. These polarizers reduce glare and produce sharper images, just as polarized sunglass lenses do. Criminalists can use PLMs to measure *birefringence*—the difference between an object's two or more refractive indices—and thereby identify the presence of certain minerals.

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§8.11 4. Microspectrophotometer

Microspectrophotometers are compound microscopes attached to spectrophotometers that can give precise information regarding color, a key issue in comparing dyed fibers.

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§8.12 5. Scanning Electron Microscope (SEM)

The *scanning electron microscope* (SEM) does not use light at all; it uses a beam of electrons to produce an image. The SEM can reveal extraordinary detail: it can magnify an object up to several thousand times, as opposed to a maximum magnification of about 600 times with an optical microscope. The electron beam also causes the object observed by an SEM to emit X-rays, which can be measured through a technique called *energy dispersive spectroscopy* (EDX) to determine the trace elemental composition of the items under examination. The SEM-EDX is the tool of choice for the detection and analysis of gunshot residue particles.

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§8.13 B. Gas Chromatograph-Mass Spectrometer or Infrared Spectroscope

Criminalists often have to determine which elements make up a substance such as a paint chip, a soil sample, or a glass fragment. In addition to the SEM-EDX (see §8.12), scientists often use a *gas chromatograph-mass spectrometer* or a *infrared spectrometer* to analyze organic substances such as drugs or combustible materials. The Scanning Electron Microscope (SEM-EDX) can also be used to examine inorganic substances.

NOTE: A technique called *Raman spectroscopy* has a number of forensic applications, including drug detection and the analysis of the components of saliva, ink, blood, and fibers. Raman spectroscopy has yet to find its way into most forensic labs.

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III. HAIR

§8.14 A. Composition and Structure

Hair, an outgrowth of the skin of mammals, is made of the protein keratin. Human hair has three layers: the *cuticle* (the shingle-like scales on the surface of the hair), the *cortex* (the middle layer, which determines color), and the *medulla* (the canal running through the center of the hair shaft). In addition to examining features of the three layers such as color and the continuity of the medulla, criminalists also look at the *root shape* and the *tip shape*. Deedrick & Koch, *Microscopy of Hair, Part I: A Practical Guide and Manual for Human Hairs,* 6(1) Forensic Sci Comm (July 2004). (You can view this article online at http://www.fbi.gov/hq/lab/fsc/backissu/jan2004/research/2004_01_research01b.htm.)

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§8.15 B. Growth Phases

Hair growth has three phases. In the *anagen* phase, the hair is actively growing. In the *telogen* phase, the hair lies dormant. The transition period between the anagen and telogen phases is the *catagen* phase. At any given time, 10-18 percent of the hairs on a human head are in the telogen (dormant) phase, which is when they are shed most easily. Scalp hair grows at a rate of about a centimeter a month; it grows for about 1000 days and then lies dormant for about 100 days. Deedrick, *Hairs, Fibers, Crime, and Evidence*, *Part 1: Hair Evidence,* 2(3) Forensic Sci Comm (July 2000). (You can view this article online at http://www.fbi.gov/hq/lab/fsc/backissu/july2000/deedric1.htm.)

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§8.16 C. Types of Human Hair

Human hairs from different parts of the body have different characteristics. Head hairs are straighter and generally longer than other hairs. They have fragmentary or no medulla, and they can show razor cuts and dyes. Pubic hairs twist and generally have thicker diameters and medullas. Limb hairs have tapered tips and arc shapes. Mustache and beard hairs can have triangular cross-sectional shapes and thick medullas. The characteristics of chest hairs fall somewhere between those of pubic and limb hairs.

According to FBI criminalist Douglas W. Deedrick, head and pubic hairs have the greatest forensic value. Pubic hairs are not subject to as much change as head hairs over time; a sample taken a year or more after a crime may still be suitable for meaningful comparison purposes. Other body hairs, such as underarm hairs, nose hairs, and eyelashes, are generally not suitable for microscopic comparison; they may, however, have some evidentiary value in corroborating other evidence. Deedrick, *Hairs, Fibers, Crime, and Evidence*, *Part 1: Hair Evidence,* 2(3) Forensic Sci Comm (July 2000). (You can view this article online at http://www.fbi.gov/hq/lab/fsc/backissu/july2000/deedric1.htm.)

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§8.17 D. Racial Differences

Forensic examiners use the (politically incorrect) terms Caucasoid (European ancestry), Mongoloid (Asian ancestry), and Negroid (African ancestry) to distinguish hairs from people of different racial origin. Head hairs are generally considered most useful for determining race. Criminalists look at the shape of the hair, its coarseness, the thickness of the cuticle and the medulla, and the size and density of pigment granules in determining racial origin. Hairs from individuals of mixed racial ancestry may possess characteristics attributed to more than one racial group. Deedrick, *Hairs, Fibers, Crime, and Evidence*, *Part 1: Hair Evidence*, 2(3) Forensic Sci Comm (July 2000). (You can view this article online at http://www.fbi.gov/hq/lab/fsc/backissu/july2000/deedric1.htm.) Hairs may also bear age and gender differences. The hair of infants, for example, is generally finer than that of adults. Longer, dyed hairs are more common among women than men in North America. The chromosomes of sheath cells from hair roots can also be analyzed to determine gender. Deedrick, *supra*.

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§8.18 E. Use of Force

The presence of sheath cells during a microscopic examination of the hair root can indicate that the hair was pulled out forcibly. Fisher, Techniques of Crime Scene Investigation (7th ed 2003). Forcibly removed hairs exhibit stretching and damage to the root area and may have tissue attached; hairs that fall out naturally, by contrast, have club-shaped roots. Deedrick, *Hairs, Fibers, Crime, and Evidence, Part 1: Hair Evidence*, 2(3) Forensic Sci Comm (July 2000). (You can view this article online at http://www.fbi.gov/hq/lab/fsc/backissu/july2000/deedric1.htm.)

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§8.19 F. Postmortem Hair

Hairs from a decomposing body may feature a dark band near the root. Linch & Pralow, *Postmortem Microscopic Changes Observed at the Human Head Hair Proximal End,* 48 (1) J Forensic Sci (Jan. 2001).

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§8.20 G. Animal Hair

Criminalists can distinguish between human and animal hair by examining the shape and size of the medulla. Because hair with thicker medullae acts as better insulation, the diameter of the medulla in animal hair tends to be greater than that of human hair. Criminalists can also analyze the hair cuticle to distinguish human from animal hair. Both human and animal hair can exhibit *coronal* (crown-like) cuticle patterns, but human hair can also have a fine pattern of overlapping cuticles called *imbricate,* and animal hair often has *spinous* (spiny) cuticle patterns. Scientists cannot, however, determine whether a hair comes from an individual animal based solely on microscopic comparison. Deedrick & Koch, *Microscopy of Hair, Part II: A Practical Guide and Manual for Animal Hairs*, 6(3) Forensic Sci Comm (July 2004); available at http://www.fbi.gov/hq/lab/fsc/backissu/july2004/research/2004_03_research02.htm.)

Identifying the species of origin of animal hair is not easy. In proficiency tests of crime labs conducted over an 11-year period, the average successful identification rate was about 50 percent. Peterson & Markham, *Crime Laboratory Proficiency Testing Results, 1978-1991, I: Identification and Classification of Physical Evidence,* 40 (6) J Forensic Sci (Nov. 1, 1995).

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§8.21 H. Techniques of Microscopic Hair Comparison

Hairs can be collected by picking, taping, scraping, or vacuuming them from an underlying item. A criminalist uses a stereomicroscope to examine the hair's external physical features, such as shape, pigment, and razor cuts. In order to see into the hair and examine internal structures, the criminalist may place a drop of a substance on the sample hair, such as Canada balsam or methyl salicylate (wintergreen oil), which has about the same refractive index as the cuticle of the hair. When observed under a transmitted light (bright field) microscope, the cuticle will disappear enabling the criminalist to see the medulla more clearly. The criminalist can then compare the known hair sample with the evidence hair under a comparison microscope using transmitted light.

Criminalists say that the evidence hair is *consistent* when it has the same microscopic characteristics as a known hair sample. If the evidence hair shares similarities with the sample hair but also has differences that cannot be accounted for, it is *inconclusive.* Evidence hair that is different than the sample hair is *excluded*. For a discussion of the probative value of hair evidence, see Fisher, Techniques of Crime Scene Investigation (7th ed 2003).

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I. Limitations of Microscopic Hair Comparison

§8.22 1. Degree of Certainty

Without using cellular DNA analysis, criminalists cannot state conclusively that a particular hair came from a particular person. According to Barry A. J. Fisher, Director of the Los Angeles County Sheriff's Department Crime Lab, "If DNA testing is not possible, the most positive statement that microscopic examination of hair can offer is that the hair did not come from a specific individual." Fisher, Techniques of Crime Scene Investigation (7th ed 2003). John I. Thornton, Emeritus Professor of Forensic Science at the University of California at Berkeley, and J.L. Peterson, Professor in the Department of Criminal Justice of the University of Illinois at Chicago, put it more bluntly: "In an exclusionary mode, hair is a rather good form of evidence … In an inclusionary mode, however, hair is a miserable form of evidence." Thornton & Peterson, *The General Assumptions and Rationale of Forensic Identification* §1-9.2.3, p 35, in Faigman, Kaye, Saks, Sanders & Cheng, Modern Scientific Evidence: Forensics (2006).

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§8.23 2. Absence of Reliable Databases

At present, scientists lack a large database of hair characteristics and therefore cannot state the rarity or prevalence of hair characteristics in statistical terms, as can be done with DNA. As Douglas W. Deedrick writes, "[I]t is difficult to establish a statistical probability for a particular association due in part to the lack of reliable quantitative assessments of the microscopic characteristics present in hairs." Deedrick, *Hairs, Fibers, Crime, and Evidence*, *Part 1: Hair Evidence*, 2(3) Forensic Sci Comm (July 2000). (You can view this article online at http://www.fbi.gov/hq/lab/fsc/backissu/july2000/deedric1.htm.)

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§8.24 3. Age of Head Hair Samples

Exposure to wind, sunlight, dryness, and other conditions can alter the appearance of hair—head hair in particular—and make comparison difficult. The significance of a time lapse varies with the type of hair being compared. As Douglas W. Deedrick points out, "Head hair samples obtained years after a crime are generally not suitable for meaningful comparison purposes.... A time period of several months to years can detract from a meaningful head hair comparison, whereas several years may not severely impact on meaningful pubic hair comparisons." Deedrick, *Hairs, Fibers, Crime, and Evidence*, *Part 1: Hair Evidence*, 2(3) Forensic Sci Comm (July 2000). (You can view this article online at http://www.fbi.gov/hq/lab/fsc/backissu/july2000/deedric1.htm.)

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§8.25 4. Sample Size

Hairs plucked from one person, and even from the same part of one person's body, can differ. The hair sample taken from a known subject may contain too few hairs for meaningful comparison with the evidence hair, or may include unrepresentative or incomplete hairs. Criminalists are trained to take a large number of hairs from a known source, not just a few, and as soon as possible after the crime. For example, Douglas W. Deedrick of the FBI Trace Information Unit suggests that a sample should include at least 25 full-length hairs taken from different areas of the scalp and pubic regions, including both plucked and combed hairs, packaged separately. Deedrick, *Trace Evidence—Hairs/Fibers—Crime Scene*, 49(5) U.S. Attorneys' Bulletin 1 (Sept. 2001). The experts at the Los Angeles County Sheriff's Department crime lab recommend that hair specimens be gathered from the entire body—face, chest, arms, pubis, and legs—including about 25 hairs collected from different areas of the head. Fisher, Techniques of Crime Scene Investigation (7th ed 2003). The National Research Council of the National Academies recommends obtaining 50 hairs from the scalp. National Research Council of the National Academies, Strengthening Forensic Science in the United States: A Path Forward, chap 5, *Descriptions of Some Forensic Science Disciplines,* p 157 (2009). You can view this book online at http://www.nap.edu/catalog.php?record_id=12589.

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§8.26 5. Number of Compared Characteristics

Obviously, the greater the number of compared characteristics (*e.g.,* medulla shape, pigments, razor marks), the more reliable the conclusion. Certain characteristics, such as natural red hair color, similar dyes or hair cosmetics, may add weight to a conclusion of similarity. Scientific Working Group on Materials Analysis (SWGMAT), *Forensic Human Hair Examination Guidelines*, *7*(2) Forensic Science Comm. (2005). (You can view this article online at http://www.fbi.gov/hq/lab/fsc/backissu/april2005/standards/2005_04_standards02.htm.)

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§8.27 6. Error Rates in Microscopic Hair Comparisons

Microscopic hair analysis, like fingerprint analysis, involves the subjective interpretation of objective phenomena. Different criminalists can look at the same two hairs and come to different conclusions. Mistakes in hair comparison have contributed to several highly publicized wrongful convictions, such as the cases of the Central Park Jogger (see *McCray v City of New York* (SD NY 2007, 03 Civ 9685 (DAB)) 2007 US Dist Lexis 90875) and the Oklahoma convictions of Ronald Williamson and Dennis Fritz. See Grisham, The Innocent Man: Murder and Injustice in a Small Town (2006) (discussing the Williamson case and the forensic issues). The Innocence Project (http://www.innocenceproject.org/) found that hair associations had been introduced at trial in 38 of 198 cases in which DNA evidence had led to postconviction exonerations. Bisbing, *Forensic Hair Comparisons: Guidelines, Standards, Protocols, Quality Assurance and Enforcement,* presented to The National Academies Committee on Identifying the Needs of the Forensic Sciences Community 3 (Apr. 24, 2007). (You can view this paper online at http://www7.nationalacademies.org/stl/April%20Forensic%20Bisbing.pdf; search for Richard Bisbing, which pulls up Committee On Identifying the Needs of the Forensic Science Community, look down near the bottom at the links for the April 23-24th, 2007 meeting and find the link for the article.) According to the National Academies report, "[C]ourts also have recognized that testimony linking microscopic hair analysis with particular defendants is highly unreliable." The National Research Council of the National Academies, Strengthening Forensic Science in the United States: A Path Forward, chap 5, *Descriptions of Some Forensic Science Disciplines*, p 161 (2009). (You can view this report online at http://www.nap.edu/catalog.php?record_id=12589.)

One study reviewed 170 microscopic hair examinations by FBI criminalists, from which 80 hair "associations" resulted. The 80 "associated" samples were also subjected to mitochondrial DNA testing, which resulted in the exclusion of nine samples that had previously been associated. Houck & Budowle, *Correlation of Microscopic and Mitochondrial DNA Comparisons,* 47(5) J Forensic Sci 964 (Sept. 1, 2002). At least one set of authors interprets the study as proof that "forensic hair comparisons have a scientific validity and basis in demonstrable fact." Houck, Bisbing, Watkins, & Harmon, *The Science of Forensic Hair Comparisons and the Admissibility of Hair Comparison Evidence: Frye and Daubert Considered,* Modern Microscopy (Mar. 2, 2004). (You can view this article online at http://www.modernmicroscopy.com/main.asp?article=36.) The authors of the influential National Academies report note, however, that the FBI concluded "even competent hair examiners can make significant errors." The National Research Council of the National Academies, Strengthening Forensic Science in the United States: A Path Forward, chap 1, *Introduction,* p 47 (2009). You can view this book online at http://books.nap.edu/openbook.php?record_id=12589.

A study of proficiency tests (in which labs were sent known samples by an independent testing service) over a 13-year period concluded that hair is a category of evidence in which "rates of correct identification are in the 80% to 90% range." The study also found that analysts struggled in identifying the part of the body from which a hair fell, and in identifying the species that was the source of nonhuman hair. Peterson & Markham, *Crime Laboratory Proficiency Testing Results, 1978-1991, II: Resolving Questions of Common Origin,* 40 (6) J Forensic Sci (Nov. 1, 1995).

Richard E. Bisbing of McCrone Associates, an independent materials testing laboratory, has noted certain common features in a number of cases in which the prosecution's hair comparison expert was later found to have been wrong. In those cases, the mistaken hair examiners (1) lacked mentoring and supervision; (2) were asked to make comparisons shortly before trial; (3) were in disagreement with a peer reviewer or defense expert; (4) ignored samples from other suspects or defendants; (5) relied solely on microscopic comparisons; and (6) each "became a hero in the eyes of the prosecutor by finding a match and helping to secure a conviction." Bisbing, *Forensic Hair Comparisons: Guidelines, Standards, Protocols, Quality Assurance and Enforcement,* presented to The National Academies Committee on Identifying the Needs of the Forensic Sciences Community, pp 3-4 (Apr. 24, 2007). (You can view this article online at http://www7.nationalacademies.org/stl/April%20Forensic%20Bisbing.pdf; search for Richard Bisbing, which pulls up Committee On Identifying the Needs of the Forensic Science Community, look down near the bottom at the links for the April 23-24th, 2007 meeting and find the link for the article.)

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§8.28 J. Mitochondrial and Nuclear DNA Testing

The cells that make up hair shafts do not contain sufficient amounts of *nuclear* DNA—the type of DNA derived from the genetic material of both parents which can be linked with a high degree of certainty to a particular person—for testing. Criminalists can, however, obtain nuclear DNA from a hair root, provided that the root has not deteriorated too much.

Cells from hair shafts do contain *mitochondrial* DNA (mtDNA). Mitochondria—the "power plants" contained in each cell—feature their own chromosome, separate from the chromosomes in the nucleus of the cell. Because maternally related people share mtDNA, and because certain mtDNA sequences occur among many people, mtDNA is not considered a unique identifier. See *Cooper v Brown* (9th Cir 2007) 510 F3d 870, 879. Mitochondrial DNA can be recovered from as little as one or two centimeters of hair shaft.

Mitochondrial DNA analysis has advantages over traditional microscopic analysis. First, the results of mtDNA testing can be expressed in objective terms, rather than in subjective categories such as "consistent" or "inconclusive." Second, mtDNA analysis can be performed on hairs, such as body hairs, which generally cannot be analyzed using traditional comparison techniques. In a review of 170 hair comparisons conducted by the FBI, forensic scientists managed to perform mtDNA analysis on 66 of the 71 samples for which traditional microscopic comparison either yielded inconclusive results or which were deemed unsuitable for analysis. Houck & Budowle, *Correlation of Microscopic and Mitochondrial DNA Comparisons, 47*(5) J Forensic Sci 964 (Sept. 1, 2002).

Microscopic analysis can determine whether a hair was pulled out by force, or whether a hair was dyed or shaven, and whether a hair came from an infant or a senior citizen; mtDNA analysis alone cannot do any of those things. Moreover, microscopic analysis can exclude suspects in cases where mtDNA analysis results in a "match." In one case, a bleached hair was matched through mtDNA to a suspect who had never bleached his hair; the microscopic comparison thus resulted in an exclusion where the genetic analysis had made a link. Bisbing, *Forensic Hair Comparisons: Guidelines, Standards, Protocols, Quality Assurance and Enforcement,* presented to The National Academies Committee on Identifying the Needs of the Forensic Sciences Community 5 (Apr. 24, 2007). (You can view this article online at http://www7.nationalacademies.org/stl/April%20Forensic%20Bisbing.pdf; search for Richard Bisbing, which pulls up Committee On Identifying the Needs of the Forensic Science Community, look down near the bottom at the links for the April 23-24th, 2007 meeting and find the link for the article.)

In light of the issues that have arisen with microscopic hair comparison, the trend seems to be toward increased reliance on mtDNA analysis, or at least toward the use of both microscopic and mtDNA analyses. According to Houck and Budowle, "Neither the microscopic nor molecular analysis alone, or together, enables absolute positive identification; together, however, these methods can be complementary examinations." The authors of the National Academies report put it more forcefully: "In cases where there seems to be a morphological match (based on microscopic examination), it must be confirmed using mtDNA analysis; microscopic studies alone are of limited probative value." The National Research Council of the National Academies, Strengthening Forensic Science in the United States: A Path Forward, chap 5, *Descriptions of Some Forensic Science Disciplines*, p 161 (2009). (You can view this book online at http://books.nap.edu/openbook.php?record_id=12589.)

For a more detailed description of DNA analysis, see chap 5.

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§8.29 K. Legal Issues in Hair Analysis

The issue of forensic hair comparison first appears in American criminal case law in *Knoll v State* (Wis 1882) 12 NW 369. *Knoll* arose from a murder case in which a doctor, on the basis of a visual inspection, declared that hair from the victim's skull and hair from the defendant's wheelbarrow were "from the head of the same person." 12 NW at 370. The Wisconsin Supreme Court reversed the conviction, declaring that "such evidence is of a most dangerous character." 12 NW at 371.

The science of forensic hair comparison has progressed considerably since the 1880s, and hair comparison evidence is now generally admitted. See, *e.g.*, *People v Pride* (1992) 3 C4th 195, 239, 10 CR2d 636.

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§8.30 1. State Court: *Kelly* Rule

Microscopic hair comparison passes muster under the *Kelly* rule (formerly the *Kelly/Frye* rule) requiring the general acceptance of scientific techniques. As the California Supreme Court noted, "Hair comparison evidence that identifies a suspect or victim as a possible donor has been routinely admitted in California for many years without any suggestion that it is unreliable under *Kelly/Frye*." *People v Pride* (1992) 3 C4th 195, 239, 10 CR2d 636.

Chapter 2 discusses what has come to be known as the "*Kelly* rule" for admission of evidence of a new or novel scientific technique, procedure, or device. See *People v Kelly* (1976) 17 C3d 24, 30, 130 CR 144; see also *People v Leahy* (1994) 8 C4th 587, 612, 34 CR2d 663.

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§8.31 2. Federal Rule: *Daubert*

In general, federal and state courts applying the more permissive *Daubert* criteria for the admissibility of scientific evidence have admitted expert testimony on hair comparisons. See, *e.g., U.S. v Santiago* (D PR 2001) 156 F Supp 2d 145, 152 (principles and procedures underlying hair and fiber evidence are overwhelmingly accepted and reliable).

At least two state courts deemed the foundations for hair comparison testimony inadequate under *Daubert,* but the relevant portions of those opinions were later reversed. The *Williamson* case raises particular concerns for the criminal justice system. The defendants in *Williamson,* both of whom had been convicted of murder and one of whom had been sent to death row, were later exonerated by DNA evidence. See *Williamson v Ward* (10th Cir 1997) 110 F3d 1508; see also *McGrew v State* (Ind 1997) 682 NE2d 1289.

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§8.32 IV. FIBERS

Transferred fibers can appear on a suspect's or victim's clothing, on a blanket or a carpet or a car seat, underneath fingernails, or on broken window panes.

Fibers come in a staggering variety of types, colors, and combinations, from a tremendous number of different producers. Former FBI criminalist Max M. Houck described some of that variety in *Statistics and Trace Evidence: The Tyranny of Numbers*, 1(3) Forensic Sci Comm (Oct. 1999):

The Federal Trade Commission lists 17 generic classes of manufactured fibers. Over 1,770 fiber manufacturers worldwide are listed for 1998. The number of cross-sectional shapes for manufactured fibers exceeds 500 different types, not counting copycats and patent infringements. More than 8,000 dyes and pigments are used in the coloring of textile fibers and variations in the processing and production of colored textiles yield an almost infinite number of potential colors. These materials are assembled into finished textiles by approximately 113,000 manufacturers. This web of production makes it difficult, if not occasionally impractical, to trace any one product and identify its components to their sources.

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Source: Criminal Law/Scientific Evidence in California Criminal Cases/8 Trace Evidence and Gunshot Residue/§8.33 A. Fiber Characteristics

§8.33 A. Fiber Characteristics

In examining a fiber sample, the trace evidence specialist looks at a number of fiber characteristics such as origin, color, structure, and staining.

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§8.34 1. Origin

Natural fibers include those of plant origin, such as cotton, and those of animal original, such as wool. Nylon, polyester, and fiberglass belong to the family of synthetic fibers, and rayon belongs to the family of generated cellulosic or wood-pulp fibers. Some threads are blends of synthetic and natural fibers, most commonly polyester and cotton. More than half of the fibers used in the production of textiles are man-made. Deedrick, *Hairs, Fibers, Crime, and Evidence*, *Part 2: Fiber Evidence*, 2(3) Forensic Sci Comm (July 2000). (You can view this article online at http://www.fbi.gov/hq/lab/fsc/backissu/july2000/deedric3.htm.)

Cotton is the most common plant fiber, and sheep's wool is the most common animal fiber. Polyester and nylon are the most common man-made fibers. Logically, the presence of uncommon fibers at a crime scene—mohair, for example, or alpaca—increases the forensic significance of a finding.

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§8.35 2. Color

Textile manufacturers use different processes in coloring cloth. They can dye the individual fiber, dye a yarn made from different fibers, dye the fabric as a whole, or use more than one technique in a single garment. A fiber may show postmanufacturing discoloration or fading, which can be matched to an exemplar. Deedrick, *Hairs, Fibers, Crime, and Evidence, Part 2: Fiber Evidence*, 2(3) Forensic Sci Comm (July 2000). (You can view this article online at http://www.fbi.gov/hq/lab/fsc/backissu/july2000/deedric3.htm.) Batches of dye actually change from batch to batch, which produces slight, but measurable, color changes from runs of different lots of dyed material.

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§8.36 3. Fiber Structure

The shape of the cross-section of certain man-made fibers may have evidentiary value. Some cross-sections are specific to a particular manufacturer or were produced only during a short period of time. Deedrick, *Hairs, Fibers, Crime, and Evidence, Part 2: Fiber Evidence*, 2(3) Forensic Sci Comm (July 2000). (You can view this article online at http://www.fbi.gov/hq/lab/fsc/backissu/july2000/deedric3.htm.) Criminalists can view the cross-section of a fiber with a polarized light microscope (PLM), or, if necessary, with a scanning electron microscope (SEM). See §§8.10 (PLM), 8.12 (SEM).

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§8.37 4. Stains

Minute traces of paint, grease, glass, soil, or other debris can give the examiner valuable information. The debris on the fiber can be used in conjunction with the fiber analysis to associate the sample with a known source. See the FBI's *A Forensic Fiber Examiner Training Program* (visited June 3, 2010), available at http://www.fbi.gov/hq/lab/fsc/backissu/april2005/standards/SWGMAT_fiber_training_program.pdf.

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§8.38 B. Techniques of Fiber Analysis

Criminalists use stereomicroscopes with a power of 10-50 times to analyze a fiber's physical appearance; polarized light microscopes with a power of 100-400 times to examine internal structural features; fluorescence microscopes and ultraviolet/visible microspetrophotometry to study dyes and additives; thermal microscopes to determine the melting characteristics of synthetic fibers; comparison microscopes to compare samples; and micro-infrared spectrophotometry to determine the generic class and subclass of synthetic fibers. For discussion of microscopes, see §§8.8-8.12.

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§8.39 C. Forensic Significance of Fiber "Matches"

Criminalists can rarely match a specific evidence fiber conclusively to a specific garment. As Douglas W. Deedrick of the FBI Trace Information Unit points out, "It can never be stated with certainty that a fiber originated from a particular garment because other garments were likely produced using the same fiber type and color." Deedrick, *Hairs, Fibers, Crime, and Evidence*, *Part 2: Fiber Evidence,* 2(3) Forensic Sci Comm (July 2000). (You can view this article online at http://www.fbi.gov/hq/lab/fsc/backissu/july2000/deedric3.htm.) In the words of the National Academies report, "[A] 'match' means only that the fibers could have come from the same type of garment, carpet, or furniture; it can provide only class evidence." The National Research Council of the National Academies, Strengthening Forensic Science in the United States: A Path Forward, chap 5, *Descriptions of Some Forensic Science Disciplines*, p 163 (2009). (You can view this book online at http://books.nap.edu/openbook.php?record_id=12589).

Nevertheless, the tremendous variation in size (measured in units of weight called *denier*), lusters, color, and cross-sectional shape makes random fiber matches between unassociated textiles very unlikely. Certain fibers—blue/white cotton fibers such as those found in denim, for example—occur so frequently that their presence may have little evidentiary value.

As with hair, the absence of fiber databases makes it impossible for a criminalist to assign a statistical significance to a fiber finding. In any case, the constant change in fiber types means that any such database is virtually impossible to create. Saferstein, Criminalistics: An Introduction to Forensic Science, chap 8 (9th ed 2007).

A negative finding—*i.e.,* the absence of fibers at a crime scene—does not mean that contact did not occur. The fabric's age and construction (the tightness with which a fabric was woven, for example) affect the rate at which fibers shed. Logically, the longer two textiles are in contact, the greater the transfer of fibers. The greater the number of fibers transferred, the stronger the likelihood that contact actually occurred.

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§8.40 D. Issues in Fiber Collection and Analysis

Removal of fibers from other items such as carpets or textiles is a job best handled in a crime lab. If fiber evidence has to be gathered at the scene, removal by means of cellophane tape is preferable to the use of forceps or vacuums. Fisher, Techniques of Crime Scene Investigation (7th ed 2003).

Improper evidence handling or the actions of paramedics at a crime scene may undercut the value of a "match" by introducing the possibility of contamination. Delay in collection of a garment may result in losses of transferred fibers as great as 80 percent in 4 hours.

Crime labs on average correctly identify about 89 percent of the test fibers sent to them. Synthetic fibers are more readily identified than natural fibers. Peterson & Markham, *Crime Laboratory Proficiency Testing Results, 1978-1991, I: Identification and Classification of Physical Evidence,* 40 (6) J Forensic Sci, pp 994-1008 (Nov. 1, 1995).

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§8.41 E. Examples From Case Law

The following are examples of the use of fiber evidence by criminalists:

- A criminalist testified that a single fiber found on a murder victim's maroon socks was consistent in color and diameter with a fiber found on another murder victim's body. Using infrared spectrophotometry and thin-layer chromatography, the criminalist also matched fiber from the victim's socks with fibers recovered from the defendant's car. *People v Kraft* (2000) 23 C4th 978, 1005, 99 CR2d 1.

- Another criminalist testified that she was able to match fibers in the defendant's jeans with fibers from the victim's body by color and material. *People v Navarette* (2003) 30 C4th 458, 497, 133 CR2d 89.

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V. PAINT

§8.42 A. Pigment, Binder, and Solvent

Paint consists of *pigment*, *binder,* and *solvent*. The pigment can contain organic and inorganic compounds, metallic or mica flakes, and extender pigments. The binder, which holds the pigment to the painted surface, creates a protective coating by undergoing polymerization, the process by which smaller molecules join to form larger molecules. Common binders include oil, latex, acrylate, and polyurethane. The solvent is a liquid in which the pigment and binder are dissolved. When paint is applied, the solvent evaporates, leaving behind the pigment and the binder. Spray paint commonly uses alcohol as a solvent, and house paints commonly use water. Saferstein, Criminalistics: An Introduction to Forensic Science, chap 8, p 232 (9th ed 2007).

Criminalists use stereomicroscopes to check color, texture, and surface features to determine the presence of contaminants and to examine the layer structure in multi-layered paint chips. They use polarized light microscopes to compare pigmentation and extenders. They employ gas chromatographs and energy dispersion spectroscopes to identify the chemical composition of the paint. Saferstein, Criminalistics, pp 235-237.

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§8.43 B. Auto Paint

Cars usually have four layers of paint. First, the body of the car is coated in electrocoat primer—a primer bound to the body of the car by the application of an electric charge—in order to prevent rust. The next coat is usually an epoxy-based primer. The base coat—the layer which contains the paint's final color—comes next, followed by a protective clear coat, which gives the car its glossy finish. Saferstein, Criminalistics: An Introduction to Forensic Science, chap 8 (9th ed 2007).

Car manufacturers have their own distinctive paints—older GM cars, for example, featured acrylic lacquers rather than enamel—and often change the formulas for their paints every few years. This makes it possible for a criminalist to determine the make and the year of a car from the paint chip. Saferstein, Criminalistics, chap 8.

The Royal Canadian Mounted Police (RCMP) maintains a database of automotive paints called the International Forensic Automotive Paint Data Query (PDQ). The PDQ contains information on more than 13,000 vehicles. (See http://www.rcmp-grc.gc.ca/fs-fd/pdfs/pdq-eng.pdf.)

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§8.44 C. Techniques of Paint Analysis

The *pyrolysis gas chromatograph* breaks down paint binder into gases, which are then analyzed to determine the binder's chemical composition. Criminalists use a microspectrophotometer to analyze a paint sample's pigment.

One significant aspect of a paint chip is its layer structure. A paint chip from the side of a house or a car may contain layer on top of layer from earlier paint jobs. Saferstein, Criminalistics: An Introduction to Forensic Science, chap 8 (9th ed 2007).

The FBI's SWGMAT and the ASTM have published guidelines for paint analysis and comparison. Neither body has proposed standard language for reporting conclusions. See the report from The National Research Council of the National Academies, Strengthening Forensic Science in the United States: A Path Forward, chap 5, *Descriptions of Some Forensic Disciplines,* p 169 (2009). (You can view this book online at http://books.nap.edu/openbook.php?record_id=12589.)

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§8.45 D. Issues in Paint Analysis

The recent National Academies' report on forensic evidence, however, concludes that "analysis of paints and coatings is based on a solid foundation of chemistry to enable class identification." The National Research Council of the National Academies, Strengthening Forensic Science in the United States: A Path Forward, chap 5, *Descriptions of Some Forensic Disciplines,* p 170 (2009). (You can view this book online at http://books.nap.edu/openbook.php?record_id=12589.)

A review of crime lab proficiency studies, however, called paint comparison "one of the most troublesome evidence categories." Peterson & Markham, *Crime Laboratory Proficiency Testing Results, 1978-1991, II: Resolving Questions of Common Origin,* 40 (6) J Forensic Sci, pp 1009-1029 (Nov. 1, 1995). Quality control procedures in the paint industry have led to greater consistency in paint composition, making it very difficult to distinguish between two samples of the same paint from different batches.

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§8.46 E. Example From Case Law

An expert criminalist from the California State Bureau of Criminal Identification and Investigation testified that he compared paint samples from a crime scene with exemplar chips from the defendant's pants using infrared spectrophotometry. *People v Garrett* (1965) 238 CA2d 324, 236, 47 CR 731.

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VI. SOIL

§8.47 A. Testing Issues

Soil evidence can appear on a suspect's shoe, on clothing, and on the treads of tires. Soil evidence "tends to be underestimated and underutilized by criminal investigators." Thornton & Peterson, *The General Assumptions and Rationale of Forensic Identification* §1-9.2.7, p 41, in Faigman, Kaye, Saks, Sanders & Cheng, Modern Scientific Evidence: Forensics (2006).

Because most forensic scientists have backgrounds in biology or chemistry rather than in the more relevant fields of mineralogy or petrology, they may lack the necessary skill set for the forensic analysis of soil.

As with hair and fiber evidence, there is no comprehensive database for soil evidence. It is therefore impossible for a scientist to testify about the uniqueness of a particular soil sample. At best, "the interpretation of soil/sediment evidence can be semi-quantitative." Morgan & Bull, *The Philosophy, Nature and Practice of Forensic Sediment Analysis,* 31(1) Progress in Physical Geography (Feb. 2007) (You can view this article online at http://ppg.sagepub.com/cgi/reprint/31/1/43.)

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§8.48 B. Composition

Soil is a mixture of weathered rock and decomposed organic material, or *humus*. It contains a variety of minerals, among them quartz, feldspar, and mica, along with decomposed leaves, pine needles, pollen grains, and plant fragments. Fisher, Techniques of Crime Scene Investigation (7th ed 2003).

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§8.49 C. Method of Analysis

Criminalists examine soil samples for density and elemental composition and may use a polarized light microscope to identify the parent minerals in a soil sample. As it has in many other areas of trace evidence analysis, DNA testing is adding a new dimension to forensic geoscience. DNA analysis can determine the constituent parts of soil as well as identify pollen and plant matter. Morgan & Bull, *The Philosophy, Nature and Practice of Forensic Sediment Analysis,* 31(1) Progress in Physical Geography 43-58 (Feb. 2007), available at http://ppg.sagepub.com/cgi/reprint/31/1/43.) For discussion of DNA analysis, see chap 5.

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§8.50 D. Examples From Case Law

In one case, the prosecution theorized that the defendant had met his murder victim on a beach, and a criminalist testified that sand found on the victim's face was consistent with beach sand. *People v Kraft* (2000) 23 C4th 978, 1007, 99 CR2d 1.

In *People v Page* (2008) 44 C4th 1, 20, 79 CR3d 4, a case arising from the murder of a child whose body was found in a bentonite mine, a forensic geologist testified that bentonite found on the defendant's clothes and in his car was of the same type and color as the bentonite from the mine.

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VII. GLASS

§8.51 A. Physical Properties

Car crashes, drive-by shootings, and burglaries can all involve broken glass. Criminalists examining a piece of glass look at physical properties such as thickness, color, and density; optical properties, including refractive index (RI), dispersion, and fluorescence under short-wavelength ultraviolet illumination; and the sample's elemental composition. "Refractive index and dispersion [which is determined by comparing the refractive index at more than one wavelength of light], together with density, represent the minimum testing that can be justified. Elemental composition alone can never form the basis of an opinion concerning commonality of source." Thornton & Peterson, *The General Assumptions and Rationale of Forensic Identification* §1-9.2.2, p 33, in Faigman, Kaye, Saks, Sanders & Cheng, Modern Scientific Evidence: Forensics (2006).

The method of analyzing glass evidence developed by Elmer T. Miller, an FBI forensic scientist and National Academy of Forensic Science fellow, has become the standard for forensic laboratories and courts. Under the widely accepted Miller Criteria, two samples of glass may be deemed to be "consistent with having shared a common origin" if they share certain density and refractive indices, which are determined by mathematical analysis. Miller, *Forensic Glass Comparisons,* in Saferstein, ed., Forensic Science Handbook, pp 139-183 (1982).

A piece of glass may also bear meaningful surface features, such as coatings or films often found on automotive glass or nonslip textures often applied to beverage bottles.

The breakage characteristics of glass under impact—*e.g.,* the radial pattern formed when a bullet or a rock hits a windshield—can have forensic significance which is beyond the scope of this chapter.

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§8.52 B. Error Rates

A review of a battery of proficiency tests for forensic glass examiners conducted over 13 years concluded that "[c]omparisons of fragments of glass in establishing possible common origin … remains problematic" and noted that false exclusions (findings that samples were not of common origin) occurred more often than false inclusions. Peterson & Markham, *Crime Laboratory Proficiency Testing Results, 1978-1991, II: Resolving Questions of Common Origin,* 40 (6) J Forensic Sci, pp 1009-1029 (Nov. 1, 1995).

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§8.53 C. Example From Case Law

Glass found on the burglary suspect's shoes was compared with shards of glass from a store's broken window and found to have identical refractive indices and density. *People v Harris* (1980) 105 CA3d 204, 209, 164 CR 296.

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VIII. GUNSHOT RESIDUE (GSR)

§8.54 A. Primer Contained in Cartridge

A cartridge has four parts: the case, the bullet, the powder, and the primer. When the firing pin of a gun strikes the base of a cartridge, the primer contained in the cartridge detonates, igniting the gunpowder. Gunshot residue (GSR) comes primarily from the primer, which sprays microscopic particles when detonated. Wright & Trimpe, *Summary of the FBI Laboratory's Gunshot Residue Symposium, May 31-June 3, 2005,* 8 (3) Forensic Sci Comm (July 2006). (You can view this article online at http://www.fbi.gov/hq/lab/fsc/backissu/july2006/research/2006_07_research01.htm#gsrdefined.)

NOTE: The primer should not be confused with the powder, which propels the bullet forward.

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§8.55 B. Composition

Gunshot residue (GSR) particles from most American-made ammunition contain barium (Ba), antimony (Sb), and lead (Pb) from the primer. Primer may also contain aluminum (Al), calcium (Ca), and silicon (Si). In addition to primer material, GSR particles may also contain elements from other parts of the cartridge, such as nickel (Ni) from the cartridge case and copper (Cu) from the bullet. See, *e.g.*, *People v Palmer (Nasmeh)* (1978) 80 CA3d 239, 248, 145 CR 466 (particles found on appellant's right hand showed the presence of lead, copper, zinc, barium, calcium, and silica).

NOTE: Rimfire.22 ammunition presents a special case. The primer composition of rimfire.22 ammunition varies from manufacturer to manufacturer—and, as in the case of Remington ammunition, may vary depending on the date the ammunition was manufactured. Rimfire.22 ammunition primer may or may not include barium or antimony.

Highly specific or *unique* GSR contains the key elements barium, antimony, and lead in an appropriately sized spherical particle. *Consistent*, *characteristic*, or *associated* GSR contains one or more (but not all) of the key elements, and *inconsistent* GSR contains none of the key elements. Wright & Trimpe, *Summary of the FBI Laboratory's Gunshot Residue Symposium, May 31-June 3, 2005,* 8 (3) Forensic Sci Comm (July 2006). (You can view this article online: http://www.fbi.gov/hq/lab/fsc/backissu/july2006/research/2006_07_research01.htm#gsrdefined.)

The presence of certain elements is not the only significant aspect of a particle's composition; the relative amounts of each element within the particle are important as well. For example, a particle that contains sulfur as well as barium, antimony, and lead can still be classified as highly specific to GSR if sulfur is not the major component.

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§8.56 C. Shape and Size

Gunshot residue (GSR) particles are produced at high temperatures and spun off at high speeds. As a result, GSR particles are generally spherical, although researchers have found particles shaped like hearts, boomerangs, roods, and cubes. Mou, Lakadwar & Rabalais, *Evaluation of Shooting Distance by AFM and FTIR/ATR Analysis of GSR,* 53 (6) J Forensic Sci 1381-1386 (November 2008). GSR particles have an extremely small diameter—generally, less than 10 microns.

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§8.57 D. Distance

The distance that gunshot residue (GSR) particles can travel is the subject of ongoing debate. The Los Angeles County Sheriff's Department believes that GSR particles can travel 2 to 3 feet to either side, and up to 2 feet to the rear. It is unclear how far downward GSR can travel.

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§8.58 E. Timing

Gunshot residue (GSR) particles can remain on a shooter's hands for up to 6 hours. Fisher, Techniques of Crime Scene Investigation (7th ed 2003). They can be washed off, and they shed easily; about 90 percent fall off within 1 hour.

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§8.59 F. Collection and Testing

Gunshot residue (GSR) collection protocols vary. Many police departments' protocols require that samples be taken within 6 hours of the shooting. Commonly, officers "bag" a suspect's hands with paper bags, then use a lipstick-sized "stub" from a commercially available kit to take a sample from the back of the hand and the webbing between the thumb and index fingers.

Some departments decline to take samples from surfaces other than hands. The Los Angeles Sheriff's Department's experts do not recommend bagging the hands, believing that bagging may actually remove GSR particles.

Back at the lab, criminalists currently analyze the collection stubs using a scanning electron microscope with energy dispersive spectroscopy (SEM-EDX or EDS). The SEM-EDX gives an image of any GSR particles present and information on the elemental composition of those particles. Even though SEM examination is now largely automated, examining a GSR collection kit is time-consuming, typically taking about 8 hours.

Scientists at Lamar University have recently proposed the use of atomic force microscropy (AFM) and Fourier transform infrared attenuated total reflectance (FTIR/ATR) spectroscopy instead of SEM-EDX. According to its proponents, use of the new technique might enable criminalists to estimate firing distances based on the size and shape of the GSR particles. Mou, Lakadwar & Rabalais, *Evaluation of Shooting Distance by AFM and FTIR/ATR Analysis of GSR,* 53 (6) J Forensic Sci 1381-1386 (November 2008).

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§8.60 G. Findings

The strongest conclusion that any gunshot residue (GSR) examiner can make is that the subject handled or fired a gun, was close when a gun had been fired, or otherwise came into contact with an environment of gunshot residue. Because GSR travels from a fired weapon and can be rubbed off one person and onto another, GSR can be found on victims and bystanders as well as suspects.

The absence of GSR does not mean that a suspect did not fire a gun. Similarly, the presence of GSR does not necessarily mean that the suspect fired a gun; it means only that the subject handled or discharged a firearm, was in close proximity to a discharging firearm, or otherwise was in contact with an environment of gunshot primer residue.

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§8.61 H. Limitations of GSR Analysis

An expert's conclusions regarding the presence of gunshot residue (GSR) should come with a number of caveats. A finding of GSR, for example, reveals nothing about the time of the shooting. Most reputable analysts will not match GSR to a specific gun or to a particular brand of ammunition.

A GSR expert should acknowledge other possible sources of consistent or even highly specific particles, including lead solder, lead batteries, certain types of brake pads, and certain fireworks no longer sold in the United States. Particles containing lead and other elements can also come from leaded paint, gasoline, and pesticides, but a properly qualified expert might be able to eliminate some of these other sources based on the relative amounts of each element found in the GSR particles.

The presence of GSR on surfaces other than hands has a reduced significance because, under the right conditions, GSR can stay on a surface indefinitely.

Potential contamination—from police officers who handle their own weapons before placing a suspect in handcuffs, for example, or from the back seat of a patrol car—can undermine the significance of a GSR finding.

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§8.62 I. Legal Issues Related to GSR

Using scanning electron microscopes (SEMs) to analyze gunshot residue is generally accepted by the scientific community and meets the *Kelly* requirement for reliability of a scientific technique. *People v Palmer (Nasmeh)* (1978) 80 CA3d 239, 250, 145 CR 466.

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§8.63 IX. TRACE METAL DETECTION (TMDT)

Trace metal detection (TMDT) involves the application of a hydroxyquinoline solution spray onto a subject's hands, which are then observed under ultraviolet light. The presence of dark areas indicates the location of metal. TMDT field kits are sold under the commercial names Ferrotrace and Ferroprint, both made in Israel. Fisher, Techniques of Crime Scene Investigation (7th ed 2003).

The forensic value of TMDT is limited. Fisher, Crime Scene Investigation. People touch so many metallic objects that some amount of trace metal will almost always be present on any suspect's hands, and the amount of sweat on a person's hands can significantly affect test results. Moreover, experiments have shown that holding a gun and firing it does not always result in a positive finding. Gunshot residue is now more commonly used as a test for recent gun use.

TMDT was a key piece of evidence in the 1983-1984 trial of Hampig Sassounian for the assassination of a diplomat in Los Angeles. See *People v Sassounian* (1986) 182 CA3d 361, 380, 226 CR 880.

NOTE: Among the more exotic types of trace evidence is glitter, which is commonly found in cosmetics and in costumes. See Blackledge & Jones, Jr., *All that Glitters Is Gold!* in Blackledge, ed., Forensic Analysis on the Cutting Edge (2007).

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X. LEGAL ISSUES RELATING TO TRACE EVIDENCE

§8.64 A. Search and Seizure

People v Superior Court (Nasmeh) (2007) 151 CA4th 85, 90, 59 CR3d 633, arose from a murder investigation, in the course of which police obtained a warrant to search a car for certain articles of clothing, certain couch covers and floor rugs, and "any part thereof." The police seized the car and transported it to a crime laboratory to check for trace evidence related to the items. The trial court suppressed certain evidence (unidentified in the opinion) on the grounds that the warrant did not specify a search for hair, fiber, or other biological or trace evidence and did not authorize an unlimited search of unspecified duration for microscopic evidence. The Court of Appeal reversed the trial court, holding that the warrant's language was sufficiently particular, and that the transportation of the car to the crime lab in order to search for trace evidence was reasonable. 151 CA4th at 96. The *Nasmeh* court held further that even if the warrant had been deficient, no warrant was necessary under the auto exception to the warrant requirement. 151 CA4th at 100.

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§8.65 B. *Brady* Issues

Los Angeles Sheriff's Department Crime Lab Director Barry A. J. Fisher points out that lab errors—*e.g.,* a failure on a proficiency test—may give rise to discovery obligations under *Brady*. *Brady v Maryland* (1963) 373 US 83, 10 L Ed 2d 215, 83 S Ct 1194.

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§8.66 C. *Melendez-Diaz* Issues

In *Melendez-Diaz v Massachusetts* (2009) ___ US ___, 174 L Ed 2d 314, 329, 129 S Ct 2527, the US Supreme Court held that a criminalist's "certificate of analysis" of narcotics contained testimonial statements within the meaning of *Crawford v Washington* (2004) 541 US 36, 158 L Ed 2d 177, 124 S Ct 1354, and its admission in lieu of the criminalist's testimony violated the defendant's Sixth Amendment right of confrontation. *Melendez-Diaz* may radically change the way in which scientific evidence, including trace evidence, is presented in criminal trials. In the wake of *Melendez-Diaz*, the proponent of trace evidence may have to call to the stand the criminalists who actually examined the evidence, as well as the officers, lab technicians, and others who were involved in the chain of custody.

Note that under Proposition 115, qualified peace officer witnesses may be able to testify at preliminary hearings about tests conducted by criminalists. See *Hosek v Superior Court* (1992) 10 CA4th 605, 12 CR2d 650. The parties, of course, can often stipulate to the admissibility of a criminalist's report or to the results of a forensic test.

Prior to *Melendez-Diaz*, the California Supreme Court seemed to have resolved hearsay challenges to the admission of criminalists' reports as official records or business records in favor of admissibility, so long as the criminalists' statements were a "contemporaneous recordation of observable events." See *People v Geier* (2007) 41 C4th 555, 605, 61 CR3d 580. After *Melendez-Diaz*, however, the California Supreme Court has granted review in a number of cases involving the testimony of criminalists. See, *e.g.*, *People v Dungo* (review granted Dec. 2, 2009, S176886; superseded opinion at 176 CA4th 1388, 98 CR3d 702) (opinion testimony of forensic pathologist based on autopsy report prepared by another non-testifying pathologist); *People v Gutierrez* (review granted Dec. 2, 2009, S176620; superseded opinion at 177 CA4th 654, 99 CR3d 369) (testimony of lead nurse practitioner concerning exam and report of non-testifying nurse practitioner); *People v Lopez* (review granted Dec. 2, 2009, S177046; superseded opinion at 177 CA4th 202, 98 CR3d 825) (admission of blood-alcohol test results and report prepared by criminalist who did not testify at trial); *People v Rutterschmidt* (review granted Dec. 2, 2009, S176213; superseded opinion at 176 CA4th 1047, 98 CR3d 390) (testimony of supervising criminalist about results of drug tests and report prepared by another criminalist); *People v Benitez* (review granted May 12, 2010, S181137; superseded opinion at 182 CA4th 194, 106 CR3d 39) (acting supervisor of the county's crime laboratory testified about drug results, based on notes made by another analyst); *People v Bowman* (review granted Jun. 9, 2010, S182172; superseded opinion at 182 CA4th 1616, 107 CR3d 156) (supervisor testified based on non-testifying analyst's notes).

For additional discussion of *Melendez-Diaz*, see §§1.27, 5.38. For additional discussion of the Sixth Amendment right of confrontation under *Crawford*, see California Criminal Law Procedure and Practice (Cal CEB Annual).

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XI. DIRECT AND CROSS-EXAMINATION

A. Suggested Preparation for Cross-Examination

§8.67 1. Discovery

A logical place to start in preparing to cross-examine a forensic witness is to request the witness's résumé. Perhaps the witness is being asked to render an opinion on a subject beyond his or her expertise, or the witness performed a test he or she was not trained to perform.

A party is entitled not only to the opposing criminalist's reports, but also to the criminalist's raw notes, often referred to as bench notes, as well. See *Woods v Superior Court* (1994) 25 CA4th 178, 184, 30 CR2d 182 (defense required to disclose test results on which psychologist based his report, not just report itself). See also *In re Beverly H.* (1980) 103 CA3d 1, 6, 162 CR 768, disapproved on other grounds in *People v Lohbauer* (1981) 29 C3d 364, 173 CR 453 (defense granted pretrial discovery of all police lab test results).

A technician's failure to comply with his or her lab's own safeguards could be a fruitful area for cross-examination. Lawyers should ask for the relevant protocols used by the crime lab or the police agency. A thorough discovery request should include quality manuals, standard operating procedures, internal audit schedules, and staff training records for the relevant areas.

Counsel might also want to learn whether the crime lab is accredited by the American Society of Criminal Laboratory Directors/Laboratory Accreditation Board (ASCLD/LAB) and, if so, whether the lab is also accredited under the more stringent ASCLD/LAB-International standards. A list of accredited labs is available at http://www.ascld-lab.org.

The crime lab's compliance with the standards set by other laboratory associations might also be worth exploring. The FBI, through its Scientific Working Group for Materials Analysis (SWGMAT), publishes guidelines for the collection and analysis of trace evidence; it may be valuable to compare the scientific methods used by the criminalist to the procedures suggested by the FBI. The SWGMAT guidelines are available online at http://www.fbi.gov. Another source of guidelines is the American Society for Testing and Materials (ASTM), which publishes standards for evidence handling and testing by forensic laboratories. The ASTM guidelines are available online at http://www.astm.org/.

Because there are so many kinds of trace evidence, criminalists may be called on to devise novel testing or collection techniques. Counsel should request validation studies for any unusual experiments or testing procedures.

Money is always a potential source of bias. Prosecutors can access county records to find out how much money, and at what rate, a defense witness has charged in the past for publicly funded defense consultation.

Finally, everyone who handled a piece of evidence—the patrol officer who collected it, the property officer who booked it, the transporting officer who took it to the lab, the technician who tested it—is a potential source of contamination. Lawyers need to know every person in the chain of command and whether that person took adequate precautions against contamination.

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§8.68 2. Consultation

A prepared attorney can often elicit powerful testimony on cross-examination of the opposing expert regarding the limitations of the proffered science or the failure to follow protocols. An hour spent reviewing reports with a qualified expert might obviate the need to call a separate expert.

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Source: Criminal Law/Scientific Evidence in California Criminal Cases/8 Trace Evidence and Gunshot Residue/§8.69 B. Suggested Areas for Direct Examination

§8.69 B. Suggested Areas for Direct Examination

The more an attorney speaks in plain English, the better he or she will connect with a jury. The use of visuals—a diagram of the basic structure of a human hair, for example, or a picture of a gun being fired in the dark to illustrate the travel of GSR—can mean the difference between a jury "getting it" and dozing off. Experts should know how to use analogies and examples from everyday life: "The cuticle on a hair is like the yellow on a pencil" (see Oien, *Forensic Hair Comparison: Background Information for Interpretation*, 11(2) Forensic Sci Comm (2009). (You may view this article online at http://www.fbi.gov/hq/lab/fsc/current/review/2009_04_review02.htm.) "You can think of GSR like chalk dust; it can rub off from your hands to your jacket, and from your jacket to the jacket of someone you bump into." Counsel should consider doing the following during examination of experts:

- Introduce your expert to the jury and qualify the witness in a quick and engaging way. Bringing out an expert's qualifications can easily turn into an excruciating slog. Consider giving a preview of the expert's opinion early in direct examination, before asking for the recitation of expertise.

Q: What do you do for a living?

Q: Did you come to court today prepared to tell us about similarities between the defendant's hair and the hair found at the crime scene?

- Before a jury, emphasize practical, hands-on experience over formal training:

Q: How many hair comparisons have you done in your *7* years as a criminalist?

- Bring out the witness's objectivity:

Q: Every time the police bring you hairs to compare, do you find a match?

Q: In what percentage of your cases do you find that evidence hairs and sample hairs are consistent?

- Get the witness to explain the evidence and the testing procedures in general terms and in plain English:

Q: What is hair made of?

Q: For our purposes, what are the important parts of a hair?

Q: In a nutshell, how do you go about comparing hair samples?

- Get the expert to explain the testing in this specific case. Wherever possible, use visual aids, such as diagrams and photographs, blown up or projected so that every juror can see them easily.

Q: How did you examine the hair in this case?

- Get the witness to explain the safeguards and protocols:

Q: What steps does your lab take to ensure that gunshot reside particles from one piece of evidence don't rub off on another?

- Get to the conclusion:

Q: After you compared the hair from the crime scene to the hairs taken from the defendant, did you come to a conclusion?

Q: What was your conclusion?

Q: Please tell us why you came to that conclusion.

- Bring out the limitations of the science before your opponent does:

Q: You've testified that the hair from the crime scene is consistent with the defendant's hair, correct?

Q: Is that the most you can say when you're comparing two hairs? Why?

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§8.70 C. Suggested Areas for Cross-Examination

On cross-examination, even more than on direct, attorneys should speak plain English and use analogies based on common experience. Attempts to "out-expert" the expert or to dazzle the jury with mastery of the science almost always result in serious embarrassment for the attorney. Counsel should consider doing the following during cross-examination of experts:

- Bring out limitations of the science:

Q: I've got a few questions about GSR analysis in general.

Q: Would you agree with me that GSR analysis can't reveal when a gun was fired?

Q: Or which gun produced it?

Q: It can't tell us whether or not the defendant fired a gun, correct?

- Emphasize the level of uncertainty:

Q: You can't match that fiber to a specific garment, can you?

Q: Do you have any idea how many garments are made every year with that kind of fiber?

- Emphasize problems with the chain of custody/evidence handling:

Q: The victim's clothing was stuck in a bag, right?

Q: It wasn't air-dried, was it?

Q: Are you familiar with your department's protocols on how to gather blood-stained evidence?

Q: The officers didn't follow their own department's protocols, did they?

- Point out possible sources of contamination:

Q: The officers put the suspect's clothing in the trunk of their car, didn't they?

Q: They kept their own guns in that trunk, didn't they?

Q: Their own guns can deposit gunshot residue onto the interior of the trunk, right?

- Bring out lack of qualifications or bias:

Q: You work at a police lab, right?

Q: You see these officers every day, don't you?

Q: You socialize with these officers, don't you?

Q: So you're being paid $700 an hour to testify for the defense about hair evidence in general, right? Even though you never examined the actual hair samples in this particular case, right?

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Source: Criminal Law/Scientific Evidence in California Criminal Cases/9 Fingerprints/Chapter Outline

9

Fingerprints

John E. Costain
Lyn Haber, Ph.D.

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I. FORENSIC FINGERPRINT IDENTIFICATION

§9.1 A. History and Background

Fingerprint comparison is the most venerable of the forensic identification tools in use today. The admission of fingerprint comparison testimony indicating that an unknown fingerprint left at a crime scene matches that of a suspect was first approved in the United States in 1911 in the case of *People v Jennings* (Ill 1911) 96 NE 1077. In just a few years, fingerprint comparison became a widespread forensic identification technique in the United States. In the past 10 years, however, in nearly every state, the scientific basis of fingerprint comparison has been challenged in *Daubert* and *Frye* hearings. (For a list of courts and cases and to access written reports, holdings, and transcripts, see the Onin nonprofit website, maintained by Ed German, at http://onin.com/fp/daubert_links2.html (visited Apr. 5, 2009).) The majority of courts have upheld the 100 years of precedent but without responding to the *Daubert* issues raised.

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B. Terminology and Definitions

§9.2 1. Properties of Fingers

The surface skin of fingers, palms, and feet consists of intricate patterns of ridges and grooves that develop between the 11th and 20th week of fetal gestation. This patterned skin, called "friction ridge skin" (because it assists with grasping), arises as a combination of genetic and random environmental factors.

Fingers are three-dimensional, their outer skin is flexible and stretchy, and along the ridges of their skin are irregularly spaced pores that exude substances loosely referred to as sweat. Oil in skin combines with these substances so that when the friction ridges of a finger touch a surface, they are likely to leave behind an image of themselves known as a fingerprint.

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§9.3 2. Fingerprints

"Fingerprints" are images of the friction ridge skin on fingers. Fingerprint evidence introduced in court is based on images produced by fingers. These images are two-dimensional and therefore distort the patterns of three-dimensional fingers in much the same way that a map of the earth distorts the shape of countries found on a globe. The patterns of friction ridge skin are further distorted by changes in direction and pressure each time the flexible skin of a finger touches a surface. As a consequence of the stretchiness of the skin, no two images of the same finger are ever identical. It is impossible to lay one image from a finger on top of a second image from the same finger and find a perfect overlap.

Fingerprint images may be separated into two types: exemplars (known prints acquired under controlled conditions) and latents (unknown prints, typically left inadvertently). The finger that made the print is called the "donor finger."

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Source: Criminal Law/Scientific Evidence in California Criminal Cases/9 Fingerprints/§9.4 a. Exemplars

§9.4 a. Exemplars

Exemplar fingerprints can be recorded on a standard paper card using either ink or chemicals or, digitally, using a scanning device. A scanner captures images of the fingers when the fingers are pressed lightly against a glass platen. Saferstein, Criminalistics: An Introduction to Forensic Science, p 438 (9th ed 2007). Each fingerprinting method is intended to capture the maximum amount of clear detail of the friction ridge patterns in the most information-rich part of a finger's surface. FBI, *Taking Legible Fingerprints*, available at http://www.fbi.gov/hq/cjisd/takingfps.html (visited May 27, 2010).

With either method, first, each finger in succession is rolled from one side to the other creating so-called "rolled" impressions, and then all five digits from one hand and then the other hand are pressed down simultaneously to create a "plain" or "flat" impression. Rolling the finger captures more detail across the surface of the friction ridge skin but creates distortion from side to side. The flat impressions contain the least distorted images of the detail-rich centers of the fingers and are used to verify the sequence and accuracy of the rolled impressions. When all ten fingers are imaged on the same fingerprint card, the collective image is called a "ten-print."

NOTE: The compulsory taking of physical identifying characteristics such as fingerprints does not implicate the Fifth Amendment to the U.S. Constitution. *People v Stuller* (1970) 10 CA3d 582, 594, 89 CR 158, citing *Gilbert v California* (1967) 388 US 263, 266, 18 L Ed 2d 1178, 1182, 87 S Ct 1951 (handwriting exemplars).

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§9.5 b. Latents

A latent fingerprint is an image of a finger left under uncontrolled conditions, such as those encountered at a crime scene. The majority of latent prints lack sufficient detail or clarity to be used to identify someone. The following factors affect the quality of a latent for comparison and identification purposes:

- **Size.** On average, a latent is one fifth the area of a rolled exemplar, thereby providing only a partial image of the overall pattern.
- **Absence of focal features.** Many latent prints are missing the information-rich "core" and/or "deltas" (see §9.6), that enable the examiner to orient the image for comparison.
- **Contrast.** When the contrast between ridges and grooves is poor, features are difficult to determine.
- **Pressure.** Excessive downward pressure of a finger on a surface obliterates the detail of the friction ridge pattern while insufficient pressure fails to produce a useable image; lateral pressure produces distortion and smears the ridge pattern.
- **Dirt.** Dirt can alter the appearance of ridge detail.
- **Patterned surfaces.** Wood grains and other patterns inherent to a surface where a print is left can mimic and thereby obscure friction ridge patterns.
- **Irregular surfaces.** Uneven surfaces produce images that distort the distance between the ridges and grooves in friction ridge skin.
- **Overlaid prints.** When prints under- or over-lie each other, isolating a specific latent's pattern is difficult.
- **Viscosity.** The consistency of a substance, such as blood or oil, that produces a fingerprint image can distort the pattern of friction ridges.
- **Processing method.** The procedure used to make the print more visible can distort the appearance of the details and ridge characteristics.

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§9.6 c. Levels of Detail and Basic Patterns

As with toolmarks (see chap 11), three levels of detail are employed to describe a fingerprint. The first level is the overall pattern created by the flow of the ridges. There are three basic patterns: whorls, loops, and arches. A whorl is comprised of ridges that flow in a circle around the "core," or approximate center, of the fingerprint. See FBI, The Science of Fingerprints: Classification and Uses, p 14 (Rev. 12-84 1985). Whorls are also distinguished by two "deltas," or areas "where three ridge systems meet," located below (toward the palm) and on each side of the core. Ashbaugh, Quantitative-Qualitative Friction Ridge Analysis: An Introduction to Basic and Advanced Ridgeology (1999). Loops consist of one or more ridges entering from one side of the fingerprint, then curving back and exiting out the same side from which they entered. Loops have one delta on the opposite side from where the ridges flow in and out. Arches are formed by ridges that enter from one side of the print and exit out the other with a rise at the center. Saferstein, Criminalistics: An Introduction to Forensic Science, p 434 (9th ed 2007). Sixty to sixty-five percent of the population have loops, 30-35 percent have whorls, and roughly 5 percent have arches. Saferstein, Criminalistics, p 433.

NOTE: Some studies have indicated that different ethnic groups may have different proportions of Level I patterns. Swafford, *Fingerprint Patterns: A Study on the Finger and Ethnicity Prioritized Order of Occurrence*, 55(4) J Forensic Identification, 480 (2005).

The overall ridge pattern imparts class characteristics to a fingerprint. Class characteristics are not sufficient for individualization to a specific donor finger.

NOTE: In the late 1800s, in order to file and retrieve fingerprints for later comparison, Sir Edward Henry, an Englishman, created a classification system based on these three general patterns of friction ridges. See Saferstein, Criminalistics, pp 429, 435. The Henry system provided the basis for early computer search systems (see §§9.24-9.25) and modified versions of it are still in use in some jurisdictions. More complex classification systems break down further the three basic fingerprint patterns into plain or tented arches, radial or ulnar loops, plain or accidental whorls and double loop and center pocket whorls and add Level 2 details.

Level 2 details, often referred to as Galton points after Francis Galton, one of the pioneers in the field of fingerprint comparison and identification, are found along individual ridges. These ridge details, also referred to as "ridge characteristics" or "minutiae," consist of bifurcations (where the ridge splits in two like a river forking), ridge endings (abrupt stops), enclosures or lakes (where the ridge bifurcates and then rejoins itself), and single ridge segments known as "dots" or "islands." A fully rolled print, or exemplar (see §9.4), has on average 75-175 identifiable ridge characteristics. The type, number, and relative location of Level 2 details impart individuating characteristics to a print. Level 2 details are most commonly used to compare and individualize latent prints.

The third level of detail includes variations in ridge width and the location of pores. Most examiners look only to the overall pattern type (Level 1) and ridge details (Level 2) for fingerprint comparison purposes. Considerable controversy surrounds the stability of Level 3 details (see Office of the Inspector General, *A Review of the FBI's Handling of the Brandon Mayfield Case,* Department of Justice Special Report (Mar. 2006), available at http://www.usdoj.gov/oig/special/s0601/PDF_list.htm), and examiners disagree whether the third level of detail should be considered. For more terms and concepts related to fingerprint comparison, see the Scientific Working Group on Friction Ridge Analysis, Study and Technology (SWGFAST) Glossary (May 2009), available online at http://www.swgfast.org/documents/glossary/090508_Glossary_2.0.pdf.

A latent print may contain one, two, or three levels of detail depending on its clarity. The levels of detail may vary in different areas within the print.

NOTE: A recent, innovative approach to friction ridge pattern description has been proposed by David Ashbaugh, one of the most prominent fingerprint examiner-instructor-authors in the field (Ashbaugh, Quantitative-Qualitative Friction Ridge Analysis: An Introduction to Basic and Advanced Ridgeology (1999)). Ashbaugh focuses on the description of individual ridge paths in sequence. The examiner begins on a selected ridge and follows that ridge, recording changes in the ridge path and the minutiae along the path. This analysis is repeated on an adjacent ridge, and so on. This procedure, now used by the FBI, is not yet widely applied in this country.

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§9.6A C. Assumptions Necessary for Forensic Fingerprint Individualization

Identification of a single individual on the basis of fingerprint comparison requires several assumptions: (1) The friction ridge patterns on fingers are permanent and do not change with time; (2) the patterns on each finger of every individual are unique; (3) the patterns in every (well made) exemplar are unique; (4) the patterns in a latent (deemed suitable for comparison) can be matched only to the exemplar from the same finger that made the latent. The first two assumptions refer to fingers and are generally accepted. See Champod, Lennard, Margot & Stoilovic, Fingerprints and Other Ridge Skin Impressions (2004). The last two assumptions relate to fingerprints and are controversial.

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§9.6B 1. Evidence of Permanence of Friction Ridge Patterns on Fingers

Convincing research supports the assumption that friction ridge patterns are permanent. The surface skin of fingers (and palms and feet) sloughs off and is replaced in roughly 30-day cycles throughout a person's life, but the generating layer reproduces the identical surface pattern with each regeneration. Babler, 27(2) Birth Defects 27, 95, Original Article Series, *Embryologic Development of Epidermal Ridges and Their Configuration* (1991); available online at http://www.clpex.com/Information/Babler/Babler_W_1991.pdf.

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§9.6C 2. Evidence of Uniqueness of Friction Ridge Patterns on Fingers

Convincing research also supports the assumption that the chances of two fingers sharing the same friction ridge pattern are very small (but see the note in §9.25). Embryological research on the development of friction ridges shows that some of the pattern determinants are random, complex processes. Scientists generally accept that the probability that random, complex processes produce unique consequences is astronomically high. See Ashbaugh, Quantitative-Qualitative Friction Ridge Analysis: An Introduction to Basic and Advanced Ridgeology (1999).

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§9.6D 3. Evidence of Uniqueness of Friction Ridge Patterns in Exemplars

The assumption underlying exemplar-to-exemplar comparison is that all well-made exemplars from the same finger will be matched to one another but never to exemplars from other fingers. A single research study tested this assumption, using an automated computer search (see §9.25). Cole, Welling, Dioso-Villa, and Carpenter, *Beyond the Individuality of Fingerprints: A Measure of Simulated Computer Latent Print Source Attribution Accuracy,* 7(3) Law, Probability & Risk 165 (2008). The authors used a large database consisting of two different takes from each finger in the database. They asked the search system to produce ten candidates for each exemplar along with a similarity score. If the exemplar-to-exemplar assumption is correct, the true match, *i.e.*, the second take from the same finger, should have always received the highest similarity score. Instead, the authors found that two different exemplars from the same finger received the highest similarity score 75 percent of the time. Four percent of the time, the true match ranked anywhere from number 2-10. Twenty-one percent of the time, the true match was not even included among the top ten possible candidates, though it was in the database. These results suggest that some exemplars can be matched to another exemplar from a different donor, at least when a computer is rating similarity. Put another way, the uniqueness assumption fails for exemplars.

The Cole study corrected the flaws in an unpublished, oft-quoted "50K study" offered in testimony in *U.S. v Mitchell* (3d Cir 2004) 365 F3d 215. In the 50K study, the FBI, in conjunction with Lockheed-Martin, attempted to show that exemplars are unique (and match only other exemplars from the same finger). An automated computer system compared 50,000 left loop exemplars in the database to the same 50,000 left loop exemplars. The computer was astronomically correct in finding the correct exemplar. However, researchers criticize this study, because the computer algorithms compared identical images to themselves, a strategy unrelated to fingerprint comparison, which always involves the comparison of two different images of the same finger. See Wayman, *When Bad Science Leads to Good Law: The Disturbing Irony of the Daubert Hearing in the Case of U.S. v Byron C. Mitchell,* SJSU National Biometric Test Center (Feb. 2000) (available online at http://www.engr.sjsu.edu/biometrics/publications_daubert.html). Other critiques of the study are cited in Cole, *Grandfathering Evidence*: *Fingerprint Admissibility Rulings from Jennings to Llera Plaza and Back Again,* 41(3) Am Crim L Rev 1189, 1228 n165.

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§9.6E 4. Evidence of Uniqueness of Friction Ridge Patterns in Latents

The assumption underlying latent comparison is that the pattern in each latent (of value for comparison) is unique, so it will be matched only to exemplars from the finger that truly made the latent. Cole, Welling, Dioso-Villa, and Carpenter asked their automated search system to compare latents to exemplars to determine whether the true match would receive the highest similarity score. Cole, Welling, Dioso-Villa, and Carpenter, *Beyond the Individuality of Fingerprints: A Measure of Simulated Computer Latent Print Source Attribution Accuracy, 7*(3) Law, Probability & Risk 165 (2008). The similarity algorithms gave the true exemplar the highest score 70 percent of the time. Twelve percent of the time the true exemplar was included among candidates ranked 2-10. The candidate list failed to include the correct exemplar about 18 percent of the time, though the true match was in the database. Just as fatally for the latent uniqueness assumption, all of the false matches received higher similarity scores than the lowest scoring true match, and 34 percent of the true matches scored lower than the highest scoring false match.

The 2008 Cole study corrects the experimental errors in the second half of the FBI's 50K study where all but the center 20.7 percent of the 50,000 exemplars were masked off (the approximate size of a latent print) and compared with the full exemplar images from which they had been made. The computer was astronomically accurate in comparing full identities with partial identities. However, latent prints are typically poor in quantity and quality of information (see §9.5) and always are different takes from the exemplar. The FBI study used neither real latents nor realistic fingerprint comparison.

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D. Finding and Developing Latent Fingerprints

§9.7 1. Dusting

Crime scene technicians are charged with locating and developing (also called "visualizing") latent prints at a crime scene. The type of surface on which prints may be laid down determines the method used to detect and visualize them. The most common means employed by crime scene fingerprint technicians to develop latent prints on nonporous surfaces is dusting with a fine powder of contrasting color. The powder is applied to the surface and carefully brushed away. Some of the powder adheres to the oils left by the finger and reveals a pattern. Because this pattern is resting on a surface and can be easily wiped away, some method of preserving it is necessary.

The usual method is to place a piece of clear tape over the powder. When the tape is peeled away, the fingerprint pattern adheres to the sticky surface of the tape. The tape is then placed on a card and labeled. These "lifts" are used to compare with the exemplar fingerprints of a suspect. This method of developing and preserving latent prints is generally restricted to smooth surfaces, and it must be done fairly soon after the print is applied to the surface, because the oils in a print are volatile and can disappear in a fairly short time. This contrasts with prints that are left behind by the liquid substances exuded by the ridge skin (*e.g.,* sweat) on a porous substrate such as paper; the sweat strikes into the paper much like ink and can stay for an indefinite period of time.

NOTE: The duties of a fingerprint technician are not sharply defined. Depending on the personnel available to the investigating agency, the fingerprint technician may have additional crime scene duties such as collecting other types of evidence, photographing, and diagraming the scene. It is possible that the technician may also perform some duties generally associated with a crime laboratory, such as using chemical processes to develop prints (see §9.8) as well as classifying and identifying latent fingerprints. If the agency and lab are small, the latent fingerprint examiner also serves as a part-time crime scene technician.

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§9.8 2. Fuming With Cyanoacrylate

Another method for developing prints on nonporous surfaces, such as glass and plastic, is fuming with cyanoacrylate fumes that emanate from the adhesive known commercially as Super Glue. The object being tested for fingerprints is placed in an enclosed environment, known as a fume hood, along with the glue, which is gently heated to release its fumes. The fumes from the Super Glue react with the moisture and oils from the fingerprint, thus forming a visible image. See Saferstein, Criminalistics: An Introduction to Forensic Science, p 444 (9th ed 2007). This image can then be enhanced by the application of other chemicals that cause fingerprints to luminesce. The resulting image can then be preserved by photography for later comparison with known fingerprints of suspects. Because the fumes are toxic, this procedure is usually restricted to items that can be brought to a crime laboratory for examination.

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§9.9 3. Applying Ninhydrin

The development of latent fingerprints on porous surfaces, such as paper, takes advantage of another characteristic of the fluid exuded through the skin pores. Sweat contains amino acids. These amino acids can be made visible by applying various chemicals, such as ninhydrin, to the paper. The ninhydrin reacts with the amino acids in the fingerprints, resulting in a purplish image of the print. See Saferstein, Criminalistics: An Introduction to Forensic Science, p 444 (9th ed 2007). Because the fluid carrying the amino acids strikes into the surface and is thus relatively resistant to abrasion, and because amino acids are highly stable chemicals, prints can be developed using this means for a long time, perhaps as long as 30 years, after a finger touches a surface. Application of other chemicals can enhance the visibility of the prints developed by ninhydrin.

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§9.10 4. Other Methods of Detecting Latent Fingerprints

The methods outlined in §§9.7-9.9 are among the most common techniques used for locating and developing latent fingerprints, but they represent only a sample of the tools available to a crime scene technician or fingerprint examiner. For instance, prints can sometimes be detected on nonporous surfaces with ultraviolet lights without applying any powder or chemicals, or they can be revealed with chemicals that cause fingerprints to luminesce. For a detailed description of these and other techniques, see Lennard, *The Detection and Enhancement of Latent Fingerprints,* a paper presented at the 13th Interpol Forensic Science Symposium in Lyon, France, in October 2001; for the online version of this paper, go to http://www.interpol.int/Public/Forensic/IFSS/meeting13/SpecialPresentation.pdf (visited May 27, 2010). For an excellent discussion of basic techniques for developing latent fingerprints, see Saferstein, Criminalistics: An Introduction to Forensic Science p 445 (9th ed 2007). For additional discussion of chemical methods for the development and enhancement of latent fingerprints, see Exline et al., *Forensic Applications of Chemical Imaging: Latent Fingerprint Detection Using Visible Absorption and Luminescence,* 48(5) J Forensic Sci 1047 (Sept. 2003); for the online version of this article, go to http://www.astm.org.

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§9.11 5. Computer Enhancement

Computers can be used to enhance the quality of latent fingerprint images. Smudged or otherwise obscured latent fingerprints can be digitally enhanced, much like a poor photograph or badly reproduced map. Using software such as Adobe Photoshop, experts are able to produce a clear image of a fingerprint, even in situations where the fingerprint may have begun its forensic life as an undecipherable smudge. Digitally enhanced fingerprint evidence was held to be admissible in *State v Hayden* (Wash App 1998) 950 P2d 1024 (using *Frye* standard (*Frye v U.S.* (DC Cir 1923) 293 F 1013, superseded by Fed R Evid 702 as stated in *Primiano v Cook* (9th Cir 2010) 2010 US App Lexis 8859), and in *State v Hartman* (Ohio 2001) 754 NE2d 1150, 1164 (using standard similar to federal standard announced in *Daubert v Merrell Dow Pharms., Inc*. (1993) 509 US 579, 125 L Ed 2d 469, 113 S Ct 2786). For detailed discussion of the use of digital imaging to enhance fingerprints, see Saferstein, Criminalistics: An Introduction to Forensic Science, p 452 (9th ed 2007).

PRACTICE TIP: Defense counsel should explore carefully the history of a courtroom latent fingerprint display, especially when the software used does not maintain records of the steps used to create the enhanced image.

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II. LATENT FINGERPRINT EXAMINERS

§9.12 A. Where They Work

Many examiners work in crime laboratories maintained by local police and sheriff agencies, the Department of Justice, or the FBI. In small jurisdictions, the fingerprint examiner may also work crime scenes as a technician. A few fingerprint examiners maintain private practices and are available for hire by attorneys. See, *e.g.,* the Forensic Identification Services' website at http://www.forensicidservices.com.

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§9.13 B. Task

The latent fingerprint examiner's task is to compare a crime scene latent to a suspect's exemplar. The latent fingerprint examiner uses a comparison methodology (see §9.17) to determine whether the latent fingerprint associated with a crime can be individualized to an exemplar fingerprint from a known suspect. Until 2009, "individualized," also loosely referred to as "identified" or "matched," meant that a latent was made by the suspect finger to the exclusion of all other fingers in the world. Ashbaugh, Quantitative-Qualitative Friction Ridge Analysis: An Introduction to Basic and Advanced Ridgeology (1999). See §9.22.

NOTE: Counsel should be extremely sensitive to the fact that in addition to assuming that friction ridge patterns on fingers are unique and permanent, the fingerprint identification profession relies on an untested and unspoken assumption that a competent fingerprint examiner can individualize an impoverished, partial, and distorted poor quality latent in which the friction ridge pattern is incomplete and ambiguous. Common sense suggests it is highly likely that a poor latent could be "matched" to more than one exemplar. See, *e.g.,* the *Mayfield* error discussed in §9.38 and the 2008 Cole, Welling, Dioso-Villa, and Carpenter study described in §§9.6D-9.6E.

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§9.14 C. Training

Many fingerprint examiners acquire their skills through on-the-job training, occasionally supplemented by seminars put on by law enforcement agencies and professional organizations. At present, there are no standardized degrees, courses, or training programs required of forensic fingerprint identification professionals. Consequently, there is enormous variation in education and training among examiners who testify in court. FBI fingerprint examiners, however, are required to have a bachelor's degree (preferably in a science) and 2 years of in-house training; plus, they must pass a 3-day certifying examination. See *U.S. v Plaza* (ED Pa 2002) 188 F Supp 2d 549 n2.

Both the FBI and the International Association for Identification (IAI), the self-proclaimed "world's oldest and largest forensic organization," offer courses in fingerprint classification and comparison. For the online resources of these two organizations, see http://www.fbi.gov/hq/cjisd/fingerprint_training.htm and http://theiai.org/education.

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§9.15 1. Certification

The International Association for Identification (IAI) offers certification to fingerprint examiners. To obtain IAI certification, a fingerprint examiner must meet specific criteria with respect to education and experience as well as pass an examination. A single erroneous identification on the examination precludes certification and bars the applicant from reapplying for 1 year. See item G.9 at http://www.theiai.org/certifications/latent_print/requirements.php (visited May 27, 2010). Fewer than 10 percent of practicing fingerprint examiners are IAI certified. For information on the pass rates of examiners for IAI certification, see §9.37.

The FBI and a few other agencies offer their own certification on completion of their own training requirements.

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§9.16 2. Professional Organization

The profession recognizes the need for more uniform training and quality assurance standards. The Scientific Working Group on Friction Ridge Analysis, Study and Technology (SWGFAST) (see http://www.swgfast.org), sponsored by the FBI Laboratory and made up of members from federal, state, and local forensic science laboratories as well as from private practice, was set up in 1995 to establish consensus guidelines and standards for forensic fingerprint examination. Guidelines that have been approved by SWGFAST include the following:

- Friction Ridge Examination Methodology for Latent Print Examiners;
- Training to Competency for Latent Print Examiners;
- Guidelines for Latent Print Proficiency Testing Programs;
- Minimum Qualifications for Latent Print Examiner Trainees; and
- Quality Assurance Guidelines for Latent Print Examiners.

These and other guidelines are posted on the SWGFAST website. The website also features a glossary of terms commonly used in fingerprint analysis.

NOTE: These guidelines are recommendations only. Fulfillment of these guidelines is neither required nor monitored. Moreover, neither "competency" nor "proficiency" has been defined by the profession.

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§9.17 III. ACE-V COMPARISON METHOD

The purpose of fingerprint comparison is to determine whether there is sufficient similarity between two prints to support an opinion that they were left by the same person. The FBI, the International Association for Identification (IAI), and a majority of examiners who testify in the United States refer to the method of fingerprint comparison that they employ as "ACE-V," an acronym for "analysis, comparison, evaluation, and verification."

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§9.18 A. Analysis

In the analysis stage, the examiner observes and records information visible in the latent, *e.g.,* the kind and direction of the pressure that left the latent, the characteristics of the surface on which the latent was left, and the matrix that created the latent (such as sweat or blood). The examiner also notes the processing procedure used to visualize the print (see §§9.7-9.10).

NOTE: Each procedure changes the latent in specific ways, sometimes called the "signature" of the processing method. Ashbaugh, Quantitative-Qualitative Friction Ridge Analysis: An Introduction to Basic and Advanced Ridgeology, p 120 (1999).

The purpose of these observations is to predict ways in which the latent print is expected to differ from the as yet unseen exemplar. Recording these factors that contribute to distortion before comparing the latent to the exemplar prevents backwards reasoning—the reading of features from the exemplar into the latent. The examiner then makes a decision on whether the latent contains a sufficient quantity and quality of details for comparison or if it is of no value. If the latter, no further examination is made.

NOTE: Counsel should be aware that "no value" prints are typically discarded. This practice prevents the possible exclusion of a suspect if Level 1 characteristics (see §9.6) permit. If the print is of value, the examiner selects an information-rich area of detail for comparison. There is no objective measure of either quantity or quality of detail in a fingerprint. Proficiency test evidence shows that examiners disagree on whether the same latent is of value.

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§9.19 B. Comparison

During the comparison stage, the examiner looks at the latent and exemplar side-by-side with a magnification device and compares the specific minutiae and their relative locations for similarity. The examiner must decide whether the evident differences are accounted for by distortions or differences due to two different donor fingers. During the comparison, the examiner makes a choice: He or she can exclude the suspect exemplar as the donor or continue the comparison process.

NOTE: The presence of a single two-donor difference is grounds for exclusion. Thornton, *The One-Dissimilarity Doctrine in Fingerprint Identification,* 32(306) Int'l Crim Police Rev 89 (1977); SWGFAST Standards for Conclusions (2004). Not all examiners are aware of the single discrepancy rule, and one prominent examiner has asserted that if the examiner has found a sufficient number of matching characteristics, two-donor pattern differences cannot occur. Leo, *Distortion Versus Similarity in Friction Ridge Skin,* 48 J Forensic Identification 125 (1998). There is no objective description of either distortion or of two-donor difference. Research shows that skilled examiners disagree over whether the same latent-exemplar pair consists of one or two different donors. See, *e.g.,* Evett & Williams, *Review of the 16 point Fingerprint Standard in England and Wales,* 46 J Forensic Identification 49 (1996).

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§9.20 C. Evaluation

In the evaluation stage, the examiner determines whether there is sufficient agreement between the details and their relative locations in the latent and exemplar prints to conclude that the impressions were left by the same source (*e.g.,* the suspect). The examiner is permitted one of two conclusions: "individualization" (identification) or "inconclusive." Expert opinion varies about the number of similarities two prints must share before they can be attributed to a single source.

The Scientific Working Group on Friction Ridge Analysis, Study and Technology (SWGFAST) Glossary (May 2009), available online at http://www.swgfast.org/documents/glossary/090508_Glossary_2.0.pdfequates individualization and identification, and defines individualization as the "determination of an examiner that there is sufficient quality and quantity of detail in agreement to conclude that two friction ridge impressions originated from the same source." See also §9.13. The report of the National Research Council of the National Academies is critical of this absolute testimony in the absence of validity data to support it:

Given the general lack of validity testing for fingerprinting; the relative dearth of difficult proficiency tests; the lack of a statistically valid model of fingerprinting; and the lack of validated standards for declaring a match, such claims of absolute, certain confidence in identification are unjustified. Strengthening Forensic Science in the United States: a Path Forward, chap 5, *Description of Some Forensic Science Disciplines*, p 141 (2009) quoting Mnookin, *The Validity of Fingerprint Identification: Confessions of a Fingerprinting Moderate*, 7 Law, Probability and Risk 111 (2008).

In response, Robert Garrett, president of the IAI, suggested that members "not assert 100 percent infallibility (zero error rate) when addressing the reliability of fingerprint comparisons." R.J. Garrett, 39 Identification News 14 (Apr./May 2009). Mr. Garrett did not provide information about what an examiner could assert.

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§9.21 1. Point System

Around the world, fingerprint examiners employ different standards for arriving at the conclusion that two fingerprints came from the same source. Some countries require two prints to share a certain minimum threshold number of "Galton points" (see §9.6) in the same spatial relationship to each other before they can be considered as left by the same source. Examiners in Argentina and Brazil require 30 points in common, while those in France demand 24, and those in Italy use 16 or 17.

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§9.22 2. Subjective Sufficiency Standard

Examiners in the United States, Canada, and the United Kingdom, however, do not use a point system. See *U.S. v Mitchell* (3d Cir 2004) 365 F3d 215, 220. Instead, they use a subjective standard, a practice endorsed by the FBI and the International Association for Identification (IAI). The final call regarding identification is left up to individual examiners, after they have analyzed prints in their "totality," assessing, based on their individual experience and training, both the quantity and quality of points of similarity.

NOTE: Many examiners in the United States continue to refer to a numerical point system. Examiners may suggest that a minimum 8, 10, or 12 points of similarity support an identification. See, *e.g.,* Thornton, *Setting Standards in the Comparison and Identification,* Presentation at the 84th Annual Training Conference of the California State Division of IAI, Laughlin, NV (May 9, 2000); for the transcript of this presentation, go to http://www.latent-prints.com/Thornton.htm (visited June 1, 2010). Research shows that skilled examiners disagree over whether the same latent-exemplar pair is an identification. See *e.g.*, Evett & Williams, *Review of the 16 point Fingerprint Standard in England and Wales,* 46 J Forensic Identification 49 (1996).

PRACTICE TIP: Counsel might ask what in the examiner's experience or training justifies the identification and point out through further questioning that it is possible for different examiners as a result of their different training and experience to come to a different conclusion about the same latent-exemplar pair as illustrated by Evett & Williams, *Review of the 16 point Fingerprint Standard in England and Wales*, 46 J Forensic Identification 49 (1996).

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§9.23 D. Verification

In the verification stage, a second examiner reviews the findings of the first. Both the FBI (see Stacey, *Report on the Erroneous Fingerprint Individualization in the Madrid Train Bombing Case,* 54 J Forensic Identification 706 (2004)) and the Office of the Inspector General (see *A Review of the FBI's Handling of the Brandon Mayfield Case,* Department of Justice Special Report (Mar. 2006)) recommend "independent verification"; the second examiner should be unaware that the two prints have already been compared and identified. Independent verification is rare in practice.

NOTE: Leading fingerprint examiners and textbooks assert that the analysis, comparison, evaluation, and verification (ACE-V) method, properly applied, is virtually error-free. See, *e.g.,* the discussion of Steven Meagher's testimony in *U.S. v Plaza* (ED Pa 2002) 188 F Supp 2d 549, 554; FBI, The Science of Fingerprints: Classification and Uses (Rev. 12-84 1985). However, a number of research and legal scientists question whether ACE-V is a scientific method at all (see, *e.g.,* Haber & Haber, *Experiential or Scientific Expertise,* Law, Probability and Risk, doi:10.1093/lpr/mgm024 (Oct. 10, 2007), available at http://www.lpr.oxfordjournals.org/cgi/reprint/mgm024v1.pdf, visited June. 1, 2010) and concur that there is no evidence that application of the ACE-V method produces correct (valid) conclusions. See also the quote from the report from the National Research Council of the National Academies Report in §9.20. Acknowledging these and other critics, the court in *U.S. v Rose* (D Md 2009) 672 F Supp 2d 723, 726, nonetheless found that fingerprint evidence based on ACE-V methodology is generally accepted in the relevant scientific community and sufficiently reliable to be admissible under Fed R Evid 702.

For further discussion of the ACE-V system, Levels 1-3 of impression detail (see §9.6), and the standards for identification in the context of a *Daubert* hearing, see *U.S. v Mitchell* (3d Cir 2004) 365 F3d 215, 220. For a comprehensive and critical review of ACE-V, see Haber & Haber, Challenges to Fingerprints (2009).

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IV. COMPUTER SEARCH SYSTEMS

§9.24 A. History and Background

If a latent print is recovered from a crime scene but the police have no suspects from whom to obtain exemplar prints for comparison, then the normal procedure is to submit the latent to an automated computer search system.

The first functioning automated search system was developed for the FBI in 1980. Very shortly thereafter, other systems were developed and sold to local and state law enforcement agencies. Because the search algorithms and files of exemplar prints differed, most of the automated systems were incompatible with each other and examiners did not have access to different databases.

The FBI led the way to require compatibility among the different systems, which permitted the merging of different database files. While individual cities and states and combined states continue to maintain their own databases, an examiner in a crime laboratory now has access to a number of databases, including the FBI's and the nearly half-billion exemplars stored therein. McCabe, *Fingerprint Interoperability Standard* in Ratha & Bolle, eds., Automatic Fingerprint Recognition Systems (2004).

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§9.25 B. Automated Fingerprint Identification System (AFIS)

Single search automated systems are referred to by the acronym AFIS, which stands for Automated Fingerprint Identification System. The name is misleading because these systems are designed not to identify latents but to produce sets of similar exemplars. Comparison and verification remain the tasks of human examiners. In essence, the system presents a manageable number of possible candidates.

Search systems differ in the amount and kind of preprocessing the latent needs for submission. The AFIS technician or latent fingerprint examiner prepares a latent for submission by enlarging it and then highlighting some ridge paths, or locating and identifying specific minutiae. The technician then decides how many similar candidates he or she would like retrieved from the database. The searches can be narrowed by using filters, such as "male, Hispanic." The AFIS reduces the latent fingerprint to a digital code, then uses its algorithms to search against its stored database of ten-prints (see §9.4) to find the most similar exemplars.

PRACTICE TIP: Defense counsel should examine the original latent in relation to the prepared latent to ascertain whether the examiner interpreted ambiguous features in the original latent as certain in the prepared latent. If the examiner did so, then the defendant was found based on similarities in his or her exemplar to interpreted features in the prepared latent, not necessarily to features in the original latent.

The AFIS produces the number of candidates requested, accompanied by a rank or rating of similarity. If the examiner believes there is a likely match, he or she requests the original ten-print card to compare to the original latent.

NOTE: Since the operating assumption is that fingerprints are unique, all but one of the candidates produced by AFIS *must* be incorrect but all *may be* incorrect. If the donor is not in the database, then all of the candidates produced by AFIS must be incorrect.

The FBI's system is called the Integrated Automated Fingerprint Identification System (IAFIS). California's system is administered by the Department of Justice and is called CAL-ID. Cal-ID has 7.5 million files stored.

For more information on the FBI's IAFIS, go to http://www.fbi.gov/hq/cjisd/iafis.htm (visited June 1, 2010).

NOTE: As databases increase in size, so does the probability of a cold hit. A cold hit refers to the identification of a suspect where the *only* evidence linking him or her to the crime is the examiner's identification based on a latent produced by an AFIS search. Statistically, the probability that a cold hit is erroneous is extremely high. See Thompson, Taroni & Aitken, *How the Probability of a False Positive Affects the Value of DNA Evidence,* 48(1) J Forensic Sci (Jan. 2003), where the authors work through the statistical reasoning with respect to DNA hits, but the issues are applicable to cold hits in any discipline.

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§9.26 V. DISCOVERY

Whenever a party plans to present fingerprint evidence, opposing counsel's discovery request should encompass the following:

- Whether the examiner's laboratory is accredited, or seeking accreditation, by the American Society of Crime Laboratory Directors (ASCLD) (see §9.36);
- Copies of any written protocols the laboratory has for development of latent fingerprints or for comparison of latent prints with known prints;
- The methods by which the latent fingerprint was developed, either at the crime scene or in the laboratory, and by whom it was developed;
- Whether any procedure was used to enhance the latent fingerprint (see §9.11);
- Whether the latent print was preserved by photography or other means at each step from its location at the crime scene through the enhancement process and, if so, copies of the photographs;
- The training and qualifications of the fingerprint examiner, including, for example, whether the examiner's training conformed to the training guidelines recommended by the Scientific Working Group on Friction Ridge Analysis, Study and Technology (SWGFAST) (http://www.swgfast.org) (see §9.16);
- Whether the fingerprint examiner has participated in proficiency testing, either internal testing (see, e.g., *U.S. v Plaza* (ED Pa 2002) 188 F Supp 2d 549, 555 (describing FBI internal proficiency testing)) or interlaboratory testing such as that conducted by Collaborative Testing Services (CTS) (for discussion, see §9.36). If the examiner has participated in CTS testing, counsel should request discovery of the secret "Web Code" that identifies the examiner's crime laboratory and provides access to the laboratory's individual test results;
- Whether the examiner has qualified as an expert witness and, if so, how many times and in what courts;
- Whether the examiner's identification was independently verified by another examiner and, if so, the identity and qualifications of that examiner (see §9.23);
- Whether the latent was submitted to AFIS. If so, a copy of the latent in its submitted forms; a report from the AFIS technician describing the number of candidates requested and which filters, if any, were used; and a copy of the complete AFIS output, including all of the candidates produced and their rankings (see §9.25);
- Copies of any notes, diagrams, or photographs produced by the examiner documenting the comparison process;
- A fine copy of the original latent print;
- A fine copy of the suspect's exemplar ten-print (and every different exemplar if there is more than one); and
- Any courtroom exhibits the fingerprint examiner intends to use to illustrate the conclusions reached, typically side-by-side photographic enlargements of the latent fingerprint and the known fingerprints.

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VI. ADMITTING THE EVIDENCE

§9.27 A. Three Parts of Fingerprint Evidence

Fingerprint evidence generally consists of three parts:

- **A latent fingerprint on some piece of evidence relevant to an issue pertinent to the case, such as on a point-of-entry window in a burglary.** Typically, someone other than the testifying examiner will present testimony about the location of the print and the means used for its development.

- **A known print of the person to be identified.** Known prints are typically found on rolled print cards—again, usually taken by someone other than the testifying examiner. If a rolled print card came from police or other official records, care must be exercised lest incriminating evidence contained on the card be introduced to the jury. To avoid any possible prejudice, have a print card prepared just for use at trial.

- **Testimony from a qualified fingerprint examiner that the evidence print matches one of the known prints.** For discussion, see §9.29.

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B. Testimony of Fingerprint Examiner

§9.28 1. Qualifying Examiner as Expert Witness

Counsel seeking to qualify a fingerprint examiner as an expert witness typically will present to the court qualifications that fall into three general categories: (1) education and training, including professional certifications; (2) years of work experience; and (3) membership in professional organizations, such as the International Association for Identification (IAI).

Because of the absence of a standard course of study for fingerprint examiners (see §9.14), years of experience may be the most important factor in the witness's qualifications. Counsel qualifying the examiner should also draw the jury's attention to any contributions the witness has made to the profession, such as published articles or research projects, and to any professional honors or other recognition the witness has obtained. If the testifying examiner is known to be well qualified, then the opponent might offer to stipulate to his or her qualifications in order to lessen the impact of the testimony. The proponent of the evidence generally should refuse the invitation.

PRACTICE TIP: The proponent should offer the examiner as an expert at the conclusion of voir dire and should take time to formulate precisely the expertise on which counsel will call. For example, an offer that the witness is "an expert in the identification of latent fingerprints with known fingerprints of subjects" is better than a general offer that the witness is "a latent fingerprint examiner."

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§9.29 2. Presenting Examiner's Testimony on Print Identification

After qualifying as an expert witness, the fingerprint examiner typically will explain how the latent fingerprints in question came to his or her attention and how he or she compared them with known fingerprints from the suspect. The examiner will explain the process of comparison, usually illustrated with enlarged photographs of the latent impression and the exemplar fingerprint displayed side-by-side with the ridge characteristics forming the basis of the identification marked and numbered. The examiner will conclude with an expert opinion that the latent print and the exemplar print were made by the same person.

In many cases, the testimony of the fingerprint examiner will be admitted by stipulation. This generally will occur when the print is not particularly germane to the case, its presence is subject to some innocent explanation, or the source is conceded. A typical stipulation will be offered in the following form:

If ___[*the expert*] were called, ___[*he or she*] would testify that the latent print on ___[*evidence item*] was made by a subject whose known prints are on ___[*specify the fingerprint card*].

Such stipulations are usually offered in the interest of judicial economy. Of course, the substance of a fingerprint examiner's report may be offered in a criminal prosecution at the preliminary hearing pursuant to Pen C §872.

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§9.30 3. Sample Direct Examination Questions

Keep in mind that the following sample questions are suggestions only and that questions must be tailored to the specific case at hand.

NOTE: Many fingerprint examiners, like other expert witnesses, will provide the attorney with a list of questions covering their qualifications as well as pertinent questions about the examination process and the conclusions reached. There is no good reason for not using the questions provided, but counsel may prefer to develop his or her own line of questioning. Counsel and the witness should reach an agreement beforehand as to which questions to use. The testimony will go more smoothly if the witness and the questioner are on the same page.

- Introduce your expert to the jury and qualify the witness as an expert:

Q: What is your business or profession?

Q: By whom are you employed?

Q: In what capacity?

Q: How long have you been so employed?

Q: Is that your full-time occupation?

Q: What else do you do?

Q: What is you formal education?

Q: How much of your formal education was devoted to the comparison of latent fingerprints?

Q: Have you had any specialized training in the comparison of latent fingerprints?

Q: When?

Q: With whom did you study?

Q: What are his or her qualifications?

Q: Please describe the details of courses you have taken.

Q: How many hours were devoted to the examination and identification of latent prints?

Q: Did any of these courses result in degrees or certificates?

Q: What else was covered in this training?

Q: Have you worked under the supervision of qualified examiners?

Q: Who are those examiners and what are their qualifications?

Q: For how long did this supervised work go on?

Q: When did this supervised work take place?

Q: Did you study any books or other treatises during your training?

Q: Do you engage in ongoing education?

Q: Do you subscribe to any professional journals or newsletters?

Q: Do you attend seminars or other training sessions?

Q: Do you maintain a library of material related to latent fingerprints?

Q: Do you consult that library regularly?

Q: Do you belong to any professional societies or organizations related to fingerprint examination?

Q: What are the requirements for membership in these organizations?

Q: Do these organizations hold regular meetings?

Q: Do you participate on a regular basis?

Q: Do you [*or does your laboratory*] participate in any proficiency testing?

Q: Is the proficiency testing internal?

Q: Is the proficiency testing through an outside agency such as Collaborative Testing Services (CTS)?

Q: Describe the proficiency testing in which you engaged.

Q: How did you do on the proficiency tests?

Q: Have you previously testified as an expert witness on latent fingerprints?

Q: How many times?

Q: When?

Q: In what jurisdictions?

[*Offer the fingerprint examiner as an expert witness.*]

- Get the witness to explain the evidence and fingerprint identification procedure in general terms and in plain English:

Q: What is a latent print?

Q: What is a known print?

Q: What does a latent fingerprint examiner do with latent and known prints?

Q: What is the purpose of such examination or comparison?

Q: Could you briefly describe the comparison process?

Q: Does this process always result in an identification?

Q: Why not?

- Get the witness to explain the fingerprint identification in this specific case:

Q: Did you examine some materials in this case?

Q: Please describe what you examined.

Q: Showing you Exhibit ___[*the questioned material*]:

Q: Is this part of the material you examined?

Q: When?

Q: Where?

Q: At whose request?

Q: For what purpose?

Q: Was Exhibit ___ subjected to any physical or chemical process by you or others?

Q: For what purpose?

Q: As a result, were any identifiable prints developed?

Q: Please describe the location of the identifiable prints.

Q: Are all latent prints identifiable?

Q: Please explain.

Q: Showing you Exhibit ___[*the known prints of the suspect or other subject*]:

Q: Have you previously examined this Exhibit?

Q: When?

Q: Where?

Q: At the request of whom?

Q: For what purpose?

- Get to the conclusion:

Q: As a result of your examination of Exhibit ___[*the questioned material*] and Exhibit ___[*the known material*], have you reached any conclusions?

Q: What is your conclusion?

Q: Did you prepare any photographic enlargements from Exhibits ___[*the questioned and known material*]?

Q: For what purpose?

Q: Showing you Exhibit ___[*the photographic enlargement*], is this the photographic enlargement to which you referred?

Q: Was this enlargement prepared by you or at your direction?

Q: What does it represent?

Q: Using Exhibit ___[*the photographic enlargement*] as necessary, would you please explain to the court and jury the reasons for your conclusion?

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§9.31 VII. CHALLENGING THE EVIDENCE

There are several ways to approach challenging a fingerprint identification. The first approach questions whether fingerprint comparison evidence is admissible (*e.g.,* whether there is evidence of its validity); the second approach questions whether the evidence (once admitted) can be trusted as accurate; and the third approach accepts the validity of the identification, but explores innocent explanations for the fingerprint's presence.

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A. Admissibility

§9.32 1. Federal Courts: *Daubert/Kumho* Test

Two significant cases in which federal courts consider fingerprint evidence under the *Daubert/Kumho* test for the admissibility of expert testimony based on scientific, technical, and other specialized knowledge (see *Daubert v Merrell Dow Pharms., Inc*. (1993) 509 US 579, 125 L Ed 2d 469, 113 S Ct 2786, and *Kumho Tire Co., Ltd. v Carmichael* (1999) 526 US 137, 143 L Ed 2d 238, 119 S Ct 1167; California Expert Witness Guide, chap 4 (2d ed Cal CEB 1991)) are *U.S. v Mitchell* (3d Cir 2004) 365 F3d 215 and *U.S. v Plaza* (ED Pa 2002) 188 F Supp 2d 549. For discussion of the California standard of *Kelly/Leahy*, see §9.33.

In *Plaza,* a murder case, the court initially limited the use of fingerprint evidence on the ground that the underpinnings of fingerprint identifications did not meet *Daubert* standards. At the government's request, the court reconsidered its ruling, held a hearing on the admissibility issue, and reversed itself, thus allowing the evidence to be presented. The court allowed the evidence, notwithstanding concerns that *Daubert's* testing requirement had not been met, explaining that to postpone the admission of fingerprint comparison evidence "until academic investigators … have made substantial headway on a 'verification and validation' research agenda … would be to make the best the enemy of the good." *Plaza,* 188 F Supp 2d at 572.

In *Mitchell,* the defendant initially was convicted of robbery, in part based on fingerprint evidence. The case was reversed on appeal (on grounds unrelated to the fingerprint evidence) and was eventually retried. Prior to the retrial, the District Court conducted a *Daubert* hearing on the admissibility of the fingerprint evidence. Both sides presented experts, and numerous exhibits were submitted. The court ruled in the government's favor allowing the admission of fingerprint evidence but also stated that "this case does not announce a categorical rule that latent fingerprint identification evidence is admissible in this Circuit." *Mitchell,* 365 F3d at 246. The court, however, did suggest that its opinion should provide "strong guidance." *Mitchell,* 365 F3d at 246.

Although the vast majority of *Daubert* and *Frye* hearings have upheld the admissibility of fingerprint testimony, counsel should be aware of the increasing number of recent judicial decisions that have restricted or denied the admission of this testimony. Federal District Courts have excluded fingerprint identification evidence for the lack of evidence as to its validity, failing to meet the *Frye* test, and because examiners do not agree on a standard for the sufficient agreement necessary between two prints in order to effectuate an identification. At least one state trial court has excluded fingerprint identification evidence because there is no evidence of the validity of the ACE-V comparison method. See *Maryland v Rose* (MD Baltimore Cir Ct 2007) No. K06-0545. A pdf of the Memorandum of Decision issued by Judge Souder is available online at http://www.clpex.com/Information/STATEOFMARYLAND-v-BryanRose.doc (visited May 27, 2010). For more information on cases addressing fingerprint identification evidence, see the Onin nonprofit website, maintained by Ed German, at http://onin.com/fp/daubert_links2.html (visited May 27, 2010).

NOTE: For articles in which the authors question the reliability and admissibility of fingerprint evidence under *Daubert,* see, *e.g.,* Cole, *Grandfathering Evidence: Fingerprint Admissibility Rulings From Jennings to Llera Plaza and Back Again,* 41(3) Am Crim L Rev 1189 (Summer 2004); Epstein, *Fingerprints Meet Daubert: The Myth of Fingerprint "Science" Is Revealed,* 75 S Cal L Rev 605 (2002); and Haber & Haber, *Scientific Validation of Fingerprint Evidence Under Daubert,* 7(2) Law, Probability & Risk (2008). For a criticism of fingerprint evidence in general see Haber & Haber, Challenges to Fingerprints (2009).

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§9.33 2. California Courts: *Kelly* Rule

California courts have not adopted the *Daubert/Kumho* test for the admissibility of expert testimony based on scientific, technical, or other specialized knowledge (see *People v Leahy* (1994) 8 C4th 587, 34 CR2d 663), but instead follow the "general acceptance" test of scientific reliability for new or novel scientific techniques set forth in *People v Kelly* (1976) 17 C3d 24, 130 CR 144. For discussion of *Kelly* and *Leahy*, see chap 2.

At the time of this writing, the authors' research has turned up no published California cases squarely addressing the admissibility of fingerprint identification. Although the California Supreme Court has ruled on the admissibility of some peripheral fingerprint issues (see, *e.g., People v Farnam* (2002) 28 C4th 107, 159, 121 CR2d 106 (*Kelly* inapplicable to use of CAL-ID preliminary screening system); *People v Webb* (1993) 6 C4th 494, 523, 24 CR2d 779 (*Kelly* inapplicable to visualization technique based on use of laser illumination)), it has not ruled directly on the admissibility of latent fingerprint evidence. Thus, the question of admissibility apparently remains open and subject to challenge in California. Although the chances of prevailing on such a challenge are problematic, it should at least be considered in the appropriate case.

When challenging the admissibility of fingerprint evidence, defense counsel must consider whether the technique is an appropriate subject within the meaning of *Kelly*. It seems that the relatively recent spate of articles such as those by Epstein and Cole (see §9.32) that question the reliability and admissibility of fingerprint evidence under *Daubert* (see §9.32) suggest that the methodology should be deemed "new" or "novel" within the meaning of *Kelly* and that the long historical use of fingerprint identification is no bar to a challenge. See *e.g.*, *People v Leahy* (1994) 8 C4th 587, 605, 34 CR2d 663 (evaluating Horizontal Gaze Nystagmus as new or novel despite being used by law enforcement for over 30 years). See also courts citing to the report from the National Research Council of the National Academies (NAS Report) regarding the unreliability of the forensic identification sciences, *e.g.*, *U.S. v Rose* (D Md 2009) 672 F Supp 2d 723, 726 (finding fingerprint identification methodology nonetheless generally accepted and admissible) and Procedural Order: Trace Evidence issued March 10, 2010 by US District Court Judge Nancy Gertner (NAS Report raises profound questions that need to be addressed in every case before trial), available at http://www.clpex.com/TheDetail.htm?issue=450 (visited June 1, 2010).

NOTE: The witnesses used to establish the validity of fingerprint examination should not be the technicians or fingerprint examiners who usually testify in such cases, as they do not represent a relevant scientific community. *Leahy,* 8 C4th at 608; *People v Kelly* (1976) 17 C3d 24, 36, 130 CR 144. The relevant witness is a scientist trained in research methodology who is also knowledgeable about fingerprint evidence, methods of identification and published research in the field.

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§9.34 B. Hiring an Outside Expert to Reassess the Identification

Defense counsel may wish to consider hiring a private examiner to double-check the conclusions of the opposing examiner and to explore issues for cross-examination. Factors to consider when deciding whether to hire a private examiner include the following:

- How important is the fingerprint evidence to the case?
- The amount of "education" the attorney requires: Simply reviewing the report of the opposing examiner with a retained expert may prove helpful in disclosing weaknesses in the evidence that may not be obvious to an nonexpert. For example, a retained expert might be able to point out differences in the features, or their locations, between the latent and exemplar prints. A retained expert may also be able to suggest innocent explanations for the evidence.
- The cost and whether it can be justified.

NOTE: If a retained examiner wants to look at the original evidence and a court order for its production is obtained, then it is possible that the fact that an outside examination was done could become known to the jury (even if the retained expert does not testify) and be interpreted against the defendant. Counsel may wish to address this issue with an in limine motion.

PRACTICE TIP: It can be risky to offer testimony from a retained expert because with fingerprint identification, two well-qualified experts are likely to disagree only in shades of certainty, such as one expert supporting an identification and another expressing a more tentative but still affirmative conclusion or, at best, refusing to attest to an identification, citing ambiguous features in the latent. However, when a refusal to attest to an identification does occur, it can be powerfully influencing on a jury to acquit

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§9.35 C. Challenging Examiner's Qualifications

Before the fingerprint examiner expresses any opinion, but after the presentation of his or her qualifications, opposing counsel will have the opportunity to voir dire him or her. If there are any questions concerning the witness's qualifications on any of the grounds discussed in §9.14 or §9.28, it is probably a better practice to explore such shortcomings during voir dire. Shortcomings could include a lack of (1) education or training, (2) participation in proficiency testing, (3) certification, (4) membership in professional organizations, (5) publications or contributions to the field of latent comparison, (6) experience with latent print comparisons, and (7) error-free identifications. Questioning the examiner's qualifications during voir dire may dilute the impact of the expert's subsequent testimony and could limit the expert's opinion on substantive issues. Any advantage counsel has over the expert's qualifications and his or her credibility will be largely forfeited if counsel defers questioning until regular cross-examination, after the witness has already offered a conclusion to the trier of fact.

Opposing counsel may wish to request, in limine, to explore the expert's qualifications prior to trial, out of the presence of the jury. The advantage to questioning the witness away from the jury is that counsel gets a preview of the witness and cannot inadvertently help the prosecution's case in front of the jury by confirming the witness's expertise should his or her qualifications be better than previously believed or established by the prosecutor. However, counsel loses the advantage of "surprise" as well as the spontaneity of the expert's answers and attitudes before the jury. Also, with prior questioning, the expert may "fix" any weaknesses in his or her testimony regarding his or her qualifications by the time of trial. For sample questions challenging the examiner's qualifications, see §9.42.

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D. Challenging Reliability of Fingerprint Identifications

1. Examination Errors

§9.36 a. Proficiency Tests

The results of proficiency testing required for laboratories accredited by the American Society of Crime Laboratory Directors (ASCLD) suggest that fingerprint comparison is not error-free. Between 2004-2009, Collaborative Testing Services (CTS), an ASCLD-approved provider of proficiency tests, administered 12 latent fingerprint examinations. The number of responding participants in these tests ranged from 250 to 419. The percentage of participants who answered correctly varied from 89 percent to 97 percent. These statistics were obtained from the CTS Summary Reports of latent print examinations given 2004-2009; for the online version of these reports, go to http://www.ctsforensics.com/reports/main.aspx (visited June 1, 2010).

Proficiency tests have been criticized as an inaccurate measure of the reliability of fingerprint identifications. See Cole, *More Than Zero: Accounting for Error in Latent Print Identification,* 95(3) J Crim Law & Criminology 985 (Spring 2005) and Haber & Haber, *Error Rates for Human Latent Fingerprint Examiners* in Ratha & Bolle, eds., Automatic Fingerprint Recognition Systems (2004). Those who criticize claim the test comparison problems are far easier than comparison problems encountered in the field and note that the tests are unproctored, so examiners can work together. Consequently, test results underestimate examiner error.

NOTE: As of March 31, 2009, ASCLD no longer accepts new applications for accreditation under its Legacy Program. ASCLD continues, however, to monitor the compliance of all accredited laboratories through the proficiency testing program and through the continued review of Annual Accreditation Audit Reports until the expiration of the lab's accreditation. New applications for accreditation must be submitted under the ASCLD/LAB-International Accreditation Program. For more information on ASCLD crime laboratory accreditation and proficiency testing requirements, see the ASCLD website at http://www.ascld-lab.org.

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§9.37 b. Certification Tests

The present International Association for Identification (IAI) certification testing program began in 1977. From then until February 1, 2008, the average failure rate for examiners was about 46 percent, or nearly half of those who took the test. See IAI's 38(2) Identification News 24 (2008). In 2005, the time limits in which to take portions of the test were removed and the overall time period for completing the test was extended. Since then, the failure rate has declined to about 28 percent. Because there is no standard measure of latent difficulty, it is unknown whether the higher pass rate is due to better examiners, more time in which to take the test, or easier test items. Note that the applicants for certification are practicing examiners.

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2. Erroneous Court Identifications

§9.38 a. The Mayfield Case

After the bombing of commuter trains in Madrid in March of 2004, the Spanish police developed some latent fingerprints related to the case and asked other countries for assistance with finding the perpetrator. The FBI submitted the prints to their Integrated Automated Fingerprint Identification System (IAFIS) (for discussion, see §§9.24-9.25). One set of prints generated by the IAFIS as a possible match was identified by a senior FBI examiner as belonging to Mr. Brandon Mayfield, an Oregon attorney and former U.S. Army officer. The identification was verified within the FBI and confirmed by two outside examiners, one of whom had been appointed by the court. This identification proved to be wrong, and the FBI acknowledged their error in a statement released on May 24, 2004. For a copy of the FBI's press release, go to http://www.fbi.gov and search for "Mayfield." Links to additional information on the Mayfield case, and other recent fingerprint misidentifications, can be found at http://www.latent-prints.com/.

The FBI's erroneous identification of Brandon Mayfield has been carefully examined. Among the major causes attributed to the error are: the ACE-V method is not fully articulated, the examiner who performed the initial comparison used the exemplar to "clarify" features in the latent (see §9.20), and the verifications were not independent. See Stacey, *A Report on the Erroneous Fingerprint Individualization in the Madrid Train Bombing Case,* 54 J Forensic Identification 706 (2004), and Office of the Inspector General, *A Review of the FBI's Handling of the Brandon Mayfield Case,* Department of Justice Special Report (Mar. 2006); for the online version of the Special Report, go to http://www.usdoj.gov/oig/special/s0601/PDF_list.htm (visited May 27, 2010).

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§9.39 b. Other Documented Cases of Error

Simon Cole, author of *More Than Zero: Accounting for Error in Latent Print Identification,* 95(3) J Crim Law & Criminology 985-1078 (Spring 2005), lists 22 cases (including Brandon Mayfield's) in which examiner identifications attested to in court were shown to be erroneous. The majority of these identifications had been verified by one or two additional examiners.

A list consisting of 36 additional erroneous conclusions drawn by latent print examiners and 13 other errors related to the analysis of latent prints has been compiled by the Los Angeles County Office of the Public Defender for use in motions to exclude fingerprint comparison evidence. See the defense motion to exclude expert testimony on latent fingerprints in *United States v Titus Faison* (DC Superior 2008, case no. CF-16636).

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3. Criticism Within the Profession

§9.40 a. Report From the National Research Council of the National Academies

In their report titled *Strengthening Forensic Science in the United Sates: a Path Forward* (2009) (NAS Report), the National Research Council of the National Academies reviewed the state of forensic science in this country and made a number of recommendations. Chapter 5 of this report explicitly describes problems with fingerprint comparisons. The issues and recommendations contained in the report might support a challenge to the admissibility of fingerprint comparison evidence. The report notes the lack of standardized, formal training for latent print examiners and the lack of requirements for proficiency and certification testing. The report documents the need for quality control in the laboratories in which examiners work, including separation from law enforcement environments, procedures for the prevention of bias, and manuals that spell out standard operating procedures. The report asserts that the ACE-V method is not specified sufficiently to permit standardized training, assessment, or to guarantee similar conclusions between examiners. The report finds that examiners must make subjective assessments continually throughout the application of the ACE-V method and that there is no evidence for the validity of the conclusions based on that method.

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§9.40A b. Absence of Quality Controls

Members of the field of fingerprint identification describe the absence of quality control in the profession. There are no standardized requirements for the education, training, testing, supervision or assessment of examiners. In addition, there is no single accepted description of the ACE-V procedure that is adhered to across the profession or requirement that the examiner contemporaneously record the process that he or she followed while making an identification. Laboratory policies and procedures are not standardized and seldom documented and there are no processes in place for the elimination or prevention of bias on the part of the examiner from extraneous information about the case or the suspect. See National Research Council, Committee on Identifying the Needs of the Forensic Sciences Community, Strengthening Forensic Science in the United States: A Path Forward, chap 5, p 143 (2009); Haber & Haber, Challenges to Fingerprints (2009); Mnookin, *The Validity of Fingerprint Identification: Confessions of a Fingerprinting Moderate*, 7 Law, Probability and Risk 111 (2008).

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§9.40B c. Bias on the Part of Examiners

There is evidence that bias leads to erroneous conclusions in the forensic disciplines. See Risinger, Saks, Thompson, & Rosenthal, *The Daubert/Khumo Implication of Observer Effects in Forensic Science: Problems of Expectation and Suggestion*, 90 Cal L Rev 1 (2002). Studies have shown the effect on fingerprint comparison conclusions. See *e.g.*, Dror, Charleton, & Peron, *Contextual Information Renders Experts to Making Erroneous Identifications*, 56 J Forensic Identification 74 (2006) and Dror & Charlton, *Why Experts Make Mistakes*, 56 J Forensic Identification 600 (2006).

In two experiments, fingerprint examiners were given comparisons from their own earlier casework in which they had reached a definitive conclusion (identification or exclusion) to compare again. None of the examiners recognized the comparisons as familiar. When biasing information was provided (*e.g.*, the suspect confessed), 80 percent of the examiners in the first study disagreed with their earlier conclusion, drawing a new conclusion consistent with the biased information. In the second study, 67 percent of the examiners disagreed with their earlier conclusion, including 8 percent who changed their opinion even without the introduction of biasing information. When examiners disagree with themselves, at least one of their conclusions must be wrong. These results show that fingerprint conclusions are unreliable. The results also suggest that when an examiner is exposed to extraneous information that suggests a particular outcome from the comparison, that outcome becomes more likely.

A further experiment explored emotional and other motivating factors that might contribute to examiner bias. One example of an emotional factor that examiners reported as biasing toward an identification, was the feeling of satisfaction in solving crimes and catching criminals. See Charlton, Dip, Ug, Fraser-Mackenzie, Peter & Dror, *Emotional Experiences and Motivating Factors Associated with Fingerprint Analysis*, 55(2) J Forensic Sciences 385 (2010).

The National Research Council of the National Academies has highlighted the absence of bias control in crime laboratories. Strengthening Forensic Sciences in the United States: A Path Forward, (2009).

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§9.41 E. Innocent Explanations

Usually the most fruitful line of attack is to offer an innocent explanation for the presence of a fingerprint (such as prior access to the burgled premises or to a gun used in a homicide) and to argue that the print is of indeterminate age and unrelated to the events of the crime. Note that to point out the absence of defendant's fingerprints where those prints would be expected had the crime occurred as the State alleges is a weak argument because there is an array of plausible explanations for the absence of expected prints.

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Source: Criminal Law/Scientific Evidence in California Criminal Cases/9 Fingerprints/§9.42 F. Sample Cross-Examination Questions

§9.42 F. Sample Cross-Examination Questions

The following are sample questions that may be asked by counsel opposing fingerprint evidence. Keep in mind, however, that these questions are suggestions only and are neither exhaustive nor necessarily applicable to a given case.

- Bring out lack of education or training:

Q: Did any of your formal education have anything to do with latent fingerprint comparisons?

Q: How many courses?

Q: How much time in each course was devoted to the comparison and identification of latent fingerprints?

Q: What material did you study?

Q: What specialized training have you had in latent fingerprint analysis?

Q: When?

Q: Where?

Q: Who were the instructors?

Q: What materials were available for study?

Q: Were any of these courses correspondence courses?

Q: Did any of these courses result in degrees or certificates?

Q: As opposed to other aspects of fingerprint work, such as classification of fingerprints or development of latent prints at a crime scene, how many total hours of training have you had in the comparison and identification of latent fingerprints in course work?

Q: What materials do you have available for continuing study?

Q: Books?

Q: Periodicals?

Q: Training memorandums?

Q: Internet publications?

Q: Do you refer to or consult any of this material on a regular basis?

Q: Are any of these materials generally available to attorneys?

NOTE: This question is particularly pertinent when the testifying witness works in a law enforcement capacity.

- Bring out lack of proficiency testing:

Q: What sort of proficiency testing do you engage in?

NOTE: If the fingerprint examiner does not engage in proficiency testing, ask why not.

Q: Is the proficiency testing internal?

Q: Is the proficiency testing through an outside agency such as Collaborative Testing Services (CTS)?

- Point out problems with witness's comparison procedure:

Q: Did you use any procedures to enhance the latent fingerprint?

Q: Which procedures did you use?

Q: Are the photographs you presented today taken of the enhanced fingerprint?

Q: Do you have any photographs of the latent print before enhancement?

Q: Why not?

Q: Do the photographic enlargements you presented today illustrate all of the points on which you based your identification?

Q: Is it not true that a single difference between a questioned and known print requires a conclusion that the prints were made by different people?

Q: Are there any points different here between the latent and known fingerprints?

Q: How about ___? [*Here counsel can point out differences on the photographic display that he or she has located personally or with the assistance of a consulting expert.*]

Q: Does the photographic enlargement represent all the area of the disputed fingerprint?

Q: Why did you choose not to illustrate the entire fingerprint?

Q: Were there any differences in the unrepresented area?

- Point out the unknown error rate and problem of misidentification in fingerprint identification:

Q: What is the error rate in the identification of fingerprints?

Q: Do fingerprint examiners sometimes identify a latent print with a known print when this is not, in fact, true?

Q: Are you familiar with the Mayfield case?

Q: Have you read anything about it?

Q: Have you seen any photographs?

Q: Are you aware that a fingerprint related to the bombings in Madrid in 2004 was inaccurately identified with Mr. Mayfield?

Q: By the FBI?

Q: By an experienced private examiner?

NOTE: For discussion of the Mayfield case, see §9.38.

Q: Have you ever made a mistake in the identification of a fingerprint?

Q: If not, how do you know?

Q: If yes, please explain.

Q: What is the scientific basis for the identification of fingerprints?

Q: Has it ever been tested?

Q: By whom?

Q: What were the results?

- Bring out bias:

Q: How often have you testified as an expert witness in the identification of latent fingerprints?

Q: In a criminal case, do you always testify for the prosecution?

Q: Are you a salaried member of the prosecution team?

Q: Are you a peace officer?

[*When questioning a private fingerprint examiner:*]

Q: Were you hired by opposing counsel?

Q: For what purpose?

Q: How much were you paid?

Q: For your examination?

Q: For your testimony?

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10

Questioned Documents

John E. Costain

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I. QUESTIONED DOCUMENT ANALYSIS

§10.1 A. Handwriting as Primary Focus of Questioned Document Examination

The most common task of the questioned document examiner is determining the authorship of a document handwritten by someone. The skill that sets the questioned document examiner apart from other forensic scientists is the identification of handwriting. Questioned document analysis also includes detecting handwriting forgeries (see §10.3), determining whether particular machines were used to produce particular documents (see §10.4), detecting alterations in documents (see §10.5), and analyzing the paper and ink used in documents (see §§10.6-10.7).

Like fingerprint comparison, the field of questioned documents, and, in particular, the identification of handwriting, has a long history as a forensic tool. The first organized treatment of handwriting analysis is found in Osborn, Questioned Documents: A Study of Questioned Documents With an Outline of Methods by Which the Facts May Be Discovered and Shown (1910). A number of other texts have been published over the years, including several revisions and updates of the Osborn text, but it remains the basic text for all handwriting examiners to this day.

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§10.2 B. When Issue Arises in Criminal Cases

The issue of questioned documents arises in a variety of contexts, and questioned document experts testify to a variety of conclusions. For example:

- Handwritten entries of victims in defendant's address book. *People v Carter* (2005) 36 C4th 1215, 1233, 32 CR3d 838.
- Handwritten note left behind at murder scene. *People v Neal* (2003) 31 C4th 63, 70, 1 CR3d 650.
- Date altered on two documents defendant produced to support defendant's alibi. *People v Carpenter* (1999) 21 C4th 1016, 1032, 90 CR2d 607.
- Handwritten list of guns that had been stolen from the murder scene. *People v Hines* (1997) 15 C4th 997, 1018, 64 CR2d 594.
- Handwriting exemplars provided by defendant written with intent to disguise handwriting. *People v Tai* (1995) 37 CA4th 990, 996, 44 CR2d 253.
- Victim's husband's name signed by defendant on invoices from stolen credit card. *People v Hamilton* (1988) 45 C3d 351, 360, 247 CR 31.

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C. Other Questioned Document Issues

§10.3 1. Handwritten Forgeries

A questioned document problem related to handwriting, but not involving handwriting identification, is the detection of handwritten forgeries. Handwritten forgeries are accomplished either by a freehand simulation of genuine writing, or by some variation on tracing. Whichever method is used, a close examination of the line quality of the questioned writing usually discloses the forgery. Only rarely can a forger duplicate the free-flowing quality of genuine writing. The forgery will usually show signs of tremor, hesitation, low speed, and retouching.

Since a forger is deliberately attempting to emulate the writing of another person, his or her own writing habits are effectively eliminated. Only rarely can a particular forgery be attributed to a given person based on the handwriting evidence alone. See, *e.g.*, Hilton, Scientific Examination of Questioned Documents (rev ed 1982). As an example of when evidence other than handwriting itself may indicate that a questioned signature is not only a forgery, but also who the forger may be, consider a signature duplicated by tracing that is accomplished by placing a document with a valid signature over a strong light source, then placing the document to be forged on top of the valid signature. The forger can then trace the valid signature producing a legitimate-appearing copy. Such a traced forgery will usually exhibit the defects discussed, but show none of the writer's own writing habits. However, if the model signature that the forger traced is available, the forgery can be shown by a comparison of the two signatures. Anyone in possession of the model signature at the time the forgery was done becomes a prime suspect in its production.

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§10.4 2. Identifying Typewriters, Printers, Photocopiers, and Fax Machines

At one time, document examiners were often requested to identify the typewriter on which a typewritten document was produced. See, *e.g.*, *People v McKenna* (1938) 11 C2d 327, 333, 79 P2d 1065. However, the replacement of typewriters with computer printers has made the identification of typewriting virtually obsolete. Document examiners may still be called on to determine whether a particular printer, fax machine, or photocopier was used to produce a document. For example, uneven pressure on printer or fax machine rollers or nicks or gouges in the surface of the roller may leave distinctive ink marks on the printed document. Similarly, scratches or foreign material on the glass surface of a photocopier may leave distinctive marks on the photocopy.

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§10.5 3. Detecting Document Alteration

The presence of an alteration in a document, by either overwriting, erasing, or adding, can usually be detected by the use of physical means, such as infrared luminescence, low-level lighting or other lighting technique, or chemicals such as volatile solvents that can make a document temporarily translucent. For example, an addition to a document may have been made with an ink of a different chemical composition from the original material. Occasionally, this can be easily shown by an infrared photograph. Manipulations with computer programs can produce similar results. See Saferstein, Criminalistics: An Introduction to Forensic Science, chap 16 (9th ed 2007).

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§10.6 4. Analyzing Paper

The composition of paper often can be detected by chemical analysis. Papers differ from one another in the coatings that often are used to improve the surface properties for specific uses such as copying. Hilton, Scientific Examination of Questioned Documents, pp 82-85 (rev ed 1982).

Watermarks can also be used to identify paper. Traditionally, a watermark was made by making a pattern of raised wires on the surface of the mold used to impress paper. This raised surface made areas of the finished paper somewhat thinner than the body of the paper and these areas could be seen by transmitted light. Today, watermarks commonly are generated by a computer and are simply overlaid faint images. The age of a document, such as a will purporting to be several years old but produced on paper of a much newer vintage, may be of importance in a case.

For more information on watermarks or other questions related to paper production, see the website maintained by the Institute of Paper Science and Technology at Georgia Tech University. Go to http://www.ipst.gatech.edu and follow the "Search" button. For more information, see also the U.S. Secret Service's website regarding Forensic Services at http://www.secretservice.gov/forensics.shtml.

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§10.7 5. Analyzing Ink

Often inks that appear identical can be differentiated by physical or chemical means. One chemical means is the use of thin-layer chromatography in which a small sample is taken from a questioned writing by punching the written line with a hypodermic needle and subjecting the resulting microdot to chemical analysis. Saferstein, Criminalistics: An Introduction to Forensic Science, p 512 (9th ed 2007). Ink examinations frequently can determine that different inks were used to prepare a document, which can bear on the question of alteration or addition.

The ink used in a document may indicate when it was prepared by reference to some collection of standards, such as the 7000 samples maintained by the Secret Service in the International Ink Library. This library also reflects the earliest date a particular ink was introduced, and thus the earliest date a document could have been produced with that ink. For example, a document produced with a ballpoint pen must have been prepared sometime after the mid-1940s, because ballpoint pens were not available before then. For more information, see the U.S. Secret Service's website at http://www.secretservice.gov/forensics.shtml.

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II. THE FORENSIC DOCUMENT EXAMINER

A. Qualifications

§10.8 1. Education and Training

A questioned document examiner's education and training typically consists of a bachelor's degree at a minimum, followed by an extensive apprenticeship or on-the-job training. At the present time, there is no college degree offered or required in document examination, nor is there a recognized major in the field. The usual course of study is an undergraduate degree, preferably in a related forensic field, such as criminalistics, or a degree in some other branch of science. Postgraduate degrees are common in the field, but not generally required for employment.

Because there is no program of formal education available, a prospective questioned document examiner acquires his or her skill and experience in an apprenticeship program, typically in an established laboratory, or with a qualified private examiner. This apprenticeship program will usually last for 2 years and cover the identification of handwriting at a bare minimum. Other related fields such as the identification of typewriters, inks, and papers, along with related questions such as indented writing, obliterated writing, erased writing, and rubber stamps may be covered. These related fields encompass any means that may be used to prepare a document; various examiners may have somewhat less intensive training in these areas, but all questioned document examiners must develop expertise in the identification of handwriting.

NOTE: The terms "questioned document examiner" and "forensic document examiner" are synonymous, at least in the legal or forensic context. The term "questioned document examiner" has a more venerable history, appearing first in the literature in 1910 with the publication of Osborn's book (see §10.1). The term "forensic document examiner" came into use only much later with the establishment of various professional associations and certifying bodies. It is conceivable that a document may be questioned and not be forensic in nature—for example, the authentication of a historical document of some sort—but for readers of this book, the terms may be considered identical and to refer to the same set of skills.

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§10.9 2. Important Professional Memberships

An important qualification of a questioned document examiner is membership in the American Academy of Forensic Sciences (AAFS) and the American Society of Questioned Document Examiners (ASQDE). The AAFS (http://www.aafs.org) is an umbrella organization established in 1948 to serve the interests of those involved in the forensic sciences. In addition to document examiners, its membership includes a wide range of disciplines such as physicians, chemists, physical anthropologists, and attorneys, among others. The AAFS publishes *The Journal of Forensic Sciences,* perhaps the leading journal in the field of forensic science. The ASQDE (http://www.asqde.org) was organized in 1942 and is devoted strictly to questioned documents. It also publishes a journal, titled *The Journal of the American Academy of Questioned Document Examiners*. The websites for both organizations contain useful information including requirements for membership, agendas for upcoming meetings, obtaining material from their journals, and links to other resources.

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§10.10 3. Certification by American Board of Forensic Document Examiners (ABFDE)

The American Board of Forensic Document Examiners (ABFDE) is a certifying body for document examiners. See http://www.abfde.org. The Board was established by a grant from the Department of Justice and sponsored by the American Academy of Forensic Sciences (AAFS), the American Society of Questioned Document Examiners (ASQDE), and the Canadian Society of Forensic Science (CSFS). The minimum qualifications for certification by the ABFDE are (1) a baccalaureate degree, not in document examination as none is offered at the present time; (2) a full-time, at least 2 years or the equivalent, training program with a qualified laboratory or private examiner; and (3) full-time practice in document examination. Applicants for certification must also pass examinations administered by the ABFDE.

For cases in which courts have cited ABFDE certification as one factor in their determination that a handwriting expert's testimony was properly admitted, see, *e.g.*, *U.S. v Prime* (9th Cir 2005) 431 F3d 1147, 1153; *U.S. v Rutland* (3d Cir 2004) 372 F3d 543, 545 fn2; *U.S. v Mooney* (1st Cir 2002) 315 F3d 54, 62; see also *U.S. v Bourgeois* (5th Cir 1992) 950 F2d 980, 987 (lack of ABFDE certification cited as one factor in not allowing testimony of proffered handwriting expert).

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§10.11 4. Work Experience, Conferences, and Library Access

Questioned document examiners may also include among their qualifications:

- Work experience as a questioned document examiner over a number of years, including participation in apprenticeship programs, usually citing to one or more mentors;
- Conferences attended and papers presented or published; and
- Access to a library of relevant technical information and industry publications.

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§10.12 5. Guidelines Set by Scientific Working Group for Forensic Document Examination (SWGDOC)

There is a Scientific Working Group for Forensic Document Examination (SWGDOC) sponsored by the FBI for the purpose of establishing a set of guidelines for the practices and procedures used by professional forensic document examiners. These guidelines include procedures for the examination of questioned handwritten material as well as proposals for quality assurance and proficiency testing.

Guidelines for proficiency testing and documentation of examination techniques can be found online at http://www.fbi.gov/hq/lab/fsc/backissu/april2000/swgdoc1.htm.

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B. Methodology

§10.13 1. Side-by-Side Comparison; Handwriting Elements

A proper examination of handwriting requires sufficient samples of comparable questioned and known handwriting that are naturally executed. If adequate samples are available, an examiner conducts a side-by-side comparison, including a visual and a microscopic study. The comparison made is of several handwriting features, such as style, smoothness, size relationships, slant, spacing, curvature, angularity, and punctuation. Similarities and differences in various features have varying levels of significance, and the latter influence the examiner's conclusions.

Handwriting elements that a forensic document examiner may particularly focus on include (Hilton, Scientific Examination of Questioned Documents (rev ed 1982); Conway, Evidential Documents (1959)):

- **Style**, which refers to the overall impression the writing leaves in the mind of the viewer. Is it legible or so degenerated from the models taught in school that decipherment is difficult? Does it look practiced, which shows that the writer takes some care in the writing, or is it slapdash, showing little concern with the impression it leaves? Is it "mature," showing the writer is familiar with writing, or does it show signs of someone who does not use handwriting often?

- **Smoothness**, which generally refers to the speed with which the writing was done. A smooth writing flows from letter to letter and within separate letters. This can be determined from a microscopic examination of the writing line that will show features such as changes of direction in pen travel without pauses or hitches. Writing that is not smooth will show evidence of hesitation and frequent pauses. The writing line may be shaky and there may be globs of ink where the pen was resting on the paper for a period of time.

- **Size relationships**, which generally refers to the relative heights of letters within words. Are the capital letters appropriately larger than the small letters? Are some of the small letters either bigger or smaller than others?

- **Slant**, which refers to whether the writing slants excessively in one direction or the other. Does it have an exaggerated forward- or right-leaning slant? Does it slant backward or to the left? Is the writing upright, having no slant at all? Is the slant consistent?

- **Spacing**, which refers both to the space the writer leaves between words and to the space within words. Does the writing appear jammed together and cramped, or is it spread out?

- **Curvature and angularity**, which refer to the manner in which letters are formed by the writer. Does the writer use an overhand motion when forming letters, such as "m" or "n," that emphasizes the rounded or curved tops of such letters? Or does the writer use an underhand motion when forming such letters, rendering the tops of such letters into spikes and making an "n" for instance indistinguishable from a "u"?

- **Punctuation**, which refers not only to the manner in which punctuation marks are formed, but what use the writer makes of the various punctuation marks. Does the writer appropriately use commas and periods? How about colons and semicolons? Question marks? Exclamation points? Does the writer overuse dashes? Parentheses?

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§10.14 2. Basic Principles and Assumptions

Handwriting examination has basic principles or assumptions underlying the practice. In handwriting, two basic assumptions are that "no two people write exactly the same way" and "no person will write exactly the same way when repeating." *U.S. v Starzecpyzel* (SD NY 1995) 880 F Supp 1027, 1031. Handwriting identification is based on the principle that every person's handwriting is distinctive. The possibility that one person could imitate the handwriting of another and successfully deceive an expert document examiner is very remote. *People v Graves* (1966) 64 C2d 208, 211 n2, 49 CR 386.

In many respects the comparison and identification of handwriting is akin to that of identification of fingerprints (see chap 9). In both cases, the questioned and known material are examined side by side, and, if there are sufficient matching individual characteristics in each, an identification can be made. There are also some basic differences between handwriting and fingerprint identification. Handwriting is a human activity and is subject to a certain degree of control by an individual, either consciously or unconsciously, such as deliberate adoption of stylized signature initials; occupational choices, such as accounting or engineering, that can particularly affect hand printing and numerals; trauma, such as the loss of use of the usual writing hand; and illness, all of which distinguish handwriting identification from fingerprint identification.

Another principle of fingerprint identification that has no parallel in handwriting identification is that fingerprint patterns remain fixed throughout life. The fingerprints of an individual at 16 years of age are identical to those of the same person at age 60, whereas the signature of the same individual at age 60 is usually much different than it was at age 16. These caveats aside, most handwriting is identifiable if there is a sufficient amount of questioned material and a representative amount of known writing.

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§10.15 3. Effect of Writer's Deviation from Learned Handwriting Models

People learn to write by emulating models of letter formation that are found in textbooks or often on cards fastened to walls in classrooms throughout the country. Typically, teachers teach students to copy the models, and students perform exercises, such as making loops and garlands, to form the shapes presented to them. Strict training results in students not only forming the shapes of letters well but also forming them in the manner they were taught. These people generally produce writing that closely resembles the prescribed models into their adult years.

In contrast, and fortunately for the handwriting examiner, most writers began to develop individual methods for forming letters very early in their instruction, either because of their own limitations or because of the relative indifference of their instructors. Thus, by the time students reach high school, the handwriting of one individual can usually be distinguished from that of another.

Deviations from prescribed handwriting models are almost endless in their variability. Some variations from the prescribed models are intentional. A common example is the various ways writers make the dot over the *i*—some writers use an x, some a heart, some a star, and some nothing at all. Writers also intentionally introduce individuality into their signatures, perhaps enlarging the initial letters and letting the following letters degenerate into an indecipherable scrawl.

Other areas of deviation from the learned models are less intentional. Some people write with large letters and some with very small. Some people vary the proportions a great deal from what they were taught. Some make letters too tall, some make them too short. Some people stretch their writing out horizontally, some squeeze it together. Some enlarge some letters and minimize others. Some people form their letters upright and others exaggerate the slant of letters. Some will slant the letters to the left while others slant to the right. Some writers crowd the left margin with their writing, while others may crowd the right side of the paper. Some write on the line if one is provided. Some may write above the line and some may write below it. If there is no guiding line, some writers habitually write with a downward trend and others may write with an upward trend.

Another area of individuality in handwriting is the way in which people make numerals. Numerals can be formed in individual ways. For example, the numeral 2 may or may not have a loop at the lower left. The numeral 5 may be formed by a single stroke of the pen or by two. The numeral 8 may be formed like a snowman with two circles or it may be one continuous stroke. Handwriting examiners also note the relative proportions of the numerals as well as the position of numerals relative to each other. Symbols related to numerals such as dollar signs or dashes, likewise, may show a great deal of individuality.

PRACTICE TIP: The comments above relate primarily to cursive writing, but hand printing can also be full of individual characteristics, particularly if the writer uses hand printing a great deal. When printing, some people use a combination of upper- and lowercase letters while others use only uppercase, usually referred to as block printing. Some people may use an idiosyncratic mixture of upper- and lowercase, while others may use one version at one time and another for other occasions. Some writers will mix printing and cursive writing and may use the cursive forms with some particular letter combinations such as a "g" and an "h."

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§10.16 4. Effect of Normal Variations

Although it may be true that no two people write alike—an article of faith with questioned document examiners—it is also true that no person writes exactly the same on every occasion. In every questioned document situation, the questioned document examiner must take into account that normal variation is present in everyone's handwriting. The variation may be minute and inconsequential or it may be pervasive and, in itself, a mark of individuality, such as the occurrence of some letter in two or more forms in some established proportion. For example, if a writer uses two forms of a letter in his or her writing, and uses the forms in a given proportion of the time, say 50 percent, then this is a strong indication of individuality, even if the two forms are, in themselves, quite common. It may be a one-time variation based on some accidental circumstance such as an uneven writing surface. Whatever the reason for a given variation, the questioned document examiner must identify and consider it. For a further general discussion of these issues, see Hilton, Scientific Examination of Questioned Documents (rev ed 1982); Conway, Evidential Documents (1959).

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§10.17 C. Obtaining Handwriting Exemplar for Comparison

A document examiner performs handwriting analysis by comparing a known sample of handwriting to the document in question to determine if they were written by the same person. *U.S. v Prime* (9th Cir 2005) 431 F3d 1147; see *People v Snow* (2003) 30 C4th 43, 61, 132 CR2d 271.

NOTE: The identification of handwriting rests on the familiar basis of observing and evaluating individual characteristics (those characteristics developed by an individual over time) as opposed to class characteristics (those learned in the training of an individual and that may be more or less common to others with similar training).

Before any questioned writing can be associated with an individual, the examiner must obtain a standard or exemplar of the individual's writing. This exemplar must also be authenticated. The easiest, but not necessarily the best, form of handwriting exemplar is one that the defendant gives on request by a law enforcement officer or other person seeking a comparison with some piece of questioned writing. Handwriting samples can be compelled; they are not protected by the privilege against self-incrimination of the Fifth Amendment of the Constitution, because they provide a physical characteristic, rather than a testimonial communication. *Gilbert v California* (1967) 388 US 263, 266, 18 L Ed 2d 1178, 87 S Ct 1951; *People v Clark* (1993) 5 C4th 950, 22 CR2d 689, disapproved on other grounds by *People v Doolin* (2009) 45 C4th 390, 421 n22, 87 CR3d 209; see *People v Paine* (1973) 33 CA3d 1048, 1050, 109 CR 496.

A requested handwriting exemplar has both advantages and disadvantages. Advantages include ease of authentication, because the requester can watch the production of the exemplar and provide testimony to that effect. Second, the requested sample can be tailored to the document in question (*i.e.,* the requested writing can repeat the questioned material, such as a signature, a number of times and also provide unrelated material that can be used to assess the validity of the sample provided). Also, the requester may be able to replicate the circumstances surrounding the production of the questioned material. For example, if the questioned document is an endorsement on a check, the requester can use blank checks to collect samples and can ask the writer to use the same type of writing implement.

The main disadvantage to using a requested handwriting exemplar is that the exemplar may not be representative of the person's true writing, either because of an attempt to disguise the handwriting sample deliberately or from some other cause such as nervousness.

The requester may be able to overcome these shortcomings by asking for a large volume of material or by asking for samples at different times. Having a large amount of known writing helps provide an adequate basis for evaluating variation. For example, some feature of the questioned writing, such as an unusual letter form used occasionally by the writer, may be highly significant in the examiner's judgment, but if this particular feature is not represented in the known writing, the expert may not consider it in forming an opinion. On the other hand, a shortage of known writing is more typically the case, and this fact may not be important if the amount of individuality in the questioned and known material is sufficient for an opinion. This must be determined on a case-by-case basis. See Hilton, Scientific Examination of Questioned Documents (rev ed 1982); Conway, Evidential Documents (1959).

PRACTICE TIP: Another method for acquiring handwriting samples is for the requester to collect writing known to have been produced by the subject at some previous time when there was no motive to alter or disguise the handwriting. In such samples, the requester should make an effort to provide material comparable to that in question, both as to the content and method of preparation.

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D. Reliability of Handwriting Comparison

§10.18 1. Accuracy of Analysis

The field of handwriting comparison has been the subject of scholarly criticism on the ground that it has not been sufficiently studied to enable courts to determine whether document examiners' claims to expertise rest on solid footing. See Risinger, Denbeaux & Saks, *Exorcism of Ignorance as a Proxy for Rational Knowledge: The Lessons of Handwriting Identification Expertise,* 137 U Pa L Rev 731 (Jan. 1989).

Arguably, the identification of handwriting remains more of an art than a science. In the case of fingerprint analysis, attempts have been made to establish at least some scientific basis for the enterprise. By contrast, review of the handwriting examination literature has disclosed no such studies in the field, and, indeed, it is hard to imagine how such studies could be structured and carried out. Evaluation of the factors listed in *U.S. v Prime* (9th Cir 2005) 431 F3d 1147 illustrates the problem. The court uses words like "sufficient," "comparable," "naturally executed," and "varying levels of significance," but does not indicate any guidance about objective definitions of these terms. *U.S. v Prime, supra*. At least for the time being, these factors are subject to the examiner's skill, training, and expertise in evaluating their relative importance.

No one claims that handwriting identification is as accurate as fingerprint identification. In fact, fingerprint identification has been shown to be subject to error. The handwriting examiner is often forced to use qualifying terms when expressing an opinion, such as those referred to in *U.S. v Prime, supra*. The examiner's failure to reach a conclusive opinion, either positive (*i.e.,* an identification) or negative (*i.e.,* an elimination), may be due to one or more of several factors, assuming that the examiner is competent. First, the questioned material may be too meager in quantity and quality. The questioned material may be too short (*e.g.,* some simple initials) or too lacking in individuality (*e.g.,* "faceless" writing that does not vary much from standard forms).

On the other hand, the questioned material may be highly individual and identifiable, but the known writing does not adequately reflect the features found in the questioned material, either because there is not enough of it, or because the writing was not done under comparable circumstances to those surrounding the preparation of the questioned material. Another factor that may militate against a conclusive opinion includes forgeries (where the writer attempts to mimic the writing of another, or deliberately disguise his or her writing) that may occur either in the questioned or the known writing. This could effectively mask the writer's habits.

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2. Error Rates

§10.19 a. Forensic Science Foundation (FSF) Study

Even when examiners are sure of their opinions, there can be a substantial error rate in their findings. For example, the Forensic Science Foundation (FSF) provided proficiency test problems to a large number of government crime laboratories. In tests conducted between 1975 and 1987, the responding laboratories got the right answer, at best, 57 percent of the time. The results of these unpublished studies are reported in some detail in Risinger & Saks, *Science and Nonscience in the Courts: Daubert Meets Handwriting Identification Expertise,* 82 Iowa L Rev 21 (1996).

NOTE: The results of these tests should be viewed with some skepticism. They are old, it is not clear exactly who was taking the tests and under what circumstances, and it is not possible to accurately evaluate the test materials since the tests were unpublished. It is, likewise, unclear who the testers were and what qualifications they may have had to administer the tests. In addition, the results do not reflect the current performance in the tests administered by the Collaborative Testing Services (CTS) (see §10.21).

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§10.20 b. FBI Study

The next attempt to generate some reliable figures for accuracy was made by Professor Moshe Kam in a study commissioned by the FBI. Kam, *Writer Identification by Professional Document Examiners*, 42 J Forensic Sci 778 (1997). Professor Kam administered an exercise in matching known and unknown writing samples to three groups of questioned document examiners and a control group of nonexperts with similar educational backgrounds. There was no statistically significant difference between the experts and nonexperts in their ability to correctly identify handwriting samples that were written by the same source. But there was a substantial difference between the two groups in the number of false matches. The percentage of false matches made by professional document examiners was only 6.5 percent, whereas the percentage of false matches made by nonexperts was 38.6 percent. For varying views of the significance of these test results, compare Moenssens, *Handwriting Identification Evidence in the Post-Daubert World,* 66 UMKC L Rev 251 (Winter 1997) with Risinger, Denbeaux & Saks, *Brave New "Post-Daubert World"—A Reply to Professor Moenssens,* 29 Seton Hall L Rev 405 (1998). Professor Kam's study was cited by the court in *U.S. v Prime* (9th Cir 2005) 431 F3d 1147, 1153, in support of its conclusion that handwriting analysis has an acceptable error rate. See also *U.S. v Mooney* (1st Cir 2002) 315 F3d 54.

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§10.21 c. Proficiency Testing by Collaborative Testing Services (CTS)

Presently, proficiency testing is administered by Collaborative Testing Services (CTS), a firm established in 1971 to perform proficiency testing in a wide range of disciplines including forensics, and an approved provider of proficiency testing for the American Society of Crime Laboratory Directors (ASCLD), an association that accredits crime laboratories throughout the country and internationally. For more information on ASCLD, see http://www.ascld.org.

By 2001, CTS was providing proficiency tests for questioned document examiners, and a review of its results may prove helpful in evaluating the current state of the performance of handwriting examiners. In general, the responding laboratories did very well on the tests, particularly in recent years. For example, in the 2006 test, there were 157 participants in a problem involving two different writers on a document. 154 correctly identified one of the two writers—three results were invalidated for incorrect procedure—for a 100-percent accuracy rate. The other writing in the test did not match any of the questioned material, but two of the participants incorrectly identified this known writing with some of the questioned material, giving an error rate on this portion of the test of about 1.5 percent. In 2009, 148 of a total of 161 participants (92 percent) correctly decided that parts of a document had been altered.

Other tests given in 2005-2009 produced similar results, with accuracy rates ranging from 98 percent to 78 percent. For details, see the CTS website at http://www.ctsforensics.com/reports/main.aspx.

NOTE: Of course, the difficulty of the tests given cannot be evaluated here and it must be kept in mind that the testing is voluntary, that all laboratories do not participate, and that not all participants who receive the test complete the tasks and return the test to CTS. In any event, a wide range of examiners have reached correct results, at least on the tests given by CTS, in the recent past. This contrasts strongly with the much older Forensic Science Foundation (FSF) results (discussed in §10.19) and it is likely that the CTS results more accurately reflect the current state of reliability for the work of questioned document examiners.

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E. Admissibility of Evidence

§10.22 1. Challenges Under *Kelly* and the Evidence Code

At the outset of a case involving a questioned document, the attorney must decide whether to challenge the admissibility of the evidence. Challenges to admissibility of expert testimony can be based on contentions that the reliability of the evidence is unproven under the general holding of *People v Kelly* (1976) 17 C3d 24, 130 CR 144, should be barred as an inappropriate subject for expert testimony under Evid C §1417, or should be barred as cumulative and likely to confuse under Evid C §352. While it seems unlikely that any such challenge will prevail given the long history of the use of handwriting or other document evidence in the courts, it may be worthwhile in an appropriate case.

A *Kelly* challenge may be the most fruitful avenue. Research has disclosed no published California case that either supports or rejects the admission of questioned document expert testimony since the adoption of the *Kelly* standard in 1976, thus leaving the question at least arguably open. For a pre-*Kelly* case upholding the admission of handwriting evidence, see *People v Bullock* (1958) 166 CA2d 494, 497, 333 P2d 88, and for an unpublished case which may give some insight about how receptive the courts may be to a *Kelly* challenge today, see *People v Scott* (Feb. 7, 2007, D047709; not certified for publication) 2007 Cal App Unpub Lexis 974. For a detailed discussion of the procedure under *Kelly*, see chap 2. It seems that a minimum threshold requirement counsel should be prepared to meet is to demonstrate there is at least some question of the reliability of such expert testimony, perhaps by submission of the law review articles and studies cited in this chapter (see §§10.19-10.20). Such a showing would put the burden of establishing the reliability on the proponent of the evidence.

Another argument that can be made is that the identification of handwriting is within common experience and that no expert testimony is necessary. This proposition is clearly supported by Evid C §1417, which states, in part, "The genuineness of handwriting, or the lack thereof, may be proved by a comparison made by the trier of fact." See *People v Rodriguez* (2005) 133 CA4th 545, 554, 34 CR3d 886, and the cases cited therein. This argument can be joined with a contention under Evid C §352 that any expert testimony will only unduly consume time or create a substantial danger of prejudice, confuse the issues, or mislead the jury.

Opposing counsel should point out that Evid C §1417 is permissive only and that an expert opinion is likewise permitted under Evid C §1418 which reads, in part, "the genuineness, or the lack thereof, may be proved by a comparison made by an expert witness." Counsel and the court should also be mindful of the results reported by Professor Moshe Kam in a study commissioned by the FBI. Kam, *Writer Identification by Professional Document Examiners,* 42 J Forensic Sci 778 (1997). See §10.20. In short, Professor Kam found that when two writings were, in fact, written by the same person, lay witnesses got it right about as often as the professionals, but when two writings were not written by the same person, the lay witnesses were wrong at about 6 times the rate of the professionals (38.6 percent versus 6.5 percent). If Professor Kam's results fairly represent the results to be expected in the real world, it seems that the professional document examiner can provide the court and jury with the most reliable evidence, which should be the goal of any admissibility inquiry.

More intriguing situations may arise when two different experts have examined the materials and only one testifies. The second expert may not be available to testify for some reason (such as death or illness) or is just not called by either party to the action. To what extent can the testifying expert rely on the nontestifying expert's opinion in forming his or her own opinion? In the event of divergent opinions, can the testifying expert comment on his counterpart's findings? Can he or she be required to do so when no reliance was placed on the nontestifying witness's conclusions or observations? Such questions have been discussed in the context of medical and psychiatric testimony (see, *e.g., People v Clark* (1993) 5 C4th 950, 1013, 22 CR2d 689, disapproved on other grounds by *People v Doolin* (2009) 45 C4th 390, 421 n22, 87 CR3d 209), but there do not appear to be any cases in the questioned document area that provide any guidance.

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§10.23 2. Challenges Under *Daubert* in Sister State and Federal Courts

As with fingerprints (see chap 9), the adoption of the *Daubert* standard (*Daubert v Merrell Dow Pharms., Inc.* (1993) 509 US 579, 125 L Ed 2d 469, 113 S Ct 2786) has led to evidentiary challenges of handwriting identification testimony on reliability grounds in federal courts and in state courts that have adopted *Daubert*. Although California has not adopted *Daubert,* counsel may wish to take note of these challenges.

Many of the criticisms that have been applied to the methodology of fingerprint comparison have also been applied to handwriting comparison. See *U.S. v Crisp* (4th Cir 2003) 324 F3d 261, 270. Thus, it has been argued that the basic premise of handwriting analysis—the uniqueness of individual handwriting—has not been tested, that no error rate has been established for the techniques handwriting analysts use to determine authorship of documents, that there are no objective or numerical standards for determining a match, and that the discipline has not been subjected to critical examination and study. 324 F3d at 270; *U.S. v Starzecpyzel* (SD NY 1995) 880 F Supp 1027.

PRACTICE TIP: *Starzecpyzel* offers a useful and informative jury instruction on handwriting evidence that might be considered by an attorney involved in a handwriting case. 880 F Supp at 1050.

Challenges to expert handwriting comparison evidence have been more successful at trial than fingerprint comparison challenges. Although the majority of trial courts to consider the issue have upheld the admissibility of expert testimony on handwriting identification (see, *e.g., U.S. v Prime* (WD Wash 2002) 220 F Supp 2d 1203, 1206), several trial courts have excluded expert testimony on handwriting comparison altogether (see, *e.g., U.S. v Lewis* (SD W Va 2002) 220 F Supp 2d 548; *U.S. v Saelee* (D Alaska 2001) 162 F Supp 2d 1097). Others have permitted the expert to testify about similarities and dissimilarities between a questioned document and a known handwriting sample, but have excluded opinion testimony about whether the samples matched. See, *e.g., U.S. v Hines* (D Mass 1999) 55 F Supp 2d 62, 67.

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§10.24 F. Discovery

Discovery involving questioned documents should include:

- The qualifications of the questioned document examiner, including (1) the examiner's education and training, including any apprenticeship programs with specified mentors and personal experience in the field; (2) whether the examiner is certified by the American Board of Forensic Document Examiners (ABFDE); (3) the examiner's membership in professional organizations, including the American Academy or Forensic Sciences (AAFS) and the American Academy of Questioned Document Examiners (ASQDE); and (4) the technical library of texts and periodic journals available to the examiner. See §§10.8-10.12.

- The participation of the questioned document examiner's laboratory in proficiency testing administered by Collaborative Testing Services (CTS) (see §10.21), including the "Web Code" assigned by CTS that provides access to individual results. If the laboratory does not participate in the CTS testing program, discovery should include inquiry as to the existence of internal testing programs and corresponding data regarding personal and institutional performance.

- Any case-specific material, such as the questioned documents examined by the opposing examiner, and the material used for comparison.

NOTE: As part of discovery, counsel also should consider personal contact with the opposing document examiner. Such personal contact is common by criminal defense attorneys with experts such as pathologists or DNA experts, but rare with questioned document experts, particularly when the examiner is employed by a crime lab or other official agency; however, because questioned document examiners, and many other forensic experts, consider themselves objective scientists, they will frequently be willing to make themselves available.

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G. Retaining Independent Expert

§10.25 1. Considerations Influencing Decision

Counsel may wish to consider hiring an independent handwriting expert to assess or criticize the methodology used by the expert testifying for the other side. The considerations for and against hiring an independent examiner are similar to those for fingerprint examination (see chap 9), with the first consideration being how important the handwriting analysis is to the case. Other considerations include the following:

- How much "education" does the attorney require? Simply reviewing the report of the opposing examiner with a retained expert may prove helpful in disclosing weaknesses in the evidence that may not be obvious to an nonexpert. For example, consider whether a retained expert might be able to suggest any innocent explanations of the evidence.
- Can the cost of a private examiner be justified?
- Is it necessary to have a retained examiner look at the original evidence, which will probably involve a court order to produce for examination, or will a review of the opposing examiner's reports suffice?
- What are the discovery implications? Will the fact that another expert examined the material come out at trial? If the retained expert does not testify, will the jury conclude that the retained expert agreed with the testifying expert?

PRACTICE TIP: Some care must be exercised to obtain a witness who has the expertise to offer testimony on the subject and who does not agree with the original opinion. For example, testimony that the other expert did things the wrong way but got the right answer is not very helpful.

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§10.26 2. Types of Independent Experts

An opponent of the evidence might want to present two kinds of experts: a handwriting examiner (who would critique the analysis the other expert performed in the case-at-hand) and an expert on the lack of standards in the field (*i.e.,* the problems that Risinger, Denbeaux, and Saks have identified). See Risinger, Denbeaux & Saks, *Exorcism of Ignorance as a Proxy for Rational Knowledge: The Lessons of Handwriting Identification Expertise,* 137 U Pa L Rev 731 (Jan. 1989). Or, as an alterative to hiring a handwriting expert, an attorney may seek the services of someone who has sufficient expertise to offer a critique about the methodology used, or about the reliability of handwriting evidence in general, but who is not qualified to give an opinion about the basic identification itself, such as the witness who was excluded in *U.S. v Velasquez* (3rd Cir 1995) 64 F 3d 844, 848 (if criticisms of technique go to weight, not admissibility, then trier of fact should get to hear criticisms so it can evaluate weight to give evidence).

While it is unlikely that a second examiner will flatly disagree with the opinion on the table, there may well be some shades of difference. For example, one examiner may say that an outright identification is indicated, while a second examiner will only go so far as to say that the person "probably" did the questioned writing. Of greater importance in the questioned document area is the "education" a privately retained examiner can provide in preparation of an effective cross-examination. The defects in a questioned document examination, particularly in handwriting problems, are often quite subtle and may not be obvious to an attorney not versed in the nuances of the discipline.

For a list of private examiners, see the American Society of Questioned Document Examiners' website at http://www.asqde.org.

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III. PRESENTATION OF DOCUMENT EXAMINER'S TESTIMONY

§10.27 A. Qualifying Examiner as Expert

The first obligation of any attorney who uses the testimony of a document examiner in court is presentation of the expert's qualifications. The attorney's goal is to bring out the witness's "special knowledge, skill, experience, training and education." Evid C §801(b). This should be done in some detail.

PRACTICE TIP: It is generally not a good idea to stipulate to the qualifications of one's own expert since the weight given to a witness's testimony is influenced by the evaluation of the witness's expertise by the trier of fact. It is particularly important when the opposition is using an expert of their own whose qualifications may not measure up.

Counsel seeking to qualify a questioned document examiner to testify as an expert witness typically should present to the court qualifications that fall generally into four categories:

- Education and training, including applicable certification;
- Membership in certain professional organizations;
- Work experience; and
- Published material and access to a professional library.

PRACTICE TIP: Because the presentation of expert document examiner evidence may not be familiar to some attorneys, many examiners will provide a list of questions to be asked or, as a guide to the attorney, the areas that should be covered. See §10.28.

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Source: Criminal Law/Scientific Evidence in California Criminal Cases/10 Questioned Documents/§10.28 B. Suggested Questions for Qualifying Expert

§10.28 B. Suggested Questions for Qualifying Expert

- Ask the examiner about name, occupation, and business office location:

Q: What is your name?

Q: What is your profession or occupation?

Q: Where is your office located?

- Ask whether the examiner operates or otherwise is employed by a laboratory that analyzes handwriting and related matters concerning questioned documents, and what the laboratory facilities consist of:

Q: [*If witness works for some agency or crime laboratory*] By whom are you employed?

Q: [*If witness operates own laboratory*] Do you operate a laboratory devoted to the analysis of handwriting, the detection of forgery, and related matters having to do with questioned and disputed documents?

Q: Please describe the laboratory facilities (*e.g.,* instruments, library, photographic equipment).

- Ask about examiner's specific official duties, whether they include examination of questioned documents, and how long the examiner has been performing them:

Q: What is your title or assignment in the laboratory?

Q: What are your specific duties?

Q: How long have you been so engaged?

Q: How much of your time is spent in the examination of questioned documents?

Q: How do you spend the rest of your working time (*e.g.*, managerial duties, other disciplines, training)?

- Ask whether the examiner has undertaken any special training and study to conduct his or her official duties:

Q: Do you have a college degree?

Q: In what field?

Q: When was that awarded?

Q: How much of your college work was devoted to the examination of questioned documents?

Q: What specialized training have you had in the field of questioned documents?

Q: What specific courses have you taken in the field of questioned documents?

Q: When were those courses taken?

Q: How many hours were devoted to questioned documents in each of those courses?

Q: Who were your instructors?

Q: What are their qualifications in the field of questioned documents?

- Ask whether the examiner has studied under specialists and, if so, their identities:

Q: Have you worked under the supervision or guidance of an expert in the field of questioned documents?

Q: Who is that?

Q: What are his or her qualifications?

Q: How long did you work under the supervision of [*name of specialist*]?

Q: What was the nature of the working relationship?

Q: Are you still working under the supervision of [*name of specialist*]?

Q: Are you or any of your supervisors certified by the American Board of Forensic Document Examiners (ABFDE)? (See §10.10.)

Q: What are the requirements for certification by the ABFDE?

Q: Have you applied for certification by the ABFDE?

Q: If not, why not?

- Ascertain the number of questioned and known documents the examiner has independently reviewed, the number of cases for which the examiner has made a formal written report, and whether the examiner has testified about specific cases in court (and, if so, the representative courts and jurisdictions he or she testified in):

Q: How may cases have you handled independently?

Q: How many cases have you handled in conjunction with another examiner or mentor?

Q: How many cases resulted in written reports?

Q: Do your examinations always result in a definite conclusion?

Q: If not, why not?

Q: Have you previously testified in court on questioned document problems?

Q: In which courts?

- Elicit a brief explanation of how handwriting is identified, the degree of accuracy in identifying the writer of a questioned document, and how the examiner reports findings in which the writer's identity remains uncertain:

Q: Are there degrees of certainty in the identification of handwriting?

Q: In general, what are the degrees of certainty?

Q: Do you provide reports on problems where there is some degree of uncertainty?

- Ask about the examiner's membership in any scientific organization of questioned document examiners or other forensic science disciplines:

Q: Are you a member of any professional societies or organizations devoted to questioned documents?

Q: Do you regularly attend the meetings of any of these societies?

Q: Do any of these organizations regularly publish any journals or other training materials?

Q: Do you regularly read such materials?

- Ask about the existence of any research projects, books, or scientific papers the examiner has conducted or written, respectively:

Q: Do you, or does your laboratory, maintain a library of materials related to questioned documents?

Q: Do you regularly consult or refer to such materials?

Q: Have you been involved in any research projects related to questioned documents?

Q: Have you written any scientific papers related to questioned documents?

Q: Have they been published?

- To this list, it may be desirable to add some questions about proficiency testing as a laboratory by the Collaborative Testing Services (CTS) (see §10.21) or as an individual (such as that suggested in the guidelines promulgated by the Scientific Working Group for Forensic Document Examination in §10.12):

Q: Are you familiar with CTS?

Q: Could you briefly describe what CTS is?

Q: Are you familiar with the proficiency testing conducted by CTS?

Q: Please describe.

Q: Do you participate in the proficiency testing?

Q: How often?

Q: Do you participate in any other proficiency testing program?

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§10.29 C. Expert's Presentation Method; Use of Photographs

After the examination, a handwriting examiner may express his or her opinion on a nine-point scale: "identification," "strong probability [of identification]," "probable," "indications," "no conclusion," "indications did not," "probably did not," "strong probability did not," and "elimination." See *U.S. v Prime* (9th Cir 2005) 431 F3d 1147.

The examiner usually will illustrate his or her testimony about the examination performed and provide a detailed explanation for the conclusions reached with enlarged photographs of portions of the questioned and known writing. Typically, this will consist of photographs of portions of the questioned material on one part of an enlargement and, in close proximity, similar portions of the known material. The expert will then go through the display letter by letter, word by word, or whatever the organizing principle the expert has chosen. The expert will point out the similarities feature by feature, comparing those appearing in the questioned material with that in the known material, which lead, in the expert's mind, inexorably to the conclusion reached.

Counsel should note that a testifying handwriting examiner usually will pick and choose the letters and letter combinations that support the opinion presented to the jury. This type of presentation often can be very persuasive, because it focuses attention on only a small portion of the questioned and known material (and only on that material which supports the expert's opinion).

PRACTICE TIP: Counsel and the expert should be absolutely clear about what material was examined, and under what circumstances. It sometimes happens that all the material the expert looked at is not in evidence for one reason or another, or there may be material which the expert has not previously examined. Counsel should make every effort to ensure that the expert knows exactly what exhibits will be the subject of his or her testimony.

In addition, note that the document examiner, like any expert witness, may explain the reasons for his or her conclusion and the matter on which the conclusions are based. Evid C §802. It is in explicating the reasons for the conclusions reached that the expert will convince the trier of fact (or not) that his or her findings are true.

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§10.30 D. Suggested Direct Examination on Expert's Findings and Conclusions

After a questioned document examiner has qualified as an expert witness, the proponent of the evidence will proceed with direct examination of the witness on the issue of the witness's findings and conclusions. This examination should normally cover areas such as the following:

- Establish that the examiner examined the documents in question, at whose insistence the examination took place, and where and when the examination took place:

Q: Have you previously examined any documents involved in this case?

Q: When?

Q: Where?

Q: At whose request?

- After showing the document to the examiner, confirm that the document examined is precisely the same as the one at issue:

Q: Is/Are Exhibit(s) _____ among the documents you previously examined?

- Establish the reason the document was examined, along with the examination method:

Q: What was the purpose of your examination?

Q: Could you briefly describe the examination you performed?

Q: Did you reach a conclusion?

Q: What is that conclusion?

- Ask whether the examiner prepared any photographs in the course of the examination and, if so, whether he or she can identify them (if marked as exhibits) as true and accurate reproductions of the questioned document, and explain how they were made and what they represent:

Q: Did you prepare any photographs of the exhibits you examined?

Q: For what purpose?

Q: Please produce the photographs and describe what they represent.

Q: Were these photographs prepared by you personally or at your direction?

Q: Do they fairly represent portions of the exhibits you examined?

Q: When and where were these photographs produced?

- Establish the fact that the examiner came to a conclusion about the identity of the document's maker, what that conclusion is, and the reasons for it:

Q: As a result of your examination, have you reached any conclusion about whether the writer of the known writing in Exhibit(s) _____ also wrote the questioned writing in Exhibit _____?

Q: What is your conclusion?

Q: Using these photographs as necessary, could you please explain to the court and jury the reasons for your conclusion?

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IV. CHALLENGING DOCUMENT EXAMINER'S TESTIMONY

§10.31 A. Strategic Considerations

Counsel for the party who opposes evidence presented by a questioned document examiner normally will be given an opportunity to voir dire the expert on his or her qualifications after the proponent has offered the witness as an expert. Alternatively, the opponent may opt to defer any questioning until general cross-examination after the expert has presented his or her opinion. While there is no hard and fast rule, voir dire of the expert *prior* to presentation of any direct testimony is usually the best practice. The witness may be barred from presenting any testimony if the court finds the witness's expertise wanting. Should the lack of expertise be developed during cross-examination after direct examination, the opinion will already be before the trier of fact and may have some lingering effect.

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§10.32 B. Suggested Questions Challenging Expert's Qualifications

The questions that opposing counsel should ask on voir dire of a questioned document examiner depend to a large extent on what the expert offered as qualification. The following are general questions that should be tailored to the individual case:

- Question the education of the document examiner:

Q: Do you have a college degree?

Q: What is the degree?

Q: Are you aware that the guidelines proposed by the Scientific Working Group for Forensic Document Examination (SWGDOC) suggest a bachelor's degree in one of the sciences? (See §10.12.)

Q: Did you have any courses as an undergraduate, or graduate student, that dealt with questioned document issues?

Q: How many of such courses?

Q: What questioned document problems did each course deal with?

Q: How many hours were devoted to such problems?

- Question the training of the document examiner:

Q: Have you attended any training programs involving questioned documents since you began practicing as a questioned document examiner?

Q: What course did you attend?

Q: What did the course cover?

Q: How many hours did the course take?

Q: How many hours of the course were devoted to questioned documents?

Q: How many hours of the course were devoted to the issue on which you've offered testimony today?

Q: Who offered the course?

Q: Who were the instructors?

Q: What qualifications did the instructors have?

Q: Did you receive on-the-job training?

Q: Who did you receive on-the-job training from?

Q: Did you have mentors to assist with that training?

Q: What training did your mentors have?

Q: How long did the training take?

Q: When was it finished?

Q: What exactly did your practical training cover?

Q: How much of your training was devoted to the issue on which you've offered testimony today?

Q: How much of your working time is devoted to questioned document problems?

Q: What other areas do you cover in your professional life?

- Ask about membership in professional societies:

Q: Do you belong to any professional societies related to questioned documents?

Q: Do you belong to the American Academy of Forensic Sciences (AAFS)?

Q: What section of the AAFS?

Q: For how long?

Q: Do you belong to the American Society of Questioned Document Examiners (ASQDE)?

Q: For how long?

Q: Do you belong to any other professional societies?

Q: Do you regularly attend meetings of the professional societies to which you belong?

- Ask about subscriptions to relevant publications:

Q: Do you subscribe to any publications devoted to the examination of questioned documents?

Q: Which publications?

- Ask about the expert's research or technical materials on questioned documents:

Q: Have you prepared any research or technical material on the questioned documents?

Q: Have you prepared such material for publication?

Q: Have you prepared such material for presentation at annual meetings of professional organizations?

Q: Is any material you've prepared on the type of problem under discussion here?

Q: Do you maintain a library of materials devoted to questioned documents?

Q: What is in your library?

Q: Have you read all of these materials?

Q: Do you regularly consult or refer to any of these materials?

Q: Did you consult or refer to any of these materials in the examination you performed in this case?

Q: Which ones?

- Ask about the expert's familiarity with proficiency tests:

Q: Are you familiar with proficiency tests?

Q: What are they?

Q: What is their purpose?

Q: Does your laboratory participate in the proficiency testing program of the Collaborative Testing Services (CTS)?

Q: What is that program?

Q: How well did your laboratory do?

Q: Which members of your laboratory performed the tests submitted to CTS?

Q: Did you personally perform any of the tests in the CTS program?

Q: Did you participate in any other proficiency testing service offered by your laboratory?

Q: Are records maintained of internal proficiency testing?

Q: How well did you personally do?

Q: Do you have the records of your proficiency tests with you?

- Ask about prior experience as an expert witness on questioned document issues:

Q: In which courts have you testified as a expert witness in questioned documents?

Q: How many times have you testified on questioned document problems?

Q: How many times have you testified on other subject areas?

Q: Has any court barred you from testifying on questioned documents?

Q: How did you prepare to testify in these proceedings?

Q: Did your preparation include mock trials?

Q: With whom did you participate in mock trials?

- Ask about assistance in preparation of exhibits and monitoring of testimony:

Q: Did you receive help with the preparation of court exhibits?

Q: Who helped with the preparation of court exhibits?

Q: Is there anyone here from your laboratory to monitor your testimony?

Q: Who is here from your laboratory?

Q: Why is that person here?

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§10.33 C. Challenging Substantive Accuracy of Document Examiner

Because of the manner in which expert testimony on handwriting identification is usually presented, attacking the expert's testimony requires careful and thorough preparation by counsel, including, in an appropriate case, the testimony of one's own expert.

Although some courts have found a potential error rate of 6.5 percent acceptable (see *U.S. v Prime* (9th Cir 2005) 431 F3d 1147, citing the survey done by Professor Moshe Kam cited in §10.20), counsel should note that such potential error rates raise the substantial possibility of error in a given case. At least one court, the Fourth Circuit Court of Appeal, seems to recognize the problem. The court stated that "[t]o the extent that a given handwriting analysis is flawed or flimsy, an able defense lawyer will bring that fact to the jury's attention, both through skillful cross-examination and by presenting expert testimony of his own." *U.S. v Crisp* (4th Cir 2003) 324 F3d 261. Because the Fourth Circuit's view begs the question of when a given handwriting examination may be "flawed or flimsy," counsel, in every case, should anticipate the possibility of a defective analysis by a handwriting examiner and be prepared with "skillful cross-examination" or be prepared to present opposing expert testimony. On deciding to retain an independent expert, see §§10.25-10.26.

Assuming the witness has been qualified by the court to give an expert opinion, focus will shift to the substantive areas of the document examiner's opinion. The proponent of the evidence should be prepared to offer the substantive evidence in as forceful and persuasive a manner as possible, primarily through the use of demonstrative material such as photographs (see §10.29). The function of the opponent is to show the reasons offered by the expert are the result of "picking and choosing" features in the questioned and known material that support his or her opinion and ignoring those that are questionable.

NOTE: It is unlikely that counsel will be able to adequately prepare to deal with an expert's testimony without going beyond the basic report of the examiner. Such reports tend to be summary in nature—detailing the material examined and presenting the conclusions without delving into the reasons for them. Normally, counsel will have copies of the reports provided by the expert, perhaps with a résumé outlining the witness's professional history. Further inquiry into the proposed testimony may require a meeting in advance of trial, or at least a conference at or near the time of court appearance.

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Source: Criminal Law/Scientific Evidence in California Criminal Cases/10 Questioned Documents/§10.34 D. Suggested Cross-Examination Questions

§10.34 D. Suggested Cross-Examination Questions

After a questioned document examiner has testified as an expert witness on the issue of the identity of a person who made or altered a writing, the opposing party's cross-examination on that issue typically should include questions such as the following:

- Ask questions about the expert's method of conducting the examination:

Q: How did you decide what features of the questioned and known writings to illustrate?

Q: Did you only pick features that support your conclusions?

Q: What portion of the material you examined is included in the demonstration material?

Q: Was your purpose in composing the demonstration material to justify your opinion to the jury?

Q: Are there other features of the questioned writing that are not represented in the known material?

Q: Are any such features included in your photographic presentations?

Q: If not, why not?

- If applicable, point out the differences between the questioned and the known writing:

Q: How many differences are required for a conclusion of elimination?

Q: How many differences did you find?

Q: How do you know that additional differences would not appear if more material were available?

Q: Did you make any effort to obtain additional exemplar material?

Q: If not, why not?

- Continue with general questions:

Q: How often do you make errors in examinations?

Q: What is the error rate in general for document examiners?

Q: Are you familiar with the studies concerning the error rates of document examiners?

- Explore possible bias of the examiner who usually testifies for the prosecution:

Q: Do you always testify for the prosecution?

Q: Is all of your work done for police agencies?

Q: Which ones?

Q: Who pays your salary?

[*If applicable, add*]

Q: How much were you paid for the examination of the documents in this case?

Q: How much additional money were you paid for your testimony?

Q: Are your fees in any way contingent on the outcome of the case?

Q: Are your fees in any way contingent on the outcome of your examination?

[*Continue*]

Q: How much time did you spend on this case?

Q: How much time did you spend in your examination?

Q: How much time did you spend in preparation for testimony?

Q: How much time did you spend in providing testimony?

Q: Did you review your testimony with counsel for the prosecution?

Q: When did you review that testimony?

Q: Where did you review that testimony?

Q: How much time was spent in review?

Q: Did your review with counsel result in any change to your proposed testimony?

Q: Did opposing counsel seek an interview with you regarding your examination or proposed testimony?

Q: Did you grant such an interview?

Q: If not, why not?

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Source: Criminal Law/Scientific Evidence in California Criminal Cases/11 Firearms and Toolmarks/Chapter Outline

11

Firearms and Toolmarks

John E. Costain

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I. FIREARMS AND TOOLMARK IDENTIFICATION BASICS

§11.1 A. Introduction to the Disciplines

In the context of forensic identification, firearms and toolmarks usually are grouped together as one subject area because both firearms and toolmark examinations entail examining the marks left by the harder of two objects (the tool) on a softer object. Firearms identification can be viewed as a subset of toolmark identification in which the expert examines marks made by a single type of tool—a firearm—on a small range of objects—bullets and cartridge cases. The foundational assumptions underlying the discipline of toolmark and firearms identification are that (1) the marks made by any given tool or firearm are unique, and (2) by comparing marks made on an object by a known tool with marks made on a similar object by an unidentified tool, it is possible in many cases to determine whether the same tool produced both sets of marks.

NOTE: The term "ballistics" is often mistakenly applied in reference to "firearms identification." The confusion between the terms arose long ago and is due in part to the use by police agencies of the term "ballistics" to describe their laboratories. Even court decisions have been known to interchange the terms. For example, in *People v Geier* (2007) 41 C4th 555, 61 CR3d 580, the court refers to the same expert as both a "firearms examiner" (41 C4th at 588) and a "ballistics expert" (41 C4th at 608). Firearms identification is concerned primarily with determining whether a bullet or cartridge was fired by a particular gun, while "ballistics" refers to the study of a projectile, such as a bullet, in flight.

Like many other forensic disciplines, firearm and toolmark identification has come under attack as lacking a sufficient scientific basis to be admitted as evidence in court. In both federal and state courts, opponents of such evidence have been effective in limiting the testimony of firearm and toolmark examiners. As a result, counsel should expect a challenge in cases that rest on firearms or toolmark identification evidence. Both opponents and proponents of firearm and toolmark identification evidence must become familiar with how firearm and toolmark examiners do their work and reach their conclusions. Prosecutors should prepare their experts for intensive cross-examination on the effectiveness of their training, experience, and proficiency as well as on the methods they employed and the standards they used to reach their conclusion. Defense attorneys must be familiar with the legal landscape in state and federal courts and develop an informed cross-examination, particularly of the assumptions underlying the accuracy of the states' expert evaluation of the evidence.

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B. Education, Training, and Proficiency of Examiners

§11.2 1. Educational Guidelines (Scientific Working Group for Firearms and Toolmarks (SWGGUN))

Most of the examiners that counsel will encounter in practice will be employed by police crime laboratories and other public agencies. There are no standardized, required minimal qualifications for examiners; each lab institutes its own policies.

The FBI sponsors Scientific Working Groups (SWGs) in several forensic disciplines. The purpose of the Scientific Working Group for Firearms and Toolmarks (SWGGUN) "is to develop a series of consensus guidelines for the firearm and toolmark discipline and to disseminate SWGGUN guidelines, studies, and other findings that may be of benefit to the forensic community." For information on SWGGUN, see http://www.swggun.org/index.htm. The 20 regular members of the Board of SWGGUN include the current year's president of the Association of Firearm and Toolmark Examiners (AFTE) (see §11.3) and members of the FBI. For SWGGUN bylaws, see http://www.swggun.org/bylaws.htm.

SWGGUN guidelines include recommendations for the minimal educational requirements, training, and standards of performance for examiners. For the complete SWGGUN guidelines and procedures, go to http://www.swggun.org/guidelines.htm. The recommended, basic educational requirement for an entry-level firearms and toolmark examiner is a bachelor's degree in a natural or physical science-based field of study from an accredited academic institution. The recommended educational or experiential requirements for an experienced examiner include a bachelor's degree in a natural or physical science from an accredited academic institution, successful completion of a firearms/toolmark training program, and 2 years of firearms or toolmark casework experience (which may include the time spent in the training program). A hiring agency may substitute, at its discretion, "other experience equivalencies" for an academic degree. For a list of SWGGUN minimum qualifications, go to http://www.swggun.org/guidelinedocs/minqualifications1.htm.

Note that SWGGUN provides guidelines only and does not intend to mandate policy for crime labs. Thus, SWGGUN's educational and training guidelines as well as its recommended standards of practice are not required. Some of the challenges to firearm and toolmark identification have focused on the lack of requirements and the unregulated nature of the discipline.

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§11.3 2. Training and Certification by Association of Firearm and Toolmark Examiners (AFTE)

The Association of Firearm and Toolmark Examiners (AFTE) is an international organization dedicated to the advancement of firearms and toolmark identification (for more information, see http://www.afte.org). It presently has about 850 members in the United States and Canada. See http://www.afte.org/AssociationInfo/a_history.htm (visited June 4, 2010). To promote professionalism, the Association of Firearm and Toolmark Examiners (AFTE) provides yearly training seminars at various sites throughout the country. AFTE also has plans to offer a certification program to its members. Certifications can be obtained in Firearms Evidence Examination and Identification, Toolmark Evidence Examination and Identification, or Gunshot Residue Evidence Examination and Identification. A prospective applicant can apply for certification in any or all of these disciplines and must pass both a written and practical examination. Successful applicants may publicly attest that they meet certain standards as defined by the AFTE. According to the AFTE website, 87 examiners have successfully completed written examinations in one or more of the disciplines offered. See http://afte.org/AssociationInfo/a_certificationmemberslist.htm (visited June 4, 2010). The practice examinations have yet to be offered, so the certification program is not yet fully operational. For further information about the AFTE's certification program, go to http://www.afte.org/AssociationInfo/a_certification.htm.

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§11.4 3. Proficiency Testing by Collaborative Testing Services (CTS)

Some crime laboratories participate in the periodic proficiency testing of their examiners administered by organizations such as Collaborative Testing Services (CTS). Testing consists of mock problems produced by CTS that are mailed to participating laboratories for analysis. Examiners in the laboratories may work independently or collaborate to answer the questions posed and return their results to CTS. CTS publishes the results on its website (http://www.ctsforensics.com/reports/main.aspx), identifying the laboratory only by a code number. CTS maintains the results on its website for approximately 5 years.

PRACTICE TIP: An examiner's participation and performance in a proficiency testing program should be part of discovery (see §11.23) and part of the inquiry into an examiner's qualifications (see §11.25).

Results of proficiency testing administered by CTS indicate that between the years 2002 and 2009, the rate of correct answers for firearms examiners ranged from 89 percent to 100 percent, while the rate of correct answers for toolmark examiners ranged from 65 percent to 99 percent. The difference between the percentage of correct answers obtained by examiners and 100 percent usually resulted from examiners characterizing their findings as inconclusive, but it reflects as well some outright misidentifications or wrongful eliminations of both firearms and tools. For more information on the results of a particular test, go to http://www.ctsforensics.com/reports/main.aspx, select the test of interest, and click "Summary Comments."

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§11.5 C. Mark Nomenclature and Categorization

Impression and striation marks. Firearms and toolmark examiners generally divide toolmarks into two broad categories: impression marks and striations. Impression marks are indentations made in the surface of an object when it is struck with force by another, harder object. An example of an impression mark is the mark made by the breechblock, a metal block which forms the back wall of the firing chamber of a firearm, on a cartridge case when the gun's recoil smashes the cartridge case into it. For further discussion, see §11.12. Striations are rows of parallel scratches formed when two surfaces rub against each other in passing. The marks made onto a bullet by the rifling of the interior of a gun barrel are striations.

Class, subclass, and individual characteristics. Toolmarks, whether impression marks or striations, are described by three major characteristics: class, subclass, and individual. *Class* characteristics are design features set by the manufacturer and shared by all tools of the same make and model. For example, all screwdrivers of a specific size made by a particular manufacturer will have the same basic outline so that the parallel scratches left by the corners of the blade of this manufacturer's make and model should all be the same distance apart. *Subclass* characteristics, often caused by the manufacturing process, are features common to a subset of a particular make and model, but are not shared by all similar tools. For example, one machine among the many used to manufacture one particular batch of a model of screwdrivers might leave a slight burr on the edge of the blade. A surface scratched by one of these screwdrivers should exhibit parallel scratches similarly spaced as those left by other tools in the screwdriver's same class and also exhibit an additional scratch left by the burr, the subclass characteristic. *Individual* characteristics are those caused by use or damage, and they are unique to a particular tool.. A screwdriver might be nicked from being used as a pry bar. The nick could leave additional marks that appear only when that particular screwdriver is used.

Individual characteristics provide the greatest probability that evidence came from a specific source. Class characteristics can only be associated with a group and, therefore, provide the least probability that evidence came from a specific source.

NOTE: One common area of difficulty for toolmark examiners is distinguishing individual characteristics from subclass characteristics; and erroneous identifications are frequently attributed to confusing the two. Because subclass characteristics are acquired during the manufacturing process, it is possible for a large number of tools to exhibit the same characteristic (*e.g.*, reducing the probability that a mark came from a specific tool); therefore, identifications based on subclass characteristics are not reliable. If improvements in manufacturing have reduced the likelihood of damage to a tool through use, the chances of confusing a subclass characteristic for an individual characteristic increase. The clearest test of skill and proficiency for a toolmark examiner is accurately distinguishing between subclass and individual characteristics.

Latent and exemplar. Firearm and toolmark examiners also distinguish between unknown and known marks. Marks found at a crime scene are called "unknown" or "latent" marks because it is not known what tool(s) made them. When investigators recover a tool they believe belongs to a suspect, it is referred to as a "known" or "exemplar" tool. The task of the firearms or toolmark examiner is to determine whether the source of unknown, latent marks (*e.g.*, on a bullet recovered from a body) is the known, exemplar tool (*e.g.*, firearm taken from suspect). To do this, examiners compare unknown marks with marks made by the known tool, or "known" marks.

For more discussion of toolmarks and their significance, see Saferstein, Criminalistics: An Introduction to Forensic Science, chap 3, pp 72-77 (9th ed 2007).

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D. Mark Examination

§11.5A 1. Premise of Firearm and Toolmark Identification

Several assumptions underlie the practice of toolmark identification.

Uniqueness. One assumption underlying firearm and toolmark identification is that a mark left by a particular tool (or firearm) is unique to that tool and that no other tool can produce a similar mark. This premise permits firearm and toolmark examiners to identify or exclude a known tool as the source of an unknown mark. See §11.5. If more than one tool can make a mark similar to that left at a crime scene, then it cannot be concluded that a tool connected to the suspect is the only possible source of that mark. The uniqueness of every tool and the marks it makes cannot be tested, it is simply assumed to be true. For more information see Schwartz, *Systematic Challenges to the Reliability and Admissibility of Firearms and Toolmark Identifications.* 6 Colum Sci & Tech L Rev. 2 (2005).

Reproducible. Another assumption underlying firearm and toolmark identification is that the unique characteristic marks (see §11.5) made by a tool (or firearm) are capable of being reproduced so that they can be successfully compared with the characteristic marks left at a crime scene. This premise demands that a known tool in question make the same mark every time it's used in the same manner; otherwise, it is not possible to conclude that an unknown mark found at a crime scene came from the tool associated with the suspect.

Note that critics of the scientific basis of firearm and toolmark identification question the assumptions underlying the discipline and argue that the assumptions have yet to be demonstrated as valid and reliable. See Committee to Assess the Feasibility, Accuracy, and Technical Capability of a National Ballistics Database, Ballistic Imaging (2008); The National Research Committee, Strengthening Forensic Science in the United States: A Path Forward (2009).

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§11.6 2. Mark Examination Methodology

Some toolmarks are visible with the naked eye, but "toolmark examination" requires the examiner to compare the details of markings that are visible only when viewed under magnification.

Many of the forensic disciplines adopt a similar procedure for the examination of evidence. See, *e.g.*, the discussion of the ACE-V method for fingerprint identification in chap 9. The details of this procedure or any other method for firearm and toolmark examiners to follow is not provided by AFTE. Different examiners employ the different methods that they have been trained to use.

NOTE: This lack of a "precisely specified, scientifically justified, series of steps that lead to results with well-characterized confidence limits" has been identified as a "fundamental problem with toolmark and firearm analysis." See The National Research Council of the National Academies, Strengthening Forensic Science in the United States: A Path Forward p 155 (2009).

In general, however, the first step an examiner takes when performing an examination for the purpose of identification is to analyze the distinctive features of a latent, or unknown, mark. This requires focus on the latent mark's class, subclass, and individual characteristics (see §11.5) as well as the distortions of those characteristics that could pose problems in subsequent comparisons. The examiner should take notes and comprehensively describe the specific features of the latent mark before a known mark is examined to reduce the influence of any information obtained from a known mark that could bias the examiner's findings and conclusions. Describing distortions caused by *e.g.*, dirt, rust, contaminants and/or the process of the examination, itself, is the most important part of the analysis; distortions must be distinguished from individual characteristics produced by a specific tool. At the conclusion of the initial analysis, the examiner must decide whether there are enough individual characteristics in the unknown mark to proceed with a comparison to a known mark. If the latent mark does not exhibit enough individual characteristics, then it is not useful and should be set aside, thus ending the examination.

If proceeding, the next step an examiner generally takes is to compare the latent mark with a known mark to look for points of agreement between the two. For example, an examiner will test fire a number of rounds from a recovered firearm to observe the duplication of marks on the ammunition. A basic tool of the firearms and toolmark examiner is the comparison microscope, which allows the viewer to look at two objects side-by-side or to superimpose images of them for accurate comparison. Even greater image definition can be provided by a scanning electron microscope (SEM), which uses a beam of electrons rather than light to scan a three-dimensional object and produce an image of it on a monitor. During the comparison, the examiner makes a determination whether there are sufficient points of agreement between the two marks to conclude that they were made by the same tool. There is no set standard or minimum number of required points of comparison necessary for drawing a conclusion. The examiner's opinion is based on knowledge, experience, and judgment.

The examiner then evaluates the points of agreement as well as the dissimilarities between the two marks and arrives at a conclusion.

An examiner can conclude the unknown mark was made by the known tool (identification), the unknown mark was not made by the known tool, (exclusion) or that the data is inconclusive. See SWGGUN Range of Conclusions (May 18, 2006) at http://www.swggun.org/guidelinedocs/guidelines_elimination.htm. See also Schehl, *Firearms and Toolmarks in the FBI Laboratory, Part I*, 2 Forensic Sci Comm (Apr. 2002) at http://www.fbi.gov/hq/lab/fsc/backissu/april2000/schehl1.htm. See also *U.S. v Monteiro* (D Mass 2006) 407 F Supp 2d 351, 363.

Once an examiner reaches a conclusion, a second examiner should conduct an independent examination to verify the findings and conclusions of the first. See SWGGUN Quality Assurance Guidelines (May 18, 2006) at http://www.swggun.org/guidelinedocs/guidelines_QA.htm. See also *U. S v Monteiro*, 407 F Supp 2d at 364.

For additional information on firearms and toolmark examination, see Saferstein, Criminalistics: An Introduction to Forensic Science, chap 15 (9th ed 2007).

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E. Identification Methods

§11.7 1. AFTE Theory of Identification

According to the "theory of identification" propounded by the Association of Firearm and Toolmark Examiners (AFTE), an examiner can conclude that two toolmarks were made by a common tool where there is "sufficient agreement" between the unique contours of the toolmarks. See *U.S. v Diaz* (ND Cal, Feb. 12, 2007, No. CR 05-00167 WHA) 2007 US Dist Lexis 13152 (quoting *AFTE theory of identification*); *U.S. v Monteiro* (D Mass 2006) 407 F Supp 2d 351, 363 (quoting *AFTE theory of identification* at 30 AFTE J 86).

This "sufficient agreement" is related to the significant duplication of random toolmarks as evidenced by the correspondence of a pattern or combination of patterns of surface contours. Significance is determined by the comparative examination of two or more sets of surface contour patterns comprised of individual peaks, ridges, and furrows. Specifically, the relative height or depth, width, curvature, and spatial relationship of the individual peaks, ridges, and furrows within one set of surface contours are defined and compared to the corresponding features in the second set of surface contours. Agreement is significant when it exceeds the best agreement demonstrated between toolmarks known to have been produced by different tools and is consistent with the agreement demonstrated by toolmarks known to have been produced by the same tool.

In short, "the statement that 'sufficient agreement' exists between two toolmarks means that the agreement is of a quantity and quality that the likelihood another tool could have made the mark is so remote as to be considered a practical impossibility." SWGGUN *Guidelines: Criteria for Identification,* referring to the AFTE "Theory of Identification" definition as set forth in the AFTE Journal, volume 24, number 3 (July 1992). You can view this article online at http://www.swggun.org/guidelinedocs/guidelines_criteriaforID.htm.

The SWGGUN endorses the AFTE theory of identification, but it and other proponents acknowledge that this approach to toolmark identification is subjective, based on an examiner's training and experience. See *U.S. v Monteiro,* 407 F Supp 2d at 363 (quoting *AFTE theory of identification*), and the SWGGUN Guidelines at http://www.swggun.org (select the "Guidelines" tab, and then click the "Guidelines: Criteria for Identification" Link (visited Apr. 5, 2009)).

This theory of identification has been criticized for its lack of objective standards. See The National Research Council of the National Academies, Strengthening Forensic Science in the United States: A Path Forward (2009); Committee to Assess the Feasibility, Accuracy and Technical Capability of a National Ballistics Database, Ballistic Imaging (2008). See also *U.S. v Mouzone* (D Md Oct 29, 2010 WDQ-08-086) 2009 US Dist Lexis 100718. For more discussion of the criticism of this method, see §§11.20-11.22.

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§11.8 2. Counting Consecutive Matching Striae (CMS)

Two firearms examiners, Alfred Biasotti and John Murdock, have proposed a quantitative method for determining whether striated toolmarks have a common origin based on what they claim to be an objective consideration of consecutive matching striae (CMS). Biasotti and Murdock suggest that when using this method to compare three-dimensional toolmarks, there must be present in the same relative position in both the unknown and test toolmark at least two different groups of three consecutive matching striae or one group of six consecutive matching striae for the examiner to conclude that the marks have a common origin. With two-dimensional toolmarks, Biasotti and Murdock suggest a match requires finding at least two groups of at least five consecutive matching striae or one group of eight consecutive matching striae. To use the CMS method to determine a match, the examiner must first rule out the possibility that he or she is observing subclass characteristics. Biasotti & Murdock, *Firearms and Tool Mark Identification,* 3 Mod Sci Evidence 501 (2001). While this method of identification was initiated over 50 years ago, there is still no documented research on the amount of matching striae needed to support an accurate conclusion.

NOTE: Firearms examiners are not required to use the CMS method of identification. The majority of examiners continue to use the more intuitive pattern recognition approach outlined by AFTE (see §11.7). Furthermore, the CMS method applies only to striated toolmarks; no equivalent methodology has been developed for comparing impressed toolmarks.

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II. IDENTIFYING FIREARMS

A. Types of Firearms and Their Operation

§11.9 1. Firearm Classification

Firearms can be classified broadly into shoulder firearms, such as rifles or shotguns, and handguns, such as revolvers, semiautomatic pistols, and fully automatic or machine pistols. Fisher, Techniques of Crime Scene Investigation, chap 10, p 257 (7th ed 2003). A revolver is the familiar "six gun" popularized in many western movies. A revolver has a cylinder, often containing six chambers (one for each round of ammunition), that sits in front of the trigger area. As each shot is fired, the cylinder rotates bringing another round of ammunition into positional alignment with the barrel in preparation to be fired. The next pull of the trigger repeats the process until all rounds of ammunition are fired. The casing of ammunition fired from a revolver remains within the cylinder and usually is not found at a crime scene.

A semiautomatic pistol has no cylinder and appears relatively flat compared to a revolver. Ammunition is placed into a spring-loaded "clip" or magazine, which typically is then placed within the handle of the weapon. As the weapon is fired, some of the explosive energy is diverted and, with the help of an ejector, the casing is ejected from the gun. The spring-loaded magazine then feeds another round into the firing chamber and, with the subsequent help of an extractor, the weapon is ready to fire again. This sequence of events is known as the "cycle of fire." A separate pull of the trigger is necessary for each round fired from a semiautomatic pistol. A fully automatic or machine pistol, such as an Uzi, operates in much the same manner as a semiautomatic, but will keep firing as long as the trigger is depressed.

Rifles are much the same as pistols in their operation except for "bolt action" rifles, which require the shooter to manually operate a mechanism that ejects a spent round and loads another.

For a general discussion of the operation of firearms, see Saferstein, Criminalistics: An Introduction to Forensic Science, chap 15 (9th ed 2007); Hatcher, Jury & Weller, Firearms Investigation, Identification, and Evidence (1957) (somewhat dated but still accurate); and Houck & Siegel, Fundamentals of Forensic Science, p 568 (2006).

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§11.10 2. Basic Firearm Operation

When a round of ammunition or "cartridge" is in the firing chamber, the gun is ready to be fired. The firing chamber holds the cartridge securely and opens only into the gun barrel. When a gun is fired, a sequence of events is set in motion that is generally the same for all types of firearms. The gun's firing pin hits the percussion cap or primer, which is a small cup that fits into the back of the cartridge case and contains a chemical mixture that explodes on being struck. The explosion ignites the gunpowder, propelling the bullet or other projectile at high speed down the barrel and out the muzzle and simultaneously hurling the cartridge case back with equal force against the breechblock (the back wall of the firing chamber). Saferstein, Criminalistics: An Introduction to Forensic Science, p 467 (9th ed 2007). See also Zawitz, *Guns Used in Crime,* U.S. Department of Justice; Bureau of Justice Statistics Selected Findings; Firearms, Crime, and Criminal Justice (July 1995) at http://www.ojp.usdoj.gov/bjs/pub/pdf/guic.pdf.

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B. Ammunition

§11.11 1. Cartridges and Their Components in General

An individual round of ammunition is called a cartridge. A cartridge consists of a percussion cap or primer, a chemical substance that explodes when struck, a propellant (usually gunpowder), and a projectile, all enclosed in a cylindrical casing, which is usually made of brass. Although the term "bullet" is sometimes colloquially used to refer to the entire cartridge or round of ammunition, properly speaking, the term bullet refers only to the projectile. Bullets are typically made of lead or a lead alloy. Some bullets are surrounded by a jacket made of a harder metal.

Shotgun ammunition is similar to other ammunition, except that the casing may be made partially of paper or plastic, and the projectile portion is composed of several small pellets. Shotgun ammunition also contains a paper or plastic wad between the gunpowder and the pellets to keep the gunpowder dry. On firing, the wad is expelled along with the pellets and other components, which may be useful in identifying the manufacturer of the shotgun shell. See Hatcher, Jury & Weller, Firearms Investigation, Identification, and Evidence, pp 79-95 (1957).

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§11.12 2. Cartridge Casings

When the firing pin strikes the percussion cap, it leaves an indentation on the cap or the back of the cartridge. When the cartridge case smashes into the breechblock, the breechblock leaves indentations in the cartridge case. Firing pin impressions and breechblock marks are impression marks. See http://www.firearmsid.com/A_CCIDImpres.htm for a private website maintained by Jeffrey Doyle, a retired firearms and toolmark examiner with the Kentucky State Police. Other marks sometimes left on cartridge cases include chamber marks, which are scratches on the cartridge case made when the cartridge was loaded into or removed from the chamber; extractor marks, which are scratches made by the mechanism that moves or pulls the cartridge case from the magazine into the chamber of a semiautomatic or automatic weapon; and ejector marks, which are scratches made by the mechanism that ejects or pushes the case from the firearm. Chamber marks, extractor marks, and ejector marks are usually striations. For more on striations, see http://www.firearmsid.com/A_CCIDStria.htm.

As with other toolmarks, the markings made on a cartridge case by the discharge of a firearm may exhibit class characteristics, subclass characteristics, and individual characteristics of the gun that fired the cartridge (for additional discussion, see §11.5). Class and subclass characteristics can sometimes be used to determine the brand and model of the firearm that fired the cartridge case, and individual characteristics may be used to trace an expended cartridge case to a particular gun. Breechblock marks are more likely than other marks left on cartridge cases to contain distinctive individual characteristics and, consequently, they provide firearms examiners with their most common method of determining that a given cartridge case was ejected from a particular gun. For more on impression marks, see http://www.firearmsid.com/A_CCIDImpres.htm.

For a case illustrating the use of expert testimony to show that a shotgun shell found in the defendant's shotgun was live ammunition for purposes of Pen C §12101(b)(1), see *In re Brandon G.* (2008) 160 CA4th 1076, 73 CR3d 273 (in response to questioning as to whether or not he knew that the primer was active, expert responded "there is no indentation"). See also *People v Burney* (2009) 47 C4th 203, 263, 97 CR3d 348 (forensic experts testified that shotgun shell casings and wadding recovered from residence of codefendant's former girlfriend were from same type of cartridge as casings recovered from victim's automobile); *People v Doolin* (2009) 45 C4th 390, 406, 87 CR3d 209, (criminalists testified to "gross" and individual characteristics of shell casings).

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§11.13 3. Effects of Rifling

As the bullet (which has a diameter slightly larger than the bore of the gun in which it is fired) travels down the gun barrel, it acquires markings that the firearms examiner can utilize in the attempt to determine whether the bullet was fired from a particular gun.

During manufacture, the interior of the barrels of most modern firearms—handguns, rifles, and even some shotguns—are incised with spiral grooves that run the length of the barrel. The grooves are designed to engage the bullet and send it into a spin, improving the stability of the bullet's trajectory and increasing accuracy. Both the process of impressing these grooves into the interior of the barrel, or "bore," and the grooves themselves are called "rifling." The interior surface areas of the barrel left between the grooves are called "lands." The caliber of a gun is determined by measuring the distance between one land and another on the opposite side of the barrel, either in fractions of an inch (*e.g.*, a 38 caliber gun is just over one-third inch or.38) or in millimeters (*e.g.*, 9 mm,). Saferstein, Criminalistics: An Introduction to Forensic Science, p 461 (9th ed 2007).

Firearms made by different manufacturers have distinct rifling characteristics—differences in the number, width, and depth of the grooves, and in the direction and angle of the twist. Saferstein, Criminalistics, pp 462-463.

NOTE: Markings reflecting these class characteristics are often visible to the naked eye on bullets and, in many cases, enable the firearms examiner to rapidly determine the make and model of the gun that fired the bullet and sometimes even its date of manufacture. These class characteristics do not, however, impart individuality to a specific firearm.

The process of creating rifling during the manufacture of a barrel leaves behind striations running the length of the grooves and the lands. These striations are assumed to be randomly distributed such that no two barrels, even those manufactured in succession, have identical striation markings. These striations become part of the individual characteristics of a firearm. Saferstein, Criminalistics, p 463.

Also, gun barrels are originally produced from solid bars of steel which are hollowed out by drilling. Microscopic drill marks left on the barrel's interior are assumed to be randomly irregular. The irregular pattern of these markings imparts a uniqueness to that specific barrel and firearm. These individual markings can also show up on the surface of a fired bullet. Saferstein, Criminalistics, p 460. Note that the assumption of random irregularity underlies the premise of uniqueness. See §11.6. However, this premise has never been scientifically validated.

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Source: Criminal Law/Scientific Evidence in California Criminal Cases/11 Firearms and Toolmarks/ C. Identifying Specific Gun That Fired Bullet or Ejected Cartridge Casing/§11.14 1. Role of Firearms Examiner

C. Identifying Specific Gun That Fired Bullet or Ejected Cartridge Casing

§11.14 1. Role of Firearms Examiner

As the first step toward firearm identification, the firearms examiner observes a bullet or casing recovered from a crime scene to determine, if possible, the class characteristics of the gun that fired the bullet or ejected the cartridge case. If the class characteristics are distinct enough, the firearms examiner will be able to limit the possible source firearm to a particular make or model, but will not be able to determine the specific gun of that type that fired the ammunition.

To accomplish this, it is necessary to compare the recovered bullet or cartridge case with ammunition test-fired from a suspect gun. Test-firings are often conducted into a box of cotton or a water tank to minimize distortion and damage to the markings on the test bullet. Saferstein, Criminalistics: An Introduction to Forensic Science, p 464 (9th ed 2007). The ammunition used for comparison in the test-fire should be identical to the type recovered from the crime scene. The class and individual markings on the recovered bullets or cartridge cases are compared with the test-fired bullet or cartridge case under magnification using a comparison microscope.

Because bullets are propelled from a gun barrel at a high rate of speed and are made of soft metal, recovered bullets are likely to be significantly distorted and may even be in fragments, especially after striking an object. This distortion can pose a major challenge to the examiner when trying to determine the gun from which a recovered bullet was fired. When bullet fragments are in good enough condition, they can sometimes be pieced back together in the manner of a jigsaw puzzle.

Another challenge posed to the examiner, especially with distorted and fragmented bullets, is phasing, *i.e.,* establishing that the recovered bullet and the test-fired bullet are properly aligned for comparison purposes. To conduct a comparison, the examiner rotates one bullet under the comparison microscope until a well-defined area of the bullet becomes visible. The examiner then rotates the other bullet until a matching area can be found. The examiner compares the lands and grooves between the two bullets. If the two bullets were fired from the same gun, the longitudinal striations should coincide. Saferstein, Criminalistics, pp 464-465.

In all, the firearms examiner compares (Houck & Siegel, Fundamentals of Forensic Science, p 578 (2006)):

- Striation marks made as the bullet passes through the barrel;
- Impression marks left by the firing pin as it strikes the cartridge;
- Impression marks left on the cartridge case by the breechblock as the cartridge rebounds against it in reaction to the bullet being forced down the gun barrel;
- Marks left on the cartridge case by the extractor (the mechanism used to move a bullet from a storage mechanism such as a magazine into the firing chamber); and
- Marks left by the ejector (the mechanism that removes an expended cartridge casing and throws it to one side or the other).

NOTE: Every cartridge or bullet suffers some distortion in the firing process which then renders it different from each successive cartridge or bullet fired from the same firearm. These distortions have to be distinguished from the differences produced by the individual characteristics of a specific firearm. Partial destruction of the bullet after impact is the most serious problem because the damage is likely to be different with every firing. Furthermore, grit and rust in the recovered gun barrel can alter markings left on a bullet, and these markings too can become altered with each successive test-firing of the firearm. These variables may cause an examiner to erroneously conclude that the markings on the bullet recovered from the crime scene and the test-fired bullet were produced by two different firearms.

Like fingerprint comparison, there is no set standard or minimum number of points of comparison necessary for determining whether there is a sufficient match. The examiner's opinion is based on knowledge, experience, and judgment. Saferstein, Criminalistics, p 465.

After comparison, the firearms examiner may conclude that the recovered ammunition was fired by a specified weapon (identification or agreement), the recovered ammunition was not fired by that weapon (elimination), or the data is inconclusive. See *SWGGUN Range of Conclusions* (May 18, 2006) at http://www.swggun.org/guidelinedocs/guidelines_elimination.htm. See also *U.S. v Monteiro* (D Mass 2006) 407 F Supp 2d 351, 359 ("A Primer on Firearm Identification"); Schehl, *Firearms and Toolmarks in*

the FBI Laboratory, Part I, 2 Forensic Sci Comm (Apr. 2002) at http://www.fbi.gov/hq/lab/fsc/backissu/april2000/schehl1.htm; Alfred A. Biasotti, *A Statistical Study of the Individual Characteristics of Fired Bullets*, 4 J Forensic Sci 34, 44 (1959).

As with toolmarks (see §11.6), standard procedure requires an examiner to have his or her findings reviewed by a second examiner. See *SWGGUN Quality Assurance Guidelines* (May 18, 2006) at http://www.swggun.org/guidelinedocs/guidelines_QA.htm. See also *U.S. v Monteiro,* 407 F Supp 2d at 364.

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§11.15 2. Integrated Ballistic Identification System (IBIS) and National Integrated Ballistic Information Network (NIBIN) Computer Databases

Computer databases have given law enforcement officers the ability to identify from expended ammunition a specific firearm where none was recovered from the crime scene and to trace its use to multiple crimes. The Integrated Ballistic Identification System (IBIS), a database originally developed for the federal Bureau of Alcohol, Tobacco, Firearms, and Explosives (ATF), is similar to the automated fingerprint systems maintained by local, state, and federal agencies. IBIS permits firearms technicians, after they have completed an analysis, to enter digital microscope images of unknown expended bullets or cartridge casings into a large database of images collected from other jurisdictions and run an automated comparison of markings. If the automated search system produces a "high-confidence candidate" that the computer's algorithms indicate may be a potential match, a firearms examiner completes the comparison and evaluation using the original evidence to reach a conclusion.

The ATF has collaborated with the FBI to create the National Integrated Ballistic Information Network (NIBIN). NIBIN makes the IBIS equipment and database available to participating local, state, and federal law enforcement agencies. As of June 2007, ballistic imaging equipment was available in every major population center, 180 agencies were participating in the NIBIN program, more than one million pieces of crime scene data had been entered into the database, and more than 20,300 hits had been logged. For more information on the NIBIN program, see http://www.nibin.gov/nibin.pdf (visited Apr. 5, 2009).

NOTE: IBIS and NIBIN are a screening tool only. The final comparison and conclusion regarding agreement between the marks must be made by a firearms examiner.

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§11.16 D. Other Firearms Issues

Counsel commonly will encounter two issues that are related to firearms but, strictly speaking, are not within the ambit of a firearms and toolmark examiner: gunshot residue analysis (see chap 8) and distance determinations (see §11.18). Both of these disciplines use comparable evidence recovered from the crime scene.

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§11.17 1. Gunshot Residue (GSR) Analysis

When a gun is fired, a cloud of gunpowder and primer residues, commonly referred to as gunshot residue (GSR), is blown back toward the hand of the shooter. Saferstein, Criminalistics: An Introduction to Forensic Science, p 475 (9th ed 2007). Primers typically contain a blend of lead, barium, and antimony. The presence of these elements on the hands of a suspect is frequently offered as evidence that the suspect fired a gun recently. Saferstein, Criminalistics, p 475. Adhesive tape is applied to a suspected shooter's hands and then examined for these elements using a scanning electron microscope (SEM). Houck & Siegel, Fundamentals of Forensic Science, p 592 (2006). The California Department of Justice, Bureau of Forensic Services, provides detailed instruction on the collection of suspected GSR, which is accessible from the website of the California Criminalistics Institute at http://www.cci.ca.gov/Reference/peb/peb15.pdf (visited Apr. 5, 2009).

PRACTICE TIP: Strictly speaking, the presence of GSR indicates only that a suspect was in the proximity of a fired weapon. The possibility of innocent explanations for the presence of GSR should be carefully explored. Alternatively, the absence of GSR does not mean conclusively that a suspect did not fire a gun.

GSR will remain on a person's hands for up to 6 hours. However, GSR is easily dislodged, and activities such as washing, wringing, or placing hands in pockets will remove the residue. Handcuffing a person behind the back will also dislodge these particles. Thus, due to its transient nature, GSR evidence must be collected quickly. For more information, see Fisher, Techniques of Crime Scene Investigation, p 262 (7th ed 2003).

NOTE: For many years, the dermal nitrate test was a popular chemical test administered to detect the unburned gunpowder or nitrites found in GSR. However, this test has fallen into disfavor due to its lack of specificity. Fertilizers, cosmetics, urine, tobacco, and other common materials give positive reactions indistinguishable by the test from gunpowder.

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§11.18 2. Firing Distance Determinations

Gunshot residue is used to determine the firing distance from gun to target. Gases containing unburned particles of the propellant are expelled from the muzzle of a gun. These unburned particles accompany the projectile for some distance from the muzzle of the weapon, gradually slowing down and dispersing in a circular pattern. The unburned particles will form a circular pattern around the point of impact of a bullet. An analysis of the pattern can often provide information about the firing distance, assuming the firing distance is fairly short (perhaps less than 3 feet). Houck & Siegel, Fundamentals of Forensic Science, p 588 (2006). See also Rijinders, Stamouli & Bolck, Comparison of GSR Composition Occurring at Diffferent Locations around the Firing Position, 55(3) J forensic Sciences 616 (2010). For more detailed information and some instructive photographs, see http://www.firearmsid.com, a private website maintained by Jeffrey Doyle, a retired firearms and toolmark examiner with the Kentucky State Police.

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§11.19 III. IDENTIFYING TOOLS OTHER THAN FIREARMS FROM MARKS

A toolmark is any sort of mark (*e.g.*, an abrasion, impression, cut, or gouge) left by a tool coming into contact with another surface or object. Saferstein, Criminalistics: An Introduction to Forensic Science, p 481 (9th ed 2007). Typical toolmark identification questions are: whether a particular screwdriver was used as a pry tool, whether a particular set of pliers gripped an item or whether a bolt cutter was used to cut a piece of metal.

Like marks made by firearms on bullets or casings, marks made by other tools on surfaces or objects can be comprised of *class* characteristics (design features set by the manufacturer and shared by all tools of the same make and model), *subclass* characteristics (often caused by the manufacturing process, common to a subset of a particular make and model but not shared by all similar tools), and *individual* characteristics (features caused by use or damage that are unique to a particular tool). For additional discussion of class, subclass, and individual characteristics, see §11.5.

The procedure for the identification of tools is essentially the same as that for firearms. The examiner who takes a mark or image of a mark recovered from the crime scene uses a comparison microscope to compare that mark to a mark associated with a tool from a suspect. The examiner looks for shared characteristics between the two marks of sufficient quantity and quality to form the opinion that the suspect tool is the same as that which left the mark at the crime scene. If there is "significant disagreement" between the class (or subclass) or individual characteristics of the marks, then the tool in question will be excluded as the source with confidence. If the marks share all class characteristics but there is some disagreement or variance between individual characteristics, yet not enough disagreement to eliminate the tool as a source, then the examiner will make an "inconclusive" finding. If there is agreement between all class characteristics and sufficient agreement between the individual characteristics to meet the AFTE theory of identification (see §11.7), then the examiner can identify the tool as the source of the mark. For the *SWGGUN Range of Conclusions,* see http://www.swggun.org/guidelinedocs/guidelines_elimination.htm (visited Apr. 5, 2009).

A major problem with toolmark identification is the difficulty encountered with re-creating in the laboratory what occurred at the crime scene. Saferstein, Criminalistics, p 482. To make an accurate comparison, it is essential that the examiner understand how the suspect tool was held at the time the marks were produced at the crime scene. Particularly with scratches, the distance between individual marks due to imperfections and variations in the tool is affected by the angle at which the tool is held. Fisher, Techniques of Crime Scene Investigation, p 247 (7th ed 2003). It is important, furthermore, that the comparison mark be made in the same material, in the same condition, as the mark left at the crime scene. The clarity of microscopic scratches varies with the material. Fisher, Crime Scene Investigation, p 248. Lastly, any contact between a tool and a toolmark during the examination process can alter the mark and throw into question the integrity of the evidence recovered at that crime scene. Saferstein, Criminalistics, p 482.

PRACTICE TIP: Counsel may wish to explore with the examiner whether anyone attempted to fit a suspect tool into a recovered toolmark, thereby compromising the evidence.

NOTE: Tools may leave trace substances behind, such as paint or oil, that can prove just as useful as a mark in identifying a specific tool as the suspect tool. For discussion of trace evidence, see chap 8.

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IV. USE OF FIREARMS AND TOOLMARK IDENTIFICATION EVIDENCE IN COURT

A. State of the Evidence

§11.20 1. Admissibility of Firearms and Toolmark Identification Evidence in Federal Court Under *Daubert*

In *U.S. v Diaz* (ND Cal, Feb. 12, 2007, No. CR 05-00167 WHA) 2007 US Dist Lexis 13152 (a gang prosecution under the Racketeer Influenced and Corrupt Organizations Act (RICO) (18 USC §§1961-1968)), the U.S. District Court for the Northern District of California considered the admissibility of firearms identification testimony under the standard for the admission of expert testimony set out in *Daubert v Merrell Dow Pharms., Inc.* (1993) 509 US 579, 125 L Ed 2d 469, 113 S Ct 2786, and *Kumho Tire Co., Ltd. v Carmichael* (1999) 526 US 137, 143 L Ed 2d 238, 119 S Ct 1167 (for discussion of *Daubert*, see chap 2). The court held that the theory of firearm identification used by the San Francisco Police Department Crime Lab, which the court found to be essentially a restatement of the AFTE theory of identification (see §11.7), was reliable under *Daubert*. However, because the record "did not support the conclusion that identifications can be made to the exclusion of all other firearms in the world," the court concluded that the examiners who would be testifying in the case could "only testify that a match has been made to a 'reasonable degree of certainty in the ballistics field.'" *U.S. v Diaz, supra*. For another decision in which the federal court has considered the admissibility of firearm identification evidence under *Daubert,* see *U.S. v Monteiro* (D Mass 2006) 407 F Supp 2d 351, 375 (firearms identification methodology is sufficiently reliable under *Daubert* and *Kumho*; and if established standards for peer review and documentation are met, expert could testify that "cartridge cases were fired from a particular firearm to a reasonable degree of ballistic certainty," but not "that there is a match to an exact statistical certainty").

For "a collection of information pertaining to the admissibility of firearm and toolmark evidence" compiled by the Scientific Working Group for Firearms and Toolmarks (SWGGUN) and referred to as the "Admissibility Resource Kit," go to http://www.swggun.org and select the "Resources" tab. This collection of information includes links to court rulings (mostly decided under *Daubert*), articles from law reviews and other journals, and to other organizations and resources.

NOTE: Although California courts have not adopted the *Daubert* standard for the admission of expert testimony, counsel nonetheless might find the holdings and reasoning in firearms identification cases decided under *Daubert* both educational and useful for developing strategies with which to approach this evidence in California courts.

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Source: Criminal Law/Scientific Evidence in California Criminal Cases/11 Firearms and Toolmarks/§11.21 2. Controversy Surrounding Identification Methods

§11.21 2. Controversy Surrounding Identification Methods

At the heart of *Daubert* challenges to the admissibility of firearms and toolmark identification evidence is the criticism that the AFTE theory of identification is too subjective and, therefore, unreliable. See, *e.g., U.S. v Diaz* (ND Cal, Feb. 12, 2007, No. CR 05-00167 WHA) 2007 US Dist Lexis 13152; *U.S. v Monteiro* (D Mass 2006) 407 F Supp 2d 351.

In an article published in 2005 in the Columbia Science and Technology Law Review, Adina Schwartz (a professor at the John Jay College of Criminal Justice and The Graduate Center, City University of New York) distinguishes what she refers to as "the traditional subjective approach to firearms and toolmark identification" from the consecutive matching striae (CMS) approach (for a discussion of the CMS approach, see §11.8). Schwartz lauds the CMS approach as an attempt to provide objective criteria for determining a match between toolmarks, but still criticizes the technique on the grounds that there are no objective standards for counting matching striae and there has been no statistical information developed to determine the significance of a match. See Schwartz, *A Systemic Challenge to the Reliability and Admissibility of Firearms and Toolmark Identification,* 6 Colum Sci & Tech L Rev 2 (2005). "[B]ecause of systemic scientific problems," Schwartz contends that "firearms and toolmark identifications should be inadmissible across-the-board."

Ronald Nichols, a firearms examiner for the federal Bureau of Alcohol, Tobacco, Firearms, and Explosives (ATF) and a member of the Association of Firearm and Toolmark Examiners (AFTE), responded to Schwartz's criticisms in an article published on the AFTE website, Nichols, *The Scientific Foundations of Firearms and Tool Mark Identification-A Response to Recent Challenges*, which can be accessed as a PDF file at http://www.afte.org/announcements/critrevnichols.htm (visited Apr. 5, 2009). Nichols first asserts that Schwartz fails to recognize that CMS and traditional pattern matching are not different methods of comparison, stating that "CMS is simply a convenient way to communicate with other examiners the extent of agreement being observed in a striated tool mark comparison." *Scientific Foundations,* p 18. Nichols also disputes Schwartz's assertion that the process of identifying matching striae is inherently subjective, asserting that, even if the criteria are not articulated, firearms and toolmark examiners use objective criteria, such as width, height, and location to determine whether two striae correspond. *Scientific Foundations,* p 18. Nichols states further that the standards for defining a match in the CMS method are conservative and points to studies of the CMS method, as applied to various toolmarks, showing that "in no case of known non-match comparisons would the criteria have permitted a false inclusion." *Scientific Foundations,* p 21.

The U.S. District Court for the Northern District of California has concluded that "[w]ithin the field … CMS is not a predominate methodology, only a method in its infancy, a work still in progress." *U.S. v Diaz* (ND Cal, Feb. 12, 2007, No. CR 05-00167 WHA) 2007 US Dist Lexis 13152. According to the court, "CMS is a school of thought among a small subclass of professionals in the firearm-identification field … [that] … has not gelled into a recognized discipline." *U.S. v Diaz, supra*. And, although "CMS may eventually develop into a functional and reliable science," the court found that the evidence in the record before it did "not warrant dismissing traditional pattern matching in favor of CMS." *U.S. v Diaz, supra*. The *Diaz* ruling followed a *Daubert* hearing (for discussion of *Daubert*, see §11.20 and chap 2) on the admissibility of firearms identification at which both Schwartz and Nichols testified.

In 2009, the National Research Council of the National Academies issued their report entitled Strengthening Forensic Science in the United States: A Path Forward (2009) (hereafter the NAS Report) (available online at http://www.nap.edu/catalog.php?record_id=12589). This followed a related report from the National Research Council in 2008 on Ballistic Imaging. See Committee to Assess the Feasibility, Accuracy, and Technical Capability of a National Ballistics Database, Ballistic Imaging (2008). The 2008 report was limited to firearm and toolmark identification. The 2009 NAS Report reviewed and evaluated all of the forensic disciplines, including firearms identification and toolmark identification (chap 5, Descriptions of Some Forensic Science Disciplines, pp 150-155). Both reports reviewed the AFTE theory of identification, and, agreeing with Schwartz rather than Nichols, concluded that the AFTE theory does not provide a specific protocol. NAS Report, p 155. Further, the reports note that AFTE claims that an examiner may offer an opinion that a specific tool or firearm was the source when sufficient agreement exists in the patterns of two sets of marks. However, both reports conclude that statements regarding the sufficiency of agreement are entirely subjective and based on unstandardized training and experience that differs from examiner to examiner. NAS Report, p 155. The 2008 report from the National Research Council also expressed concern that "[t]he validity of the fundamental assumptions of uniqueness and reproducibility of firearm related toolmarks has not yet been fully demonstrated" (p 3). Quoted in the NAS Report, p 154.

Because of these two prestigious reports and incomplete and weak federal rulings in *U.S. v Diaz, supra,* and *U.S. v Monteiro*, *supra,* district attorneys should anticipate a *Daubert* or *Frye* challenge when introducing firearm or toolmark identification evidence. Conversely, defense attorneys should explore both kinds of challenges when defending their clients against firearm or toolmark identification evidence. Attorneys in this state should note that the court in *U.S. v Diaz,* using a *Daubert* standard, was critical of

the existence of any community of examiners who accepted or followed the arguably more scientific CMS methodology for firearm identification. This may be relevant to a *Frye* challenge.

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§11.22 3. Concerns Regarding Misidentification Based on Subclass Rather Than Individual Characteristics

The identification of a given tool as the one that made particular marks, or a given weapon as the one that fired a particular bullet (or ejected a particular casing), requires the agreement of *individual* characteristics. Identifications based on subclass characteristics are unreliable. (For more discussion, see §§11.5, 11.22.) In her article challenging the reliability of firearms and toolmark identification (see §11.21), Adina Schwartz expresses concern about the potential for misidentification of a firearm or other tool if an examiner confuses subclass characteristics with individual characteristics (for discussion of class, subclass, and individual characteristics, see §11.5). See Schwartz, *A Systemic Challenge to the Reliability and Admissibility of Firearms and Toolmark Identification,* 6 Colum Sci & Tech L Rev 2 (2005). In this article, Schwartz asserts that firearms and toolmark examiners have not developed generalizations or statistics concerning the likelihood of encountering subclass characteristics in newly manufactured tools and firearms, and that they have not formulated rules for distinguishing between subclass and individual characteristics.

However, in Ronald Nichols's rebuttal to Schwartz's critique (see §11.21), he cites 19 studies "detailing issues of subclass characteristics from which well-trained and competent firearm and tool mark examiners may draw generalizations regarding the potential for subclass influence on the specific evidence with which he or she is concerned." See Nichols, *The Scientific Foundations of Firearms and Tool Mark Identification-A Response to Recent Challenges,* p 10, which can be accessed as a PDF file at http://www.afte.org/announcements/critrevnichols.htm (visited Apr. 5, 2009).

The National Research Council's 2008 report on Ballistic Imaging supports Schwartz and asserts that further research is still needed before there is sufficient evidence that individual characteristics permit individualization.

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B. Qualifying or Challenging the Firearms or Toolmark Identification Expert

§11.23 1. Discovery

Discovery involving firearms and toolmark evidence should include information about:

- The laboratory that performed the examination;
- The examiner who performed the examination; and
- The protocols used in performing the examination in the case at hand.

With respect to the laboratory, counsel should:

- Request copies of the laboratory's protocols for the examination of firearms and toolmark evidence. (See the Quality Assurance Guidelines of the Scientific Working Group for Firearms and Toolmarks (SWGGUN), available at http://www.swggun.org; for additional discussion of SWGGUN, see §11.2.)
- Determine whether the laboratory is accredited or is seeking accreditation by the American Society of Crime Laboratory Directors (ASCLD) and, if so, whether the lab is also accredited under the more stringent ASCLD/LAB-International standards.

NOTE: For more information on the crime laboratory accreditation program offered by the ASCLD, including proficiency testing requirements, see the ASCLD website at http://www.ascld-lab.org.

- Determine whether the laboratory participates in external proficiency testing, such as the testing administered by Collaborative Testing Services (CTS) (see §11.4); and, if so, request data regarding institutional performance.
- Determine whether the laboratory participates in internal proficiency testing; and, if so, request data regarding institutional performance.

With respect to the examiner, counsel should:

- Obtain information about the examiner's education, training, and work experience and full resume. (For information about proposed standards, see discussion of SWGGUN in §11.2.)
- Determine whether the examiner previously has qualified as an expert, and if so, how many times, and in what courts.
- Determine whether the examiner has ever failed to qualify as an expert and why.
- Determine whether the examiner is certified by the Association of Firearm and Toolmark Examiners (AFTE) and if so, under what category.
- Determine whether the examiner has participated in external or internal proficiency testing, and, if so, request data regarding the examiner's performance on any proficiency examinations.
- Whether or not the laboratory has standard written protocols for firearms and toolmark examination, determine whether the examiner followed written protocols, and if so, obtain copies.

With respect to the examination, counsel should:

- Request copies of all written reports prepared by the examiner, including notes, photographs, or diagrams used to document the examination process.
- Determine whether the examiner's conclusions were confirmed by another examiner, and if so, whether the confirmation was independent and obtain the identity of that examiner. Counsel also should request information about the education, training, and experience of the reviewing examiner for purposes of cross-examination.

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Source: Criminal Law/Scientific Evidence in California Criminal Cases/11 Firearms and Toolmarks/§11.24 2. Deciding Whether to Retain Independent Firearms or Toolmark Examiner

§11.24 2. Deciding Whether to Retain Independent Firearms or Toolmark Examiner

Counsel may wish to consider hiring an independent firearms or toolmark examiner to assess, review, or criticize the methodology used by the examiner testifying for the other side. Factors to consider when deciding whether to hire an independent examiner include:

- How important is the firearms or toolmark evidence in the case?
- Can the cost of a private examiner be justified?
- How much "education" does the attorney require? Reviewing the report of the opposing examiner with a retained expert may prove helpful in disclosing weaknesses in the evidence that may not be obvious to an nonexpert. For example, a retained expert might be able to suggest innocent explanations for the evidence.
- Is it necessary to have a retained examiner look at the original evidence (which will probably involve a court order to produce for examination) or will a review of the opposing examiner's reports suffice?

NOTE: For a list of experts available for private case work, go to the AFTE website (http:\\www.afte.org) and select the "Expert Referral" link.

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§11.25 3. Qualifying the Firearms or Toolmark Expert Witness

Counsel seeking to qualify a firearms or toolmark examiner to testify as an expert witness typically will present qualifications that fall into four general categories: (1) education and ongoing training under the supervision of a recognized expert in the field; (2) certification by a professional organization such as the Association of Firearm and Toolmark Examiners (AFTE); (3) periodic proficiency testing (see §11.4); and (4) an adequate amount of demonstrated personal experience in the field, consisting ideally of a number of cases examined under the guidance of an experienced examiner and a number of cases examined independently.

The Scientific Working Group for Firearms and Toolmarks (SWGGUN) (see §11.2) provides recommended education and experience requirements for entry-level and experienced firearms and toolmark examiners. For SWGGUN's recommended qualifications, see http://www.swggun.org/guidelinedocs/minqualifications1.htm. Note that SWGGUN's education and training guidelines are not mandatory.

For information on AFTE training, its certification program, and an expert referral list, see http://www.afte.org.

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§11.26 4. Sample Direct Questions for Proponent of Evidence

As with other expert witnesses, firearms and toolmark examiners may provide counsel with a list of questions covering their qualifications, as well as pertinent questions about the firearms and toolmark examination process and the conclusions reached. There is no good reason for not using the questions provided, but counsel may prefer to develop his or her own line of questioning. Counsel and the witness should reach an agreement beforehand as to exactly which questions counsel will ask and in what order. Testimony will go more smoothly if counsel and the witness are on the same page.

Keep in mind that the sample questions that follow are suggestions only and that counsel must carefully tailor questions to the specific case at hand.

- Qualify the witness as an expert:

Q: What is your business or profession?

Q: By whom are you employed?

Q: In what capacity?

Q: How long have you been so employed?

Q: Is that your full-time occupation?

Q: What else do you do?

Q: What is you formal education?

Q: How much of your formal education was devoted to the examination of firearms [*or toolmarks, or both*]?

Q: Have you had any specialized training in the examination of firearms [*or toolmarks*]?

Q: By whom?

Q: With whom did you study?

Q: What are his or her qualifications?

Q: Please provide details of the courses you have taken.

Q: How many hours of those courses were devoted to examination and identification of firearms [*or toolmarks*]?

Q: Did any of these courses result in degrees or certificates?

Q: What else was covered in this training?

Q: Have you worked under the supervision of qualified examiners?

Q: Who are they and what are their qualifications?

Q: How long did this supervised work go on?

Q: When was it?

Q: Did you study any books or other treatises during your training?

Q: Do you engage in ongoing education?

Q: Do you subscribe to any journals or newsletters?

Q: Do you attend seminars or other training sessions?

Q: Do you maintain a library of material related to firearms [*or toolmark*] examinations?

Q: Do you consult it regularly?

Q: Do you belong to any professional societies or organizations related to firearms [*or toolmark*] examinations?

Q: What are the requirements for membership in these organizations?

Q: Do these organizations hold regular meetings?

Q: Do you participate on a regular basis?

Q: Do any of these organizations provide some sort of certification?

Q: In what areas?

Q: What are the qualifications for such certification?

Q: Are you certified as a firearms [*or toolmark*] examiner?

Q: Do you or your laboratory participate in any proficiency testing?

Q: Internal?

Q: Through Collaborative Testing Services?

Q: Describe the proficiency testing in which you engaged.

Q: How did you do?

Q: Have you previously testified as an expert witness on firearms [*or toolmark*] examinations?

Q: How many times?

Q: When?

Q: In what jurisdictions?

Q: What did your testimony cover?

[*Offer the examiner as an expert witness*]

- Get the expert to explain the evidence and examination conducted in this specific case. The following questions focus on firearms examiners, by far the most commonly encountered experts in the field of firearms and toolmark examination:

[*If a weapon was recovered in the case*]:

Q: Did you examine a particular weapon in this case?

Q: When, where, and at whose request?

Q: What type of weapon did you examine [*specify, such as a revolver, semi-automatic pistol, or shotgun*]?

Q: [*Showing the weapon*] Is this the weapon you examined?

Q: Did you bring some visual aids with you?

NOTE: Visual aids typically will consist of generic photographs or drawings that illustrate the operation of the weapon in question.

Q: For what purpose?

Q: How were these assembled?

Q: Using these visual aids as necessary, could you explain the operation of the weapon in question?

[*If no weapon was recovered*]:

Q: Did you determine the type of weapon used in this case?

Q: How was that done?

Q: Did you bring with you a weapon of the same type used in this case?

NOTE: A weapon similar to the weapon used may already be in evidence, provided from a police collection or some other source.

Q: Did you bring some visual aids with you?

Q: Using these materials as necessary, could you explain the operation of the weapon used?

Q: Did you also examine some other material in connection with this case [*materials such as casings and bullets*]?

Q: When, where, and at whose request?

Q: What was the purpose of your examination?

Q: What equipment did you utilize in your examination [*equipment such as a microscope or comparison microscope*]?

- Get to the conclusion:

Q: As a result of your examination, have you reached any conclusions?

Q: What are they?

Q: Did you prepare any photographic or other visual aids from the material in evidence in this case?

Q: For what purpose?

Q: Were the photographs prepared by you or under your direction?

Q: Showing you exhibits _____, are these the photographs you referred to?

Q: Using these visual aids as necessary, could you explain the examination you performed and the reasons for your conclusions?

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Source: Criminal Law/Scientific Evidence in California Criminal Cases/11 Firearms and Toolmarks/§11.27 5. Sample Cross-Examination Questions for Proponent of Evidence

§11.27 5. Sample Cross-Examination Questions for Proponent of Evidence

The following are sample questions that may be asked by the opponent of firearms and toolmark evidence. Counsel should keep in mind that these questions are suggestions only and are neither exhaustive nor necessarily applicable to a given case.

- Bring out lack of qualifications:

Q: Did any of your formal education have anything to do with firearms or toolmark examinations?

Q: Which courses?

Q: How long was each course?

Q: How much time was devoted to firearms and toolmarks?

Q: What material did you study?

Q: What specialized training have you had in firearms and toolmarks?

Q: When?

Q: Where?

Q: Who were your instructors?

Q: What materials were available for study?

Q: Were any of these courses correspondence courses?

Q: Did any of these courses result in degrees or certificates?

Q: How many hours of each course were devoted to the identification of firearms or toolmarks?

Q: What materials do you have available for continuing study?

Q: Books?

Q: Periodicals?

Q: Training memorandums?

Q: Internet publications?

Q: Do you refer to or consult with any of this material on a regular basis?

Q: Are any of these materials generally available to people outside the profession?

Q: Do you belong to any professional societies related to your work?

Q: [*If not*] Why not?

Q: Have you been certified by any professional body such as the Association of Firearm and Toolmark Examiners?

Q: Have you applied for such certification?

Q: Were you denied such certification?

Q: Why?

Q: What sort of proficiency testing do you engage in?

Q: Internal?

Q: Through an outside organization such as Collaborative Testing Services?

[*If the witness does not engage in proficiency testing, ask why not.*]

- Bring out limitations of the science:

Q: What is the scientific basis for the identification of firearms and toolmarks?

Q: Has it ever been tested?

Q: By whom?

Q: What were the results?

Q: Isn't it true that the identification of firearms and toolmarks is, essentially, a subjective process?

Q: Please explain.

Q: What is the error rate in the identification of firearms and toolmarks?

Q: Have you ever made a mistake in the identification of a firearm or toolmark?

Q: [*If yes*] Please explain.

Q: If not, how do you know?

- Bring out bias:

Q: How often have you testified as an expert witness in the identification firearms or toolmarks?

Q: Do you always testify for the prosecution in a criminal case?

Q: Are you a salaried member of the prosecution team?

Q: Are you a peace officer?

[*For private examiners*]:

Q: Were you hired by the opposing counsel?

Q: For what purpose?

Q: How much were you paid?

Q: For your examination?

Q: For your testimony?

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§11.28 6. Selecting Expert to Challenge Admissibility of Firearm and Toolmark Evidence

Generalizing from *Daubert* and *Frye* hearings that have challenged other areas of forensic evidence (especially fingerprints), the defense may wish to retain as an expert witness a research scientist who is familiar with the research literature concerning validity tests and the accuracy of toolmark evidence. This scientific background is likely to be much more useful to the court than hands-on working examiners familiar with toolmark examinations. This distinction is important because courts are becoming more focused on the underlying science than on the opinions of the practitioners who use the methods being challenged. See, *e.g.,* the Memorandum of Decision issued by the circuit court of the County of Baltimore in *Maryland v Rose* (MD Baltimore Cir Ct 2007), No. K06-0545, available online at http://www.clpex.com/Information/STATEOFMARYLAND-v-BryanRose.doc.

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Source: Criminal Law/Scientific Evidence in California Criminal Cases/12 Origin and Cause of Fire/Chapter Outline

12

Origin and Cause of Fire

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I. ESTABLISHING PROOF OF INCENDIARY FIRES

A. Application of National Fire Protection Association Standards (NFPA 921) to Fire Investigations

§12.1 1. NFPA 921: Purpose

The National Fire Protection Association (NFPA) is an international nonprofit organization whose mission "is to reduce the worldwide burden of fire and other hazards on the quality of life by providing and advocating consensus codes and standards, research, training, and education." (See the NFPA's website at http://www.nfpa.org and select the "About Us" link.) Among the more than 300 codes and standards developed, published, and disseminated by the NFPA for the purpose of "minimiz[ing] the possibility and effects of fire and other risks," is NFPA 921: Guide for Fire and Explosion Investigations (2008). (See http://www.nfpa.org and select the "Codes and Standards" tab, then the "List of Codes and Standards" link.)

NFPA 921 establishes guidelines and recommendations for conducting safe and systematic investigations of fire or explosion incidents. NFPA 921 §1.2.1. Developed by the NFPA's Technical Committee on Fire Investigations (NFPA 921, p 921-1), NFPA 921 is the product of a sophisticated peer-review process and represents the consensus of a wide cross-section of industry experts, including NFPA members and the fire investigation public.

Although there are other books and documents on fire investigation, NFPA 921 is the only one that is developed under the review of, and published by, one the largest fire organizations in the world and, except for Dr. John D. DeHaan's leading treatise, Kirk's Fire Investigation, is the only one that is developed by a peer-review process. See DeHaan, Kirk's Fire Investigation (6th ed 2007); see also §§12.48, 12.70. Most of the books and articles published since the emergence of NFPA 921 follow or expand on the procedures outlined in NFPA 921. For discussion of the significance of NFPA 921's peer-reviewed status in terms of the admissibility in court of fire investigation expert testimony, see §§12.48, 12.50.

NOTE: For ease in referencing, note that all instances of NFPA 921: Guide for Fire and Explosion Investigations (2008) are shortened to NFPA 921 and reflect the 2008 edition, unless otherwise noted.

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§12.2 2. NFPA 921: Development

In developing NFPA 921, the NFPA's Technical Committee on Fire Investigations must follow the NFPA standards-making process that allows for public input and requires a consensus for the acceptance and publication of any part of the document. As anyone is allowed to comment, the document is "peer reviewed." NFPA 921 contains specific procedures in which "deviations are not necessarily wrong or inferior but need to be justified." NFPA 921 §1.3. It is this wording that suggests if an investigator uses other procedures or methods, then the investigator must be able to explain those procedures or deviations from the NFPA 921 guidelines.

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§12.3 3. NFPA 921: Methodology

In Chapter 4, titled "Basic Methodology," NFPA 921 outlines the "systematic approach" (or method) for conducting fire and explosion investigations. The systematic approach recommended by NFPA 921 is the *scientific method* used in the physical sciences. NFPA 921 §4.2. NFPA 921 defines scientific method as "the systematic pursuit of knowledge involving the recognition and formulation of a problem, the collection of data through observation and experiment, and the formulation and testing of a hypothesis." NFPA 921 §3.3.139. NFPA 921 outlines in general terms what this scientific method is and how it relates to a fire investigation. The scientific method is applied by following seven steps: (1) recognize the need (identify the problem); (2) define the problem; (3) collect data; (4) analyze the data; (5) develop a hypothesis; (6) test the hypothesis; and (7) select the final hypothesis. NFPA 921 §4.3.

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B. Definition and General Indicators of Incendiary Fires

§12.4 1. Incendiary Fire Defined

"An incendiary fire is a fire that has been deliberately ignited under circumstances in which the person knows the fire should not be ignited." NFPA 921 §22.1. Under the California Penal Code, "[a] person is guilty of arson when he or she willfully and maliciously sets fire to or burns or causes to be burned or who aids, counsels, or procures the burning of, any structure, forest land, or property." Pen C §451. When the smoke clears, an arson case is simply a fire investigation that resulted in a finding of an incendiary fire. Such a finding demands a careful and thoughtful analysis of the evidence to determine that an intentionally set fire really exists. That analysis must ensure that the fire investigation was conducted in an objective and systematic manner (see §12.3).

NOTE: There are only four classifications that an investigator may assign to any fire cause. In addition to "incendiary," the other three classifications are natural, accidental, and undetermined. See NFPA 921 §18.6.2.

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§12.5 2. Need to Establish Incendiary Cause of Fire

Sometimes incendiarism may be proved referencing only credible affirmative evidence that the fire was intentionally set. Other times, the expert must thoroughly and credibly address and eliminate all accidental ignition sources and other plausible explanations for the fire's cause. If the fire investigation did not reveal physical evidence of the ignition source and, thus, a conclusion of incendiarism was reached by credibly eliminating all accidental sources of ignition, then counsel will want to be sure that the expert rendering that conclusion followed the procedure for a determining cause through a process of elimination set forth in NFPA 921 §§18.2-18.2.6 (for discussion, see §12.38). For discussion of ignition sources, see §§12.34, 12.36-12.37.

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§12.6 3. Need for Connective Evidence to Show Responsibility for Fire

Factors typically considered in identifying who was responsible for an intentionally set fire include the following:

- Who had access to the premises, including who had keys and alarm code access; the condition of all doors and windows; and whether or not there was any evidence of forced entry.
- Who had the opportunity to set the fire, including considerations such as alibi.
- Who had a motive to set the fire. Motives can include financial profit or "need" or "greed," spite or revenge, business advantage, concealment of another crime, and social protest or terrorism. See NFPA 921 §22.4.9; DeHaan, Kirk's Fire Investigation, chap 16 (6th ed 2007).
- Evidence of preparations. See, *e.g.,* NFPA 921 §22.3 for common examples of such preparations, including blocked doorways, opened windows, disabled alarm or suppression systems, and personal property removal or substitution. "Trailers" (used to propagate fire from one area to another) (see NFPA 921 §22.2.2; see also §12.9) can also provide evidence of preparations.
- Whether the suspected party exhibited conduct consistent with guilt before or after the fire.
- The credibility of the suspected party.

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§12.7 C. Physical Indicators of Incendiary Fire

The indicators that follow (see §§12.8-12.14) are typical of the data required to support an incendiary fire hypothesis as the appropriate determination of cause. See NFPA 921 §§22.2, 22.3.2.

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§12.8 1. Multiple Fires

Multiple fires are two or more simultaneously burning separate fires with no obvious connection. See NFPA 921 §22.2.1. Multiple fires result from the application of an ignition source at multiple points to ensure that destruction results. They are indicative of an incendiary cause.

The natural spread of fire, however, also can result in fires in separate locations that the investigator must explain before determining the cause to be incendiary. For example, many wood-frame houses are built with wall studs that extend from foundation to roof—a technique known as balloon framing. A fire that starts in the basement of a balloon-frame house can spread naturally through the vertical openings in the walls and ignite combustible fuels in a location such as the attic that is remote from the initial fire. For discussion and illustration of balloon framing, see DeHaan, Kirk's Fire Investigation, chap 7 (6th ed 2007). Thus, before concluding that a fire was incendiary, a fire investigator should eliminate the ways that fire can spread naturally. See NFPA 921 §22.2.1. In addition to fire spread within wall or floor cavities, examples of such spread include the following (see NFPA 921 §22.2.1.2):

- Conduction, convection, or radiation;
- Flying brands, *i.e.,* pieces of burning wood (commonly called "sparks" or "embers");
- Direct-flame impingement, *i.e.,* flames reaching target fuels;
- Falling flaming materials (*i.e.,* "drop down");
- Fire spread through shafts (such as elevators, light wells, and vent pipes);
- Overloaded electrical wiring;
- Utility system failures;
- Fuel, gas, or dust explosions; and
- Lightning.

As further illustration, consider an investigation that reveals two apparent separate areas of fire origin. One is found in the attic and another in the basement of the same building. Because principles of fire behavior don't allow for this condition, this would be an indicator of an incendiary fire. If, however, the investigator could not eliminate the possibility that an ABS (black plastic) plumbing vent pipe ran within the wall from attic to basement and melted, thus allowing burning material to fall into the basement, then the investigator could not determine that the fire was incendiary.

NOTE: The investigator should always conduct a thorough scene examination to determine whether separate fires occurred. Otherwise, he or she may miss valuable evidence. An arsonist may have used similar devices to set multiple fires. Finding such a device (or its remains) in one location may be a valuable clue to the ignition source (see §12.34) in an area where the damage was more extensive. The investigator should not limit the inspection to the areas that were damaged, but should inspect the scene to determine whether other fires were set that did not extend.

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§12.9 2. Spreading Fire Using Fuels or Liquids (Trailers)

Arsonists may attempt to spread fire from one area to another by linking separate fires together with combustible fuels or ignitable liquids called trailers. One fire will, in turn, ignite other fuels via these trailers. See NFPA 921 §§6.3.7.10.1, 22.2.2.

Materials that can be used as trailers include (NFPA 921 §22.2.2.2):

- Ignitable liquids;
- Clothing;
- Paper; and
- Straw.

Trailers may leave elongated burn patterns (for discussion, see §12.32) on horizontal surfaces such as floors that are easily discernible when the floor is cleared of debris. It is important to distinguish trailer patterns from similar patterns that may be observed in open areas near furniture or other items that could protect part of the floor surface and from patterns on floors or under tables created by radiant heat in fires where there was full-room involvement. See NFPA 921 §22.2.2.4.

NOTE: Because common household goods (*e.g.,* cleaning fluids and gasoline) may contain ignitable liquids, their presence on the fire scene is not necessarily indicative of use as a trailer.

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§12.10 3. Limited Fuel Load in Area of Origin

Fire investigators frequently refer to the "total quantity of combustible contents of a building, space, or fire area" as the "fuel load." NFPA 921 §3.3.78. When a fire occurs in an area with a limited fuel load (*e.g.,* a stairway or hallway, or a vacant building), the investigator may suspect an incendiary fire. See NFPA 921 §22.2.3.

Burning in an area with a low fuel load, however, is not enough to classify the fire cause as incendiary in and of itself. Burning in such an area may not be unusual if the burning represents fire extension or movement from another area, particularly if the adjacent space has developed past flashover. Flashover is the room temperature where all surface materials reach ignition more or less simultaneously; full-room involvement immediately follows. See NFPA 921 §3.3.74. The fire investigator should carefully assess whether the fire originated in the low fuel area and should attempt to quantify the fire damage that would be expected to be caused by the observable fuel load.

If the origin of a fire is in a location with a limited fuel load, the investigator should look for physical evidence of fuels such as an ignitable liquid and take debris samples to test for ignitable liquid residue. For further discussion of sampling and testing for ignitable liquid residue, see DeHaan, Kirk's Fire Investigation, chap 14 (6th ed 2007). See also §12.43. For discussion of area of origin, see §§12.22-12.33.

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§12.11 4. Unexpected Ignition Sources

When a fire starts in an area that has limited accidental ignition sources (*e.g.,* in an attic, a closet, or a crawl space), the investigator may suspect that the fire was intentionally started by means of an incendiary device. See NFPA 921 §22.2.3. For discussion of ignition sources, see §§12.34-12.38. The term "incendiary device" is "used to describe a wide range of mechanisms used to initiate an incendiary fire." NFPA 921 §22.2.7.

The investigator should examine the debris for evidence of ignition sources that have been consumed in the fire. Examples of objects that could be used as incendiary devices include (see NFPA 921 §§22.2.7-22.2.7.2):

- Books of paper matches wrapped around a cigarette;
- Candles;
- Wiring systems of heating appliances that have been tampered with to bypass safety mechanisms;
- Combustible materials placed in proximity to heat-producing appliances;
- Fire bombs (*i.e.,* Molotov cocktails);
- Road flares; and
- Delay devices that allow the firesetter to leave the scene and establish an alibi. These devices include cigarettes and candles placed in proximity to combustible materials and mechanical or electrical timing devices.

Naturally, the presence of these items does not necessarily always prove that an incendiary fire has occurred; just as the absence of such devices does not prove that the cause of a fire was not incendiary. For additional discussion of ignition sources, see §§12.34-12.38.

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§12.12 5. Unusual Fuel Load or Configuration

When the area where the fire originates contains (1) an unusually large fuel load, (2) a fuel load placed in an unusual configuration, or (3) a fuel load where contents are unusual or unexpected for that location, the investigator may suspect an incendiary fire. For example, a firesetter may stack up furniture in the middle of a room or may put cardboard boxes or other flammable material in the living room in an attempt to encourage the fire. See NFPA 921 §22.2.5.

NOTE: Before assuming that an unusual fuel load or configuration is related to the fire cause, the investigator should first find out if it is truly unusual. Witnesses may be able to provide information as to the position or location of contents prior to the fire.

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§12.13 6. Burn Injuries

The nature and extent of injuries sustained by fire victims shed light on the cause and spread of a fire. The fire investigator should interview fire victims to attempt to determine whether their injuries are consistent with the investigator's theories about the fire. In addition, an arsonist may sustain injuries while setting the fire. See NFPA 921 §22.2.6. For example, flash burns to the face and hands sometimes occur when the arsonist bends down to apply the flame to an ignitable liquid.

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§12.14 7. Appliances Used to Mask Cause of Fire

A firesetter may try to mask the true cause of a fire by attempting to make an appliance appear to be the "obvious" accidental cause of the fire. See NFPA 921 §22.3.2. For example, a firesetter may pour an ignitable liquid into a coffeemaker, thus causing a fire. Forensic examination of the coffeemaker or laboratory confirmation of the presence of ignitable liquid would likely play a role in testing the incendiary fire hypothesis.

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D. Indicators of Prior Knowledge of Fire

§12.15 1. Contents Removed or Replaced Before Fire Started

Removal or replacement of the contents of a building with items of lesser value before a fire may be indicative of prior knowledge of the fire. See NFPA 921 §§22.3.3-22.3.3.2. For example, the absence of personal items or irreplaceable items (*e.g.,* jewelry, photographs, pets, tax and business records, and firearms) should be investigated and explained. See NFPA 921 §22.3.3.3.

The investigator, however, should not conclude that items have been removed from the fire scene without corroboration (from witnesses, or inventory or sales receipts) that the items were present before the fire. See NFPA 921 §22.3.3.1.

NOTE: Careful documentation of the personal property remains within the debris may be useful in establishing a fraudulent insurance claim, even in those situations in which the fire cause cannot be determined.

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§12.16 2. Open Windows and Exterior Doors

Open windows and exterior doors also may be indicative of prior knowledge of the fire. Because a fire needs oxygen to burn, a firesetter may have opened windows and exterior doors to provide better ventilation. See NFPA 921 §22.3.6. Wind direction also might be a factor that the firesetter attempted to use in spreading the fire as the firesetter might have opened select windows, depending on the wind direction, to help spread the fire. The investigator also should consider firefighter suppression activities during the analysis of fire spread to clarify what the firefighters observed and what role they may have played in spreading the fire.

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§12.17 E. Other Evidentiary Factors

Once the investigator has concluded from the circumstances of a fire that the fire was incendiary, it is often useful to broaden the scope of the investigation to include other readily available evidence. Information that may be relevant to suspect identification includes the following (see NFPA 921 §§22.4.1-22.4.8.3):

- Trends of confirmed incendiary fires;
- Fires that are located within close geographic areas;
- Fires that happen at a common time (same time of day or same day of week);
- Same material and method used in ignition;
- Evidence of other crimes and crime concealment;
- Incendiary fire as an attempt to conceal other crime;
- Other crime as an attempt to disguise an incendiary fire;
- Financial stress;
- Fraud;
- Code violations;
- Similar fires at other properties owned by the same person;
- Over-insurance;
- Timed opportunity for the fire;
- During extreme natural conditions;
- During civil unrest; and
- When the fire department is unavailable.

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§12.18 F. Assessing the Proof Package

Evaluating the relative strength of a fire case involves a careful examination of all of the issues addressed throughout this chapter:

- The strength of the origin and cause determination (see §§12.22-12.45);
- The strength of the witnesses who will present those opinions and the investigatory work leading to them (see §§12.51-12.88); and
- The connective evidence (who is responsible for the fire) that completes the package (see §12.20).

In seeking to assess the strengths, and weaknesses, of any fire case, it is important to start with an assessment of the "proof package" relating to the fire's cause. Counsel may wish to consider the following proof factors relating to the expert's work and opinions (see §12.19) and the connective evidence relating to who was responsible for the fire (see §12.20).

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§12.19 1. Proof Factors Relating to Expert's Work and Opinions as to Cause of Fire

The following questions provide a broad outline of the topics that counsel should consider in assessing the fire expert's work and opinions relating to the cause of the fire. For further details, see §§12.77-12.88 (sample questions).

- Did the investigator follow (and document) the scientific method in his or her approach to the fire investigation? (For discussion of the scientific method, see §12.3.)
- How solid (provable) is the determination regarding the identified area (or point) of origin? (For discussion of area and point of origin determination, see §§12.22-12.33.)
- How solid (provable) is the determination regarding the identified ignition source? (For discussion of ignition source identification, see §§12.34, 12.36.)
- How solid (provable) is the determination regarding the identified first ignited fuel? (For discussion of first ignited fuel, see §12.34.)
- How solid (provable) is the determination regarding the identified ignition scenario (*i.e.,* is the identified ignition source competent to ignite the identified first ignited fuel)? (For discussion, see §§12.34, 12.37.)
- How thoroughly did the investigator address and rule out all other alternative possible causes? (For discussion, see §§12.77, 12.89.)
- How well were the fire scene and the investigator's work and conclusions documented (including photos and diagrams)? (For discussion, see §§12.62, 12.65.)
- Did the investigator properly secure relevant physical evidence? (For discussion, see §12.64.)
- Did the investigator's handling of the scene or any physical evidence present any "sample collection," "cross-contamination," "chain of custody," or spoliation of evidence issues or problems? (For discussion, see §12.64.)
- Will counsel likely have to contend with challenges related to the use of, or reliance on, a hydrocarbon-detecting canine or a mechanical or electrical hydrocarbon detector? (For discussion of canine detection of ignitable liquids, see NFPA 921, chap 16; DeHaan, Kirk's Fire Investigation, chap 7 (6th ed 2007). (For discussion of hydrocarbon detectors, see DeHaan, Kirk's Fire Investigation, chap 7.)
- Was appropriate or needed scientific or other testing or engineering analysis considered and utilized? (For discussion, see §§12.40-12.45.)
- Will counsel likely have to contend with challenges related to the methodology or another aspect of any laboratory, engineering, or other testing relied on?
- How important are witnesses to the investigator's conclusions? Have those witnesses been evaluated for credibility and reliability?
- How experienced and qualified is the investigator, and what kind of a witness will he or she make? (For discussion, see §§12.51-12.76.)
- Does the investigator have any "skeletons in his or her closet" that might negatively impact the presentation of this aspect of the case or his or her opinions?
- Was the investigator's work and conclusion peer reviewed?

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§12.20 2. Proof Factors Relating to Connective Evidence—Who Is Responsible for Fire?

In addition to consideration of the investigator's work and opinions relating to the cause of the fire (see §12.19), counsel should examine thoroughly all the other evidence supporting the conclusion that a particular person (or product) was responsible for the fire. In this regard, counsel may wish to explore the following:

- **How solid is the evidence regarding access to the premises?** This evidence might include relative ease or lack of ease to the premises (*e.g.,* is the structure in a secure, gated community or generally open to the public?) as well as access to the structure itself (including who had keys and alarm code access, the condition of all doors and windows, and whether or not there was any evidence of forced entry). For additional discussion, see §12.6.

- **How solid is the evidence regarding the opportunity to have set the fire?** Evidence relating to opportunity might include the time of day of the fire, the number and quality of witnesses present at or observing the property at and before the time of the fire, how big a "time window of opportunity" existed during which the fire could have been set, the suspect's alibi, and similar considerations. For additional discussion, see §12.6.

- **Who had a credible motive (or motives) to set the fire?** Although poor financial condition or financial distress at and before the time of the fire is a common, well-recognized motive, that is, however, by no means the only reason people intentionally set fires. Among the many other more common motives are vandalism, excitement (including thrill seeking, attention seeking, recognition, and sexual gratification), financial profit or "need," simple "greed," spite, revenge, business advantage, concealment of another crime, and social protest or terrorism. See NFPA 921 §22.4.9.3; DeHaan, Kirk's Fire Investigation, chap chap 16 (6th ed 2007). For additional discussion of motive, see §12.6.

- **Is there evidence of "preparations" (and that the suspect was involved in those preparations)?** Some of the common preparations for an intentionally set fire include removing sentimental or valuable items, sabotage to fire protection systems, an increase in insurance limits prior to the fire, a carefully timed fire opportunity, "trailers" (used to propagate fire from one area to another), blocked doorways, opened windows, disabled alarm or suppression systems, and personal property removal or substitution. See NFPA 921 §§22.2-22.4. For discussion of evidence of prior knowledge of fire and other evidentiary factors related to suspect identification, see §§12.15-12.17.

- **Has the suspected party exhibited conduct consistent (or inconsistent) with guilt?** For example, the willful suppression of evidence long has been recognized as reflecting a consciousness of guilt, and the law therefore long has considered it fair and appropriate to draw reasonable inferences from such conduct. See, *e.g.,* Evid C §413. Examples of conduct consistent with guilt might include attempting to interfere with, mislead, or misdirect the investigation of the fire or surrounding circumstances; attempts to influence the statements of witnesses; and inconsistent stories regarding the circumstances of the loss. Similarly, much of the conduct that may implicate the concealment or fraud condition of an insurance policy (*e.g.,* intentionally concealing or misrepresenting facts regarding the circumstances of the loss, the insured's whereabouts or financial condition, the quality of the structure, and the quantity or quality of its contents) also is more consistent with guilt than innocence.

- **What is the suspected party's credibility, and what kind of a witness will he or she make on his or her own behalf?**

- **What is the credibility and reliability of any accusing witnesses?**

- **What are the possible motives of any accusing witnesses, and what kind of a witness will he or she make?**

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II. EXPERT'S ROLE AND METHODOLOGY

§12.21 A. Expert's Role and Purpose

Often, on counsel's notice of a case, the fire scene is long gone and, as a result, fire origin and cause experts are limited to reviewing reports, photographs, and the evidence secured at the scene. Rather than focusing on the opposing expert's "conclusions," a more productive use of investigation and litigation resources is to have the expert compare the data obtained and relied on by the opposing expert, and his or her methodology, with the guidelines set forth in NFPA 921 (for discussion, see §§12.1-12.3). When the data gathering methodology is flawed or inadequate, that expert's opinions are necessarily flawed. Such exposed flaws generally serve as an effective litigation theme and lead to more successful results.

PRACTICE TIP: Counsel intending to try a case involving a fire or explosion incident should become intimately familiar with NFPA 921 and should use it as a significant resource in developing appropriate screening criteria for selecting or evaluating a fire investigator in a particular case. Counsel would be wise to engage a potential expert in a detailed discussion about NFPA 921, and elicit the expert's views on a variety of topics covered by NFPA 921 that are germane to the particular case.

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B. Expert's Methods in Determining Origin and Cause of Fire

§12.22 1. Relationship Between Origin and Cause

Although "origin" and "cause" are treated as separate topics, origin determination and cause determination are very closely related. If an investigator cannot reliably identify either the point of origin or the area of origin for the fire, it is virtually impossible to determine the cause of the fire. NFPA 921 §17.1. For discussion of origin determination, see §§12.23-12.33. For discussion of cause determination, see §§12.34-12.38.

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2. Determining Origin of Fire

a. Area and Point of Origin Defined

§12.23 (1) Area of Origin

The "area of fire origin" (or area of origin) is the general area where a fire began. NFPA 921 §§3.3.9, 17.1. It may be a single room, garage, or any general area within a structure or compartment where a fire has occurred.

Fire investigators form hypotheses about the general area where a fire began by (see NFPA 921 §17.1.2):

- Conducting a scene evaluation;
- Interviewing the first witnesses to the fire, the fire suppression crews, and occupants of the affected building; and
- Comparing the given statements with known fire behavior and burn or char indicators.

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Source: Criminal Law/Scientific Evidence in California Criminal Cases/12 Origin and Cause of Fire/§12.24 (2) Point of Origin

§12.24 (2) Point of Origin

The "point of fire origin" (or point of origin) is the exact location at which a heat source and a combustible material first came in contact. See NFPA §§3.3.122, 17.1. As a practical matter, the term is used to describe the smallest area within the area of fire origin that the investigator can reliably identify as the place where the fire started. In some cases, it may be possible to document the exact point of origin; for example, an electrical arc from a frayed wire or the place where an open flame ignited a combustible fuel can often be identified to a specific location. In other cases, the point of origin may be identified as a section of a room, a room, a floor, or a building. The precision with which the point of origin can be pinpointed will vary depending on the following:

- The amount of physical evidence and data gathered during the investigation;
- The reliability of the evidence; and
- The amount of destruction caused by the fire and firefighting efforts.

NOTE: The point of fire origin is always located within the area of fire origin. If the investigator determines the point of origin, he or she can usually determine the cause of the fire as well. It is not always necessary to identify the point of fire origin precisely to determine a cause of the fire. For example, in a case in which an ignitable liquid was applied and ignited, it would be unrealistic to expect the investigator to specify the exact "point" where the open flame was added to the vapors, but even so, he or she may be able to determine the cause because the burn patterns (see §12.32) support the conclusion of an ignitable liquid being applied where it should not be found and laboratory results confirm the presence of such liquid.

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Source: Criminal Law/Scientific Evidence in California Criminal Cases/12 Origin and Cause of Fire/§12.25 b. Examining Scene to Determine Fire's Origin

§12.25 b. Examining Scene to Determine Fire's Origin

To determine the origin of a fire, investigators must employ a systematic approach in their examination of the fire scene. By being systematic and using the scientific method (see §12.3), the investigator can reduce any potential errors or oversights that might enter into the fire investigation process. NFPA 921 §17.2.4.

NFPA 921 recommends the following specific steps for conducting a fire scene investigation (see NFPA 921 §17.2.5):

- Initial scene assessment (see §§12.26-12.30);
- Development of a preliminary fire-spread hypothesis;
- In-depth examination of the fire scene;
- Fire scene reconstruction (see §12.31);
- Development of a final fire-spread hypothesis; and
- Identification of the fire's origin.

An assessment of the fire scene continues until the area of fire origin or the point of fire origin has been determined. This assessment continues to involve a systematic process of comparison between materials exposed to heat and flame and evaluation as to how those materials were affected by the fire. The properties of these materials are considered in light of the exposure to the specific fire incident and general scientific knowledge.

NOTE: As with every guideline, there are times when an investigator can vary this procedure based on information that is available at the time of the investigation. The investigator, however, should provide a reasonable explanation for any variation from this standard protocol.

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Source: Criminal Law/Scientific Evidence in California Criminal Cases/12 Origin and Cause of Fire/§12.26 (1) Initial Scene Assessment

§12.26 (1) Initial Scene Assessment

The initial scene assessment is the fire investigator's initial size-up of the fire scene. It provides a "big picture" perspective of the building and the damage as well as an opportunity to determine the scope of the investigation. See NFPA 921 §17.3.1. The initial scene assessment should include the collection of information described in §§12.27-12.30.

NOTE: The order of the initial scene assessment may vary depending on the conditions of the fire scene. Although some investigators prefer to begin in areas with the least damage and progress to areas of most damage, others prefer to work downward from the highest point in a scene. NFPA 921 §17.3.1.3.

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§12.27 (i) Resources

The investigator should determine the resources that will be needed, such as equipment, additional investigation assistance, and security. See NFPA 921 §17.3.1.

NOTE: The resources utilized by the investigator will likely be scrutinized in any "postinvestigation" forensic review of the investigation. Among the questions that might be raised are the following: What equipment did the fire investigator use in the fire investigation process (*e.g.,* gas-powered or diesel, as such fuels might contaminate the fire scene and bring into question the validity of a laboratory confirmation of such ignitable liquid being present)? Who assisted the fire investigator in determining the origin and cause of this fire? Were such individuals trained fire investigators or were they simply laborers? If they were laborers, were they appropriately supervised? Did the fire scene remain secured during the investigation process? Was such security, or lack thereof, a potential contributing factor to possible contamination of the scene?

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§12.28 (ii) Surrounding Areas

The investigator should examine areas surrounding the structure for significant evidence or fire patterns (see §12.32) that might help to further delineate the site (see NFPA §3.3.147) and the investigation. NFPA 921 §17.3.1.4.

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§12.29 (iii) Exterior of Structure

The investigator should examine the exterior of the structure, noting information such as the type of structure, construction features, and exterior fire damage. See NFPA 921 §§17.3.1.5, 17.3.1.5.2.

NOTE: Exterior fire damage may aid in determining where the fire originated. However, such damage may be related to fuel loading or ventilation within the area of fire origin. For example, exterior fire damage venting from a certain room and not observed elsewhere might indicate the room of origin. However, the damage might have resulted from the fact that the room was the only one with an open window or the abundance of fuel in the room as compared with the rest of the dwelling.

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§12.30 (iv) Interior of Structure

During this phase of the investigation, the investigator can gather a great deal of information on the fire damage that can be instrumental in determining the area of origin. The investigator should systematically examine the interior of the structure, noting information such as the following:

- Type of construction (see NFPA 921 §17.3.1.6);
- Material from which surface coverings (walls and floors) were made (see NFPA 921 §17.3.1.6);
- Ventilation;
- Windows and doors (open or closed?);
- Other openings such as fire department ventilation openings for suppression, heating and cooling ducts, attic and roof access hatches, and skylights;
- Areas of fire damage and the relative extent of damage in each area (see NFPA 921 §17.3.1.6);
- Indicators of smoke and heat movement such as patterns on surfaces;
- Contents (see NFPA 921 §17.3.1.6);
- Nature of the contents;
- How the contents were stored;
- How the contents were positioned;
- Living conditions (see NFPA 921 §17.3.1.6);
- Housekeeping; and
- General maintenance.

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§12.31 (2) Fire Scene Reconstruction

Fire scene reconstruction involves first systematically removing (usually by digging) and examining fire debris to get to the lowest area of burn damage (usually the floor). The structure's significant contents and selected structural elements are then often replaced in their prefire positions. See NFPA 921 §3.3.62. This process reveals the fire patterns (see §12.32) in the proper relationship. It often enables the investigator to determine how the fire developed and spread, and it may lead to a complete identification of all potential ignition sources within the area of origin. For additional discussion of ignition sources, see NFPA 921 §18.3; see also §§12.34-12.36.

The first step in the fire scene reconstruction process requires the investigator to carefully and systematically remove fire debris to reveal the evidence contained in the debris and buried beneath it. During the initial scene assessment, the investigator often has been able to narrow down a fire scene to an area of fire origin or a few areas that warrant further study. In this case, the reconstruction effort can be limited to these areas as opposed to the entire area of damage. See NFPA 921 §17.3.2.1.

Removing fire debris is similar to an archeological excavation and should be conducted in similar fashion: the debris should be removed in a systematic and controlled manner. Inadequate debris removal may result in the disclosure of incomplete fire patterns (see §12.32), which can lead to misinterpretation of those patterns by the investigator. See NFPA 921 §17.3.2.3.

For additional discussion of fire scene reconstruction, see Icove & DeHaan, Forensic Fire Scene Reconstruction (2d ed 2008).

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§12.32 (3) Recognition and Evaluation of Fire Patterns

"Burn patterns" is a commonly used term of art that is synonymous with "fire pattern" used by NFPA 921. The term refers to "[t]he visible or measurable physical changes, or identifiable shapes, formed by a fire effect or group of fire effects." NFPA 921 §3.3.60. The term "fire effects" refers to "the observable or measurable changes in or on a material as a result of exposure to the fire." NFPA 921 §6.1.1. The condition of the burnt materials after a fire will vary depending on the physical properties of the material. For example, wood will be damaged by fire in a different manner than metal objects.

The art of properly "reading" fire patterns on surfaces is in many ways similar to the wilderness guide reading clues while tracking game or an enemy. In tracking, evidence such as footprints, broken twigs, animal waste, and an abandoned campfire are all considered in establishing a hypothesis about the proximity of the party being tracked. Similarly, the fire investigator reads clues such as the effect of the fire on various materials to determine where the fire originated.

The skill required to read fire patterns ranges from the obvious situation (*e.g.,* smoke damage and charring above a window where the fire vented with early extinguishment) to subtle (*e.g.,* complete compartment involvement with delayed suppression). As such, when the fire was limited in scope and extinguished early, it is often easy to read the fire patterns, but in other cases, when a fire has burned for a long time and has caused extensive damage, it may be more difficult to interpret the patterns. Obviously, experience counts in the application of this fire investigative skill. Such experience should be complemented by education and training and manifested in a fire investigation conducted according to the principles articulated in NFPA 921 (for discussion, see §§12.1-12.3). Historically, the fire investigator relied on the "art" of reading patterns to determine the origin of a fire. This approach was dependent on skills and years of experience that could not be evaluated objectively. Consequently, NFPA 921 has evolved as a guide to fire investigation that recognizes the need for a refined fire pattern analysis "art" while providing the objective scientific validation to buttress that analysis. NFPA 921 also attempts to eliminate the myths and "junk science" sometimes proffered by unqualified or unscrupulous fire investigators. For detailed discussion of fire patterns, see NFPA 921, chap 6 and §§17.4.1-17.4.1.5.

Examples of the indicators that might be observed by the fire investigator include the following:

- The lowest area of significant charring found;
- A "V" pattern extended up and out along a vertical surface from the point of fire origin;
- The ceiling area above the area or point of fire origin that sustained the greatest amount of overall fire damage to any section of the ceiling in the fire loss room;
- Fire patterns that decrease in severity as one moves away from the area or point of fire origin;
- Clean burning on a noncombustible surface that was observed at the point of fire origin (this being caused by direct-flame impingement or intense radiant heat);
- Severe calcination of the sheet rock wallboard occurring at the point adjacent to the point of fire origin;
- Accelerated rusting occurring on the side of the metal closest to the point of fire origin; and
- Char depth observations on wood structural members.

For the requisite scientific validation for these indicators, see NFPA 921, chap 6; DeHaan, Kirk's Fire Investigation, chap 7 (6th ed 2007); Icove & DeHaan, Forensic Fire Scene Reconstruction (2nd ed 2008); Kennedy & Kennedy, Fires and Explosions: Determining Cause and Origin (1985).

These individual fire patterns must be viewed collectively. No single pattern will likely be the "smoking gun" in the determination of a fire's origin. Because the fire event did not occur as part of a scientific experiment with controlled variables, certain patterns may conflict with the investigator's findings. Although those patterns do not necessarily invalidate the findings, they should not be ignored.

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Source: Criminal Law/Scientific Evidence in California Criminal Cases/12 Origin and Cause of Fire/§12.33 (4) Collection of Additional Data

§12.33 (4) Collection of Additional Data

In addition to the examination and reconstruction of the fire scene, NFPA 921 describes other activities that will provide helpful data in origin determination, including the following (see NFPA 921 §17.3.3):

- Pre-fire conditions:
- State of repair of the building and its mechanical and electrical systems;
- Condition of structural elements such as foundations, framing members, and wall coverings;
- Any prior fire or nonfire damage; and
- Condition of fire suppression and detection systems such as smoke detectors, fire or burglar alarms, and sprinklers.
- Weather reports:
- Temperature;
- Wind velocity and direction; and
- Humidity.

NOTE: Weather at the time of the fire is an important piece of information. Wind can play a role in the spread of fire. Humidity can affect ignition and spread.

- Witnesses' statements (see also NFPA 921 §17.3.1.4):
- Reporting party;
- Fire suppression crews; and
- Occupants of the burned structure.

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3. Determining Cause of Fire

§12.34 a. How Fire Starts

For a fire to occur, all of the following must be true:

- There must be a competent ignition source. A competent ignition source is a source of heat (energy) that is capable of igniting a fuel under the conditions existing at the time of the fire. See NFPA 921 §18.3.2. This means that the heat source must be capable of transferring sufficient heat to the material first ignited to raise that fuel's surface to its ignition temperature. If a heat source cannot raise the first fuel to its ignition temperature, it was not the ignition source for the fire. For example, a lighted match placed on a kitchen counter might scorch the counter but will not likely cause the counter to ignite (sustain combustion). For additional discussion of first fuel ("first material ignited"), see NFPA 921 §18.4.

- Fuel must be available in close enough proximity to the heat source to transfer sufficient heat from the heat source to the fuel to generate combustible gases. For example, if a candle is 10 feet from a newspaper, it is unlikely that ignition will occur. However, if the newspaper is held 2 inches over the flame, it will be heated sufficiently to ignite.

- The fuel and the heat source must be in proximity long enough to allow the heat transfer to occur. If a newspaper is passed quickly within inches of a candle flame, ignition may not occur because there was not sufficient time for the newspaper to be heated by the flame and start giving off combustible gases.

- The ignition of the first fuel must take place under the right conditions to produce a sustained combustion. Fire investigators sometimes describe this process with the following equation: heat source + first fuel + event (ignition factor) = fire.

In order to illustrate this equation, consider Mrs. O'Leary's cow and the Chicago fire. Heat source (lantern) + first fuel (straw or hay in the shed) + ignition factor (cow kicked it over) = *hot time in the old town tonight*. However, a target fuel (the wooden shed for the Chicago fire) has to be available for the Chicago fire to take place. If not, the fire would burn out when the straw was consumed. A sad day for the cow, but no conflagration! For discussion of ignition and combustion generally, see NFPA 921, chaps 5, 18; DeHaan, Kirk's Fire Investigation, chap 3 (6th ed 2007).

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§12.35 b. Steps in Cause Determination

NFPA 921 defines "fire cause" as "[t]he circumstances, conditions, or agencies that bring together a fuel, ignition source, and oxidizer (such as air or oxygen) resulting in a fire or a combustion explosion." NFPA 921 §3.3.57. Thus, determining the cause of a fire requires the investigator to identify the following:

- The potential ignition sources at the area or point of fire origin;
- The steps that brought the ignition source and the fuel source (first fuel) together with a resulting fire; and
- A target fuel that spread the fire within the compartment (room or area of origin) or beyond. For discussion of area of fire origin and point of fire origin, see §§12.23-12.24.

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§12.36 (1) Identifying and Examining Possible Ignition Sources

Applying the scientific method (for discussion, see §12.3), the investigator should evaluate (through cognitive or experimental testing) and, if possible, eliminate possible sources of ignition in the area of origin to arrive at a supportable hypothesis regarding the ignition source and the first fuel. See NFPA 921 §18.5.3. The investigator does this by methodically evaluating each potential ignition source in the area of fire origin in light of the known facts to determine whether it could have been the first ignition source.

All potential ignition sources in the area of origin must be identified, considered, and examined. Each of these potential ignition sources should be secured into evidence if field examination is unable to eliminate it. If an ignition source is identified in the area of origin, all the other potential ignition sources in the area of origin must be eliminated or else the cause cannot be determined.

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§12.37 (2) Determining Contact Between Ignition Source and Fuel

Identifying only an ignition source (*e.g.,* smoking material, electrical arcing, or candles) is not a determination of cause. See NFPA 921 §18.5.1. Rather, cause is the description of how the ignition source was able to come into contact with the first fuel ignited or how the ignition source was able to transfer enough heat energy (heat flux) to the first fuel ignited and, if necessary, how the first fuel provided enough energy to ignite surrounding materials. See NFPA 921 §3.3.57. For discussion, see §12.35. For example, a curtain comes into contact with the flame of a candle placed near a window opening, thus igniting the curtain. Similarly, the resistance heating (see NFPA 921 §8.9.2) of an electrical failure provided enough heat to ignite the insulation of the wire of an appliance (and dust and lint deposited around that area), which provided enough heat to ignite the couch located next to the appliance.

If a hypothesis does not fit with the known facts, the investigator should discard it. It may be necessary to return to one of the earlier steps in the scientific method and repeat the process from that point to ensure that a sound conclusion is reached.

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Source: Criminal Law/Scientific Evidence in California Criminal Cases/12 Origin and Cause of Fire/§12.38 (3) Using Process of Elimination to Determine Cause of Fire

§12.38 (3) Using Process of Elimination to Determine Cause of Fire

When the area of origin of a fire is clearly defined, it may be possible to come to a conclusion as to the cause of the fire even when there is no physical evidence of the ignition source. An investigator may make this determination of cause by testing hypotheses as to other potential ignition sources, as long as "the conclusion regarding the remaining ignition source is consistent with all known facts." NFPA 921 §18.2.1.

NOTE: NFPA 921 cautions that the process of elimination cannot be used when the area of origin is not clearly defined, stating that "[a] clearly defined origin exists when it is known conclusively to the exclusion of all other potential origins." NFPA 921 §18.2.1.

As part of the process of elimination, the investigator should be able to give reasons for eliminating other potential ignition sources by explaining how the postfire appearance or condition of a particular heat source would be different if it were the ignition source. For example, if a kitchen countertop is identified as the area of origin, then all potential ignition sources within the area must be examined and eliminated to determine the specific cause of the fire. This process may entail an inspection of each electrical outlet and each electrical appliance as well as a determination of whether there were any smoking materials in the room or whether there were any cooking appliances that may have served as the ignition source.

NOTE: Cause determination through the process of elimination becomes more difficult as the damage in the area of origin increases. See NFPA 921 §18.2.3.

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4. Expert's Use of Relevant Scientific Background Information

§12.39 a. Textbook and Research Data

Investigators can apply basic scientific information and calculations based on first principles to support or disprove basic findings. Common examples include the following:

- An investigator may utilize textbook data, such as upper and lower flammable limits for gases (see NFPA 921, Table 21.8), to assess whether sufficient combustible vapors were present for a gas explosion or ignition to take place under a given scenario or scenarios.
- An investigator may use oxygen consumption principles to determine whether sufficient oxygen was present in a room with a closed door for a fire to grow to a given size. For discussion of oxygen concentration, see DeHaan, Kirk's Fire Investigation, chap 3 (6th ed 2007).
- An investigator may use melting points of common metals found in available metallurgical data to determine temperatures present, or ranges of temperatures present, during a fire incident. For discussion of metal melting, see NFPA 921 §6.2.8.3. For melting points of common metals, see NFPA 921, Table 6.2.8.2.

In the absence of a credible testimony as to the start of a fire, such analyses should be made to confirm investigative findings or to address the veracity or reasonableness of witness accounts.

Indeed, application of basic fire science-related information (for discussion of fire science, see §12.56) is warranted in almost all cases to systematically review the investigator's postulated situation or evaluated scenarios. Researching reference data on given materials such as melting or ignition points as well as relevant thermal properties is generally a good starting point. Thoughtful use of such data can be helpful, for example, to scientifically validate whether a given fuel load (*e.g.,* a burning couch) would give off sufficient heat to first melt and then ignite a television set on the far side of the room given known ventilation conditions. If the investigator cannot support such a hypothesis, he or she will need to assess other possibilities such as additional fuel loads (*e.g.,* drapes or other furniture) or possibly extraneous fuels (*e.g.,* ignitable fluids) that may be responsible for the particular fire scenario that actually transpired.

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§12.40 b. Using Analyses and Models of Fire Scene or Materials

Beyond simple research correlating the properties of known materials present with what actually transpired in a given fire (for discussion, see §12.39), a wide range of techniques involving various levels of sophistication is available to answer important questions. These questions would include whether a given fuel actually ignited and burned; what conditions existed before, after, and during the specific fire incident; and what credible markers of those conditions can be identified that are consistent with the evidence available. Some of the techniques an investigator can use to answer these questions include the following:

- Visual analysis of the fire scene (see §12.41);
- Thermal analysis of the fire scene (see §12.42);
- Analysis of materials composition (see §12.43);
- Performance evaluations and failure analysis (see §12.44); and
- Fire and graphics modeling (see §12.45).

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§12.41 (1) Visual Analysis of Fire Scene

Useful visual analysis begins with comprehensive photographic documentation of potentially relevant evidence at a fire scene. Consistent with this, it may be necessary to utilize macrophotography at the scene and offsite light microscopy, or even electron microscopy coupled with effective site photography to document important details such as the condition of potentially important electrical contacts. A scanning electron microscope (SEM) may be used effectively to visualize such elements. Properties of an SEM that make it a potentially important forensic tool include ease of use, lack of extensive preparation or potential alternation needed to examine samples, common availability at reasonable hourly rates, and end-product images that enable an investigator to prepare accurate 3D specimen images that can also include sophisticated and reliable in situ chemical analyses. For example, many SEMs are equipped with an energy dispersive X-ray analyzer (EDXA), which makes it possible to determine the elemental composition of specimens.

Such techniques can be used, for example, to confirm the use of correct wiring materials or the presence or absence of contaminants in materials of interest. The equipment and expertise to conduct SEM analyses are quite widely available, can accommodate relatively large specimens, and are surprisingly cost effective. SEM images are also of interest to juries, as they are readily understood and can be coupled with simple photographic images.

For general discussion of SEM, see Saferstein, Criminalistics: An Introduction to Forensic Science, chap 7 (9th ed 2007). For discussion of laboratory examination of electrical wiring, see DeHaan, Kirk's Fire Investigation, chap 10 (6th ed 2007).

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§12.42 (2) Thermal Analysis of Fire Scene

It may be of interest to the investigator to determine the melting point of a piece of evidence found at a fire scene to determine either a range of temperatures or maximum temperature that existed during a given fire incident or to identify the melting point of that material as compared with a standard. For this reason, in conjunction with information on the composition of "marker" materials present, it is often useful to determine melting or ignition temperatures (if a material present was capable of being ignited) since products made from plastics, metals (namely, steel and aluminum), and glass each melt at widely different discrete temperatures that can be checked against reference values.

Many physical testing laboratories are equipped to perform a variety of thermal analytical techniques, each of which has particular advantages in given situations. Coupled to these instruments are a range of accepted standard methods, generally grouped under the title "thermal analysis," whose applicability is supported by extensive peer-reviewed literature. Analysis of basic thermal properties of materials found at fire scenes may explain unusual burn patterns discovered near an area of sample collection or send the investigator back to look for other explanations. In these and many other ways, thermal analysis can provide another piece of the puzzle in putting together the specific occurrences that caused a given fire.

For discussion of laboratory testing of melting points and laboratory services generally, see DeHaan, Kirk's Fire Investigation, chap 14 (6th ed 2007).

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§12.43 (3) Analysis of Materials Composition

Gas chromatography (GC) is a laboratory test method that "separates the mixtures into their individual components and then provides a graphical representation of each component and its relative amount." NFPA 921 §16.10.2.1. Investigators frequently use GC to determine the chemical composition of liquid mixtures when issues of materials composition are important. For example, when evidence suggests that a liquid accelerant may have been employed in starting or intensifying a fire, investigators often use GC as the baseline analytical technique.

A more contemporary approach involves GC coupled with mass spectrometry (GCMS). The latter is a more sophisticated approach for determining chemical composition that represents a newer and more complex application of GC. GCMS is based on taking the data from a GC-based separation of materials present and using an MS-based identification technology that can specifically identify the building blocks of compounds identified. Classical gas chromatography is less complex, requires less interpretational expertise, is less expensive, and has been reliably used for decades in forensic settings. For detailed discussion of GC and MS, see DeHaan, Kirk's Fire Investigation, chap 14 (6th ed 2007).

Infrared analytical techniques such as Fourier transform infrared (FTIR) spectroscopy can be used to identify a wide variety of organic compounds. This technique is particularly useful when it is necessary to determine the composition of specific items such as coatings, adhesives, and commercial plastics

FTIR is *so* sensitive that it can identify the components in a plastic blend and identify the specific manufacture of a given plastic. This technology allows for the identification of possible additives present (*e.g.,* fire retardants, pigments, and plasticizers) which, in a forensic situation, can be crucial to case outcome. For example, one of the authors recently used this technology to determine not only the generic plastic used to manufacture a disposable cigarette lighter found at a potential crime scene, but also the likely manufacturer and components of the particular plastic formulation in question. This information assisted in confirming purchase details for the lighter that were crucial to the case.

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§12.44 (4) Performance Evaluations and Failure Analysis

To determine whether a *potential* ignition source found in an area of fire origin (see §12.23) caused a fire, it is generally necessary to answer questions about its performance under normal and abnormal operating conditions. Investigators frequently refer to the processes by which this is accomplished as failure analysis or failure modes and effects analysis (FMEA). See NFPA 921 §3.3.52 (defining "failure analysis"); NFPA 921 §20.3.2 (defining FMEA). For discussion of failure analysis generally, see NFPA 921, chap 20.

For illustration, consider the evaluations conducted of electrical appliances located in an area of fire origin such as a kitchen counter. Such items are unlikely to cause fires if operating properly. Under given fault scenarios, however, they may overheat and cause an initial ignition. In considering appliances as potential ignition sources, the investigator should systematically consider ways in which these appliances might have failed. For example, an on-off switch, a high-limit switch, or a thermostat can malfunction. The investigator should devise ways to assess the consequences of such possible failure modes (*e.g.*, Was it a fail-safe design or one where a failure could lead to ignition of nearby combustibles and causation of the fire that occurred?). Implicit in such analyses is a need to test each hypothesis considered. For discussion of testing hypotheses as part of the scientific method, see §12.3.

A simple and relatively cost-effective way of testing such hypotheses may involve taking an X-ray of a switch or thermostat present or testing electrical properties of an appliance to determine whether it had continuity before or after the incident. Such simple analyses can frequently help an investigator include or eliminate such items as possible sources of ignition.

FMEA offers a more sophisticated approach to failure analysis that an investigator can employ to systematically study devices ranging from a simple hot-water heater to a complex industrial furnace to determine the limits of their operations in normal and out-of-control situations.

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§12.45 (5) Fire Modeling and Graphics Modeling

The term fire modeling is generally used to refer to numerically based programs and applications that can be used on a personal computer to calculate fire dynamics (see §12.73) occurring under a given and specified set of circumstances. To create a fire model, an investigator must enter comprehensive data describing the geometry and other factors related to a fire scene, the fuels available during the fire incident in question, and the duration of the fire. The results can help an investigator set boundaries on the growth of a fire that can help explain how an event unfolded. Conversely, an investigator may be able to use the results to disprove assumptions based on lay accounts or other forensic evidence. These results also can be used to explain to other people, such as a jury, how the fire developed and to show, without the use of complicated equations, what actually happened.

Fire modeling can yield an accurate simulation of the fire incident, but those results are only as sound as the assumptions and scenario-specific information on which they are based. Data available from such analyses can include temperatures present, time and temperature history (which is useful in the evaluation of timeline data), heat released, and the composition of combustion gases present at various times.

NOTE: For fire modeling efforts to be admissible, they must be carried out by a qualified modeler using software, the performance of which has been peer reviewed. Frequently, corroboration with physical tests, such as real scale burn tests of given materials, will be needed to provide a judge with guidance as to the admissibility of a given set of proffered modeling results.

For detailed discussion of fire modeling, see DeHaan, Kirk's Fire Investigation, chap 17 (6th ed 2007).

Graphics modeling is a separate, though also potentially powerful, tool that is based on work that can be done on a personal computer. Graphics modeling generally yields a graphic representation or illustration of a given scenario or a set of possible scenarios. Graphics modeling can be as simple as a diagram of a fire scene in perspective based on measurements of floor plans and building dimensions, or as complex as an animated walk-through of a fire scene. A graphic model can, and for admissibility purposes generally *should,* incorporate relevant photos if for no other reason than to confirm that it represents what a scene actually looked like.

Graphics modeling and fire modeling results can be used together effectively to provide a demonstrative picture of how a fire developed or to illustrate response and travel of people involved in a given fire incident. In such cases, use of an annotated timeline frequently is quite useful. Of course, it is extremely important for counsel to research both classes of models carefully and lay an appropriate foundation for their admission.

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III. PRETRIAL CONSIDERATIONS

§12.46 A. Discovery

This section addresses certain limited discovery issues unique to fire investigation experts along with related documentation. Document requests should include the following:

- **Laboratory reports and supporting data.** Laboratories chronicle their findings confirming the presence of an ignitable liquid in an "interpretative report." In addition to the interpretative report, counsel should always obtain the raw data on which those interpretative findings are based. Counsel also should confirm that the testing was conducted in accordance with the American Society for Testing and Materials (ASTM) standards for fire debris testing (*e.g., ASTM E1387-01: Standard Test Method for Ignitable Liquid Residues in Extracts From Fire Debris Samples by Gas Chromatography*; *ASTM E1618-06e1: Standard Test Method for Ignitable Liquid Residues in Extracts From Fire Debris Samples by Gas Chromatography-Mass Spectrometry*). ASTM standards are available online at http://www.astm.org. Samples submitted for testing should include a comparison sample of the debris, which includes similar material that is not suspected to contain ignitable liquid residue.

CAUTION: Counsel should be sure that the person in possession of physical evidence pertinent to the case is placed on notice promptly in order to preserve it for further examination or testing.

Document requests should include items beyond the basic report. For example, counsel should request *all* the photos taken by the investigator, not just those chosen for the report, and additional information such as the investigator's field notes. In addition, counsel should consider other parties who may have pertinent information or documents, such as the fire department, police department, the media, and neighbors.

CAUTION: Because agencies often retain 911 tapes for no more than a few weeks, counsel should make requests for such tapes a priority if they are pertinent to the case.

- **Alarm company records.** Alarm company records are often overlooked as a key source of information. A timeline is an important investigative tool and such records can assist in establishing a firm timeline of activities at the fire scene prior to the fire department's response.

- **Satellite photography.** Satellite photography can provide valuable information regarding fire location within a building and construction details that might be pertinent to an investigation.

- **Surveillance video.** Counsel also should consider surveillance tapes from a neighboring business, such as a convenience store or a bank's ATM, as potential sources of information in the discovery of the case.

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§12.47 B. Application of *Kelly* Rule

The California Supreme Court set forth the general principles of admissibility for expert testimony based on new scientific methods or techniques in California in *People v Kelly* (1976) 17 C3d 24, 130 CR 144. *Kelly* sets forth a three-step (or three-prong) process:

1. The reliability of the method must be established (by showing that the method has achieved "general acceptance within the scientific community");

2. The witness proffering such testimony must be properly qualified as an expert to give an opinion on that subject; and

3. The proponent of the testimony must demonstrate that correct scientific procedures were used in the particular case.

NOTE: The *Daubert* standard has continued to evolve in federal court (see *Daubert v Merrell Dow Pharms., Inc.* (1993) 509 US 579, 587, 125 L Ed 2d 469, 113 S Ct 2786; *General Electric Co. v Joiner* (1997) 522 US 136, 139 L Ed 2d 508, 118 S Ct 512; *Kumho Tire Co., Ltd. v Carmichael* (1999) 526 US 137, 143 L Ed 2d 238, 119 S Ct 1167; and the revised federal rules of evidence). The California Supreme Court, however, has held that California would continue to utilize the *Kelly* standard for testing the admissibility of new scientific techniques, and that California would not follow the evolving federal standard. *People v Leahy* (1994) 8 C4th 587, 34 CR2d 663. For additional discussion of *Kelly, Leahy,* and *Daubert,* see chap 2.

Kelly, however, does not require the court to decide whether a "procedure is reliable as a matter of scientific fact." *People v Soto* (1999) 21 C4th 512, 519, 88 CR2d 34. Rather, the court merely looks to the professional literature and expert testimony to determine whether the relevant scientific community accepts the technique as reliable and whether scientists with significance either in number or expertise have publicly opposed a technique as unreliable. 21 C4th at 519. Under *Kelly,* "general acceptance … means a consensus drawn from a typical cross-section of the relevant, qualified scientific community." 21 C4th at 519 (quoting *Leahy*).

When seeking to qualify or challenge a fire origin and cause expert, it is important to consider all aspects of the evidentiary requirements of the *Kelly* rule. For more details about each prong of the *Kelly* rule, see §§12.48-12.50.

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§12.48 1. Prong 1: Expert's Methods Are Generally Accepted as Reliable

Under the first prong of the *Kelly* rule, the proponent of the evidence must establish the reliability of a new scientific method or technique by showing that the method has achieved "general acceptance within the scientific community." See *People v Kelly* (1976) 17 C3d 24, 130 CR 144 (for discussion, see §12.47). As noted above (see §12.1), NFPA 921 is the product of a sophisticated peer-review process and represents the consensus of a wide cross-section of industry experts including NFPA members and the fire investigation public generally. Accordingly, this peer-reviewed, industry consensus document sets forth principles and procedures of fire and explosion investigation that are generally accepted within the fire investigation community as authoritative. Another peer-reviewed work that has long received general acceptance in the fire investigation community as an authoritative treatise is DeHaan, Kirk's Fire Investigation (6th ed 2007).

A fire investigation that complies with the systematic approach to fire investigation set forth in NFPA 921 (or DeHaan, Kirk's Fire Investigation) and reaches a determination of fire cause to the degree of certainty required by those generally accepted guidelines (see, *e.g.,* NFPA 921 §18.6) therefore generally should be held to meet the first prong of the *Kelly* rule. An investigation following NFPA 921 generally also should meet the federal standard for the admission of expert testimony set forth in *Daubert v Merrell Dow Pharms., Inc., General Electric Co. v Joiner,* and *Kumho Tire Co., Ltd. v Carmichael* (see §12.47) (and the new federal rules of evidence), too, as the principles and procedures set forth in NFPA 921 should be considered by a court to be scientifically reliable.

Just because a fire investigation varies in some respect from the procedures set forth in NFPA 921, however, does not necessarily mean that it fails the first prong of the *Kelly* rule. NFPA 921 recognizes that each fire scene and investigation presents unique challenges and acknowledges that a fire investigation professional, in the exercise of his or her expert judgment, may deviate from the specified procedures but must justify those deviations. NFPA 921 §1.3. For additional discussion, see §12.2. In the context of the *Kelly* rule, that means that the investigator should be able to point to other reliable evidence that the alternative technique, principle, or procedure has been similarly accepted by the fire investigation community as reliable.

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§12.49 2. Prong 2: Expert Is Sufficiently Qualified to Proffer This Opinion

Under the second prong of the *Kelly* rule, a court must determine whether the fire origin and cause witness is sufficiently qualified to testify regarding the proffered opinions. See *People v Kelly* (1976) 17 C3d 24, 130 CR 144 (for discussion, see §12.47). The proponent of the expert obviously will want to demonstrate to the court the qualifications and expertise of the proffered expert.

The proffer and challenge of a fire investigation expert frequently focus on the several important considerations and questions regarding the fire expert's qualifications (for discussion, see §§12.51-12.76).

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§12.50 3. Prong 3: Expert Correctly Utilized Generally Accepted Principles and Procedures

The third prong of the *Kelly* rule requires the proponent of testimony to demonstrate that correct scientific procedures were used in the particular case. See *People v Kelly* (1976) 17 C3d 24, 130 CR 144 (for discussion, see §12.47). In federal court, since *Daubert v Merrell Dow Pharms., Inc.* (1993) 509 US 579, 587, 125 L Ed 2d 469, 113 S Ct 2786, experts increasingly are being challenged and more frequently entirely eliminated or limited than ever before. In California, however, the practical result of the *Kelly* rule is that most fire experts will be permitted to offer their opinions to the jury, leaving it to the jury to decide which expert is the more credible and worthy of their trust. As a result, the primary battlegrounds regarding such experts tend to focus on whether and how well the expert complied with the guidelines set forth in NFPA 921 (or DeHaan, Kirk's Fire Investigation (6th ed 2007)) (for discussion, see §12.1), and how the expert applied those principles to the facts presented by a particular fire scene to reach his or her conclusions. For additional discussion and sample questions, see §§12.77-12.89.

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IV. DETERMINING AND ESTABLISHING EXPERT'S QUALIFICATIONS

§12.51 A. Evaluating Expert's Qualifications

In the fire litigation context, the assessment and selection of a fire origin and cause expert can be outcome determinative. The National Fire Protection Association's (NFPA's) Technical Committee on Fire Investigations (NFPA 1033, p 1033-1) has developed a set of minimum qualifications for professional fire investigators, which it publishes as NFPA 1033: Standard for Professional Qualifications for Fire Investigator (2009) (NFPA 1033). (See http://www.nfpa.org and select the "Codes and Standards" tab, then the "List of Codes and Standards" link; for discussion of NFPA, see §§12.1-12.3.)

NFPA 1033 is intended to establish a set of nationally applicable performance standards that can be used to determine whether a particular individual possesses the minimum skills and knowledge necessary to perform as a fire investigator. As a practical matter, however, counsel should keep in mind that NFPA 1033 sets forth only minimum qualifications. Further, because the NFPA describes the requisite skills and knowledge mandated by NFPA 1033 in such broad terms, it provides little guidance to counsel or others unfamiliar with more detailed descriptions of these skills and knowledge requirements (such as the descriptions contained in NFPA 921). Given these limitations, nearly all practicing fire investigators might seem to meet these criteria. NPFA 1033, therefore, does not provide counsel with a structure for a particularly penetrating analysis of the expert's suitability for a particular case.

Beyond these minimal requirements, when counsel retains a fire origin and cause expert, it is critically important to evaluate several other aspects of the expert's qualifications, including his or her education and training (see §§12.52-12.76).

The most critical skills of a fire origin and cause expert include the following:

- Fire scene investigation skills;
- Witness interviewing skills;
- Evidence collection, preservation, documentation, and retention skills;
- Photography and videography skills;
- Written and oral communication skills; and
- Analytical skills.

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B. Qualifications

§12.52 1. Education and Training

Education is relevant not only to qualifying the fire origin and cause expert as an expert witness but, more significantly, it plays an important role in helping to effectively portray the expert as the jury's most credible source for the topics of his or her expertise. Topics counsel might wish to explore with the expert during the selection process include the following:

- The expert's general formal education (*i.e.,* junior college, 4-year college, as well as advanced courses or degrees); and
- The expert's fire-related education (*i.e.,* degrees or courses in fire science, fire prevention, fire suppression, fire investigation, building materials, and construction).

In general, the more quality, depth, and specialty-focused the education, the better. In addition to formal education, it is common for fire origin and cause experts to receive extensive job-related education and training. Counsel should explore in detail all job-related courses and other formal training programs the expert has completed as part of his or her fire-related employment, any mentoring relationships or other significant training influences, and the emphasis the expert, or his or her employer, has placed on continuing education, training, and skill development. For sample questions related to the expert's professional education and training, see §12.71.

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§12.53 2. Certification

A variety of organizations offer certification of fire investigators, and the requirements to obtain such certification vary widely. As a result, some "certifications" are relatively meaningless, while others evince a high level of professional achievement. Thus, counsel should find out what organization granted the expert's certification, the specific requirements the expert had to meet to obtain the certification, and the continuing education and other requirements the expert must meet to keep the certification current. For example, the International Association of Arson Investigators (IAAI) sets standards that result in a meaningful certification. For information on the IAAI, see http://www.firearson.com.

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§12.54 3. Fire Experience

Evaluating the nature, depth, and type of fire-related experience is a critical part of assessing a fire origin and cause expert's qualifications. Counsel will want to explore in detail several aspects of the expert's experience, including experience in fire investigation (see §12.55), fire science (see §12.56), testifying (see §12.57), and teaching (see §12.58).

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§12.55 a. Fire Investigation Experience

With regard to the fire origin and cause expert's fire investigation experience, counsel should inquire as to the following:

- In what capacities did the expert serve?
- How much time did the expert spend in the public sector?
- What portion of the expert's time was spent on fire prevention roles, suppression roles, and investigation roles? (Although the prevention and suppression experience is, without a doubt, helpful background, more investigative experience is obviously preferable.)
- With regard to investigation experience, how much of that was as a lead investigator?
- In how many team investigations has the expert participated?
- In how many large, multi-investigator fire scene investigations has the expert participated?
- What types and depth of resources were committed to fire investigation within the expert's jurisdiction?
- What types of fires (*e.g.,* structural, wildland, vehicle) has the expert investigated primarily?

NOTE: The type and quality of the expert's investigative experience is important. For example, an investigator who has spent most of his or her career fighting and investigating wildland fires (and an occasionally involved structural fire) has a very different set of background skills and experiences from an investigator who has spent most of his or her career as the lead investigator working structural fires in a major city. Similarly, a frontline investigator may be more qualified as an expert than a higher ranking battalion chief, who may not have actually investigated a scene personally in some time. Counsel will want to seek an expert with background experiences and skills pertinent to the type of fire at issue in the particular case.

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§12.56 b. Fire Science Experience

One distinguishing qualification of a fire origin and cause expert is his or her experience with "fire science," including fire testing, fire modeling, test burns, and materials testing. For a definition of "fire science," see NFPA 921 §3.3.63; for discussion of basic fire science, see NFPA 921, chap 5; for a definition of "fire dynamics," see §12.73. The more experience the expert has with the fire science aspect of fire investigation, the more depth and credibility the expert will bring to a case. For example, short of a set of test burns (for discussion, see NFPA 921 §20.5) designed specifically for the case at hand, there is little as persuasive as an expert who can state that he or she has set, watched, and then documented just such a fire as well as explain why he or she *knows* that the fire patterns mean what he or she says they mean. For discussion of fire patterns, see §12.32.

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§12.57 4. Testifying Experience

To explore the fire origin and cause expert's prior testifying experience, counsel should consider obtaining a list of all depositions the expert has given and all trials in which the expert has testified. Counsel also should consider whether to obtain and examine copies of any and all prior testimony given by the expert.

WARNING: Reviewing the expert's prior testimony can be a double-edged sword. It will reveal a great deal about the expert's testifying skill, style, and experience as well as serve as a tip-off to any potentially troubling prior testimony that caused a problem at trial, but it also may make it easier for opposing counsel to obtain the same information through discovery.

Whether or not counsel reviews the expert's prior testimony, it usually is a good idea to obtain the contact information for other attorneys for and against whom the expert has testified, and to follow up with them for their impressions of the expert.

Finally, in questioning the expert about prior testifying experiences, counsel should determine the nature of the cases in which the expert was involved (*e.g.,* criminal prosecution, insurance dispute, subrogation matter, or liability matter). The nature of the expert's previous testimony may provide clues about the type and depth of the expert's experience.

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§12.58 5. Teaching Experience

One of the most overlooked roles the fire origin and cause expert will play at trial is that of "Professor Fire." It will be important at trial for the expert to explain to the jury in clear, graphic, interesting, understandable, and even entertaining ways how fire behaves, what signs fire leaves behind to tell the investigator what happened, and how fire investigators piece together the origin and cause of what looks to most of the jury like a large pile of black, charred wood. The expert should be credible, understandable, and persuasive.

Although prior teaching experience certainly is no guaranty of quality teaching ability, it does provide counsel a place to start. Counsel should inquire about the courses or subjects the expert has taught, the institution or entity that offered the courses, how often they were taught, and the types of students who attended. Counsel should consider whether to obtain copies of the expert's teaching materials, handouts, tests, and answer keys. Counsel also may want to speak with current or former students and administrators regarding the expert's teaching style, reputation, and effectiveness. For sample questions relating to an expert's teaching experience, see §12.71.

WARNING: Reviewing an expert's teaching material may reveal a great deal about the expert's depth of understanding, but it also may make it easier for opposing counsel to obtain the same information through discovery.

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§12.59 6. Professional Publications

A fire origin and cause expert's published materials are a frequent source of impeachment material for opposing counsel. Therefore, counsel would be wise to learn early on what, if anything, the expert has published and in what sources. It is also wise to obtain copies of any published materials that are even remotely related to the subject matter of the intended expert's testimony. Although extensive publication can be a credibility and qualifications plus, published material by the expert that is contrary to the expert's proffered opinions in the case at hand can be very damaging.

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§12.60 7. Membership in Professional Organizations

Fire investigators typically belong to law enforcement-related organizations, such as the following:

- International Association of Arson Investigators (IAAI) (see http://www.firearson.com);
- California Conference of Arson Investigators (CCAI) (see http://www.arson.org);
- Northern California Fraud Investigators Association (NCFIA) (see http://www.ncfia.org);
- Southern California Fraud Investigators' Association (SCFIA) (see http://www.scfia.org);
- National Association of Fire Investigators (NAFI) (see http://www.nafi.org); and
- National Fire Protection Association (NFPA) (see http://www.nfpa.org).

NOTE: NFPA is widely recognized as the most authoritative and scientifically based fire organization.

Counsel should find out what professional organizations the expert belongs to and how active the expert is in those organizations, including his or her participation in public roles. Questions about membership in such organizations provide an avenue to inquire about the expert's skills and reputation. Professional and fraternal organizations offer forums for the exchange of ideas and information as well as provide opportunities for continuing education. Increasingly, some of these organizations offer certification programs for fire investigators (for discussion of certification, see §12.53) and other training and stature enhancements.

NOTE: Counsel, however, should be aware that membership in certain organizations (for instance, an insurance industry-sponsored fraud-fighting organization) may carry with it a certain inference of bias.

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§12.61 8. Written Communication Skills: Report Writing

Before engaging a fire origin and cause expert, counsel should review carefully a generous sample of the written reports (including appropriate photographs, video footage, diagrams, and witness interviews) the expert has prepared in prior fire investigations. The key is to examine these reports thoroughly and critically, looking for patterns in the expert's methodology, analytical skills, and writing skills. The report should indicate a thorough, systematic, objective, well-organized, and well-documented approach to the fire scene investigation.

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§12.62 a. Fire Scene Investigation and Documentation Skills; Analytical Skills

Among the many things counsel will be looking for in a prior report are (1) the expert's methodology in examining the evidence presented at the scene and by relevant witnesses; (2) the expert's analytical skills and deductive reasoning as applied to the evidence of origin and cause; and (3) the care and skill with which the expert documented the progress of the investigation and detailed the conclusions drawn as well as the basis for those conclusions. Counsel may want to keep in mind the following questions while assessing what the expert's reports say about these skills:

- Did the expert conduct the investigation and carefully document his or her work in accordance with the guidance offered by NFPA 921? (On NFPA 921, see §§12.1-12.3.)
- Does the report document facts that conclusively demonstrate that the expert carefully examined the entire fire scene and evaluated all aspects of the evidence?
- How well supported is the conclusion regarding the area (or point) of origin (on area and point of origin, see §§12.23-12.33) including:
- How well are alternative areas of origin considered and ruled out?
- Is the fuel load in the area of origin carefully documented? (On fuel load, see §12.10.)
- Does the report consider factors such as the impact of ventilation, suppression technique, order of attack, and unusual fuel load on the fire patterns relied on? (On fire patterns, see §12.32.)
- Are alternative explanations for key fire patterns identified, explored, and rejected with convincing reasons?
- Is the first-ignited fuel clearly and convincingly identified? (On the first-ignited fuel (or "first material ignited"), see NFPA 921 §18.4; see also §12.34.)
- Does the report list all the potential ignition sources, outline the steps the investigator took to investigate each source, and give the reasons why any given source was rejected? (On ignition sources, see §12.36.)

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§12.63 b. Witness Interviewing Skills

In reviewing a prior report for the purpose of assessing the expert's witness interviewing skills, counsel should keep in mind the following questions:

- Did the expert interview all relevant witnesses?
- How were the witness statements preserved?
- How crisp was the questioning?
- Did the expert ask logical follow-up questions?
- Did the expert cover all relevant areas of inquiry?
- Did the expert maintain an appropriate noninterrogating attitude and tone during the questioning?
- In cases in which the investigator was retained by an insurance company, do the interviews demonstrate sensitivity to the restraints imposed by the covenant of good faith and fair dealing? (For discussion, see §12.67.)

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§12.64 c. Evidence Collection Skills

In reviewing a prior report for the purpose of assessing the expert's evidence collection, preservation, documentation, and retention skills, counsel should bear in mind the following questions:

- Does the report reflect particular care to evidence collection, preservation, documentation, and retention? (Because of attacks on evidence collection and testing, and spoliation of evidence claims, these skills have assumed heightened importance.)
- Is the original condition of the evidence, as found in place at the scene, well documented?
- Is the process of careful collection and documentation of the evidence detailed? Is the chain of custody of the evidence well documented?
- Was the evidence collection conducted with appropriate authority?
- Were appropriate comparison samples selected for sample evidence for examination in a laboratory setting?

On evidence collection, see NFPA 921, chap 16; DeHaan, Kirk's Fire Investigation, chap 7 (6th ed 2007).

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§12.65 d. Photographic and Other Demonstrative Evidence Skills

In reviewing a prior report for the purpose of assessing an expert's skill relating to photographs and other demonstrative evidence, counsel should keep in mind the following questions:

- Does the report exhibit a thorough and careful photographic or video record of all aspects of the scene, with particular attention to (1) electrical and gas services; (2) areas of origin; (3) fuel loads; (4) key burn patterns and their probable causes and influences; and (5) potential ignition sources?

- Does the report utilize appropriate, detailed, and accurate drawings, diagrams, and other demonstrative exhibits to complete the careful documentation of the investigation, the conclusions, and the basis for the conclusions?

On documenting a fire investigation, see §§12.61-12.64; see also NFPA 921, chap 15; DeHaan, Kirk's Fire Investigation, chap 7 (6th ed 2007).

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§12.66 9. Oral Communication Skills

In assessing a fire origin and cause expert's oral communication skills, counsel should look for the ability to communicate clearly and crisply and to explain complex concepts in an organized, straightforward, and persuasive manner. It is also helpful for the expert to be extremely conscious of details, but still have an excellent grasp of the "big picture."

Methods of assessing the expert's oral communication skills include (1) an evaluation of the expert's educational background and job experiences; and (2) feedback from students and attorneys who have observed the expert teaching or testifying. Counsel should plan and structure the initial interview with the expert with these goals in mind. Doing so will help establish the theme of the case.

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Source: Criminal Law/Scientific Evidence in California Criminal Cases/12 Origin and Cause of Fire/§12.67 10. Knowledge of Insurance Claims Process

§12.67 10. Knowledge of Insurance Claims Process

A fire origin and cause expert retained by, or on behalf of, an insurance company should have knowledge of the insurance claims process. It is also important for the expert to be aware of and understand the following:

- The covenant of good faith and fair dealing, which requires the insurer, both in handling claims made by its insured and settling claims made by third parties against its insured, to give at least as much consideration to its insured's interests as to its own (see, *e.g.*, *Egan v Mutual of Omaha Ins. Co.* (1979) 24 C3d 809, 818, 169 CR 691); and

- California's good faith settlement statutes (CCP §§877, 877.6), which immunize a defendant who settles in good faith from liability to joint tortfeasors. See, *e.g.*, *Tech-Bilt, Inc. v Woodward-Clyde & Assocs.* (1985) 38 C3d 488, 213 CR 256.

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§12.68 11. Integrity

Of all the origin and cause expert qualifications discussed in this chapter, integrity is perhaps the most critical. Because of the importance of credibility at trial, it is very important to locate and rely on fire origin and cause experts who pride themselves on absolute and unassailable integrity.

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§12.69 C. Sample Questions: Expert's Background and Qualifications

Evaluating the relative strength of a fire case involves a careful examination of all of the issues addressed throughout this chapter: the strength of the origin and cause determination, the strength of the witnesses who will present those opinions and the investigatory work leading to them (see §§12.21-12.45, 12.51-12.68), and the connective evidence that completes the package (see §12.20).

The broad sample questions in this chapter do not attempt to address all of those aspects of the arson case. Instead, the sample questions in §§12.70-12.76 are provided to help counsel begin to address the more technical aspects of the fire expert's qualifications. For sample questions relating to the fire expert's methodology, see §§12.79-12.89. Considerably more may be required in a particular case. Counsel can develop additional detailed questions in conjunction with his or her own expert and reference works such as NFPA 921 (see §§12.1-12.3) and DeHaan, Kirk's Fire Investigation (6th ed 2007) (see §12.1).

NOTE: The authors gratefully acknowledge the contributions of Agent Steve Carmen of the Bureau of Alcohol, Tobacco, Firearms and Explosives (ATF) to §§12.70-12.76.

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Source: Criminal Law/Scientific Evidence in California Criminal Cases/12 Origin and Cause of Fire/§12.70 1. Professional Qualifications

§12.70 1. Professional Qualifications

Q: What is your full-time profession?

Q: In what subject areas do you consider yourself to be an expert?

Q: Do you consider yourself an expert in fire or explosion investigation and analysis, or both?

Q: What specific training and education have you received in fire or explosion investigation, or both?

Q: Specifically, when did you become an expert in fire or explosion investigation, or both?

Q: Do you consider yourself an expert in fire or explosion dynamics, or both?

Q: What specific training and education have you received in fire or explosion dynamics, or both?

Q: Do you consider yourself an expert in fire pattern analysis?

Q: What specific training and education have you received in fire pattern analysis?

Q: How many fires or explosion incidents, or both, have you investigated?

Q: How many fire or explosion scenes, or both, have you actually physically examined in order to render expert opinions?

Q: How many times have you given expert opinion testimony by way of depositions?

Q: In what subject areas have you given expert opinion testimony by way of depositions?

Q: How many times have you given expert opinion testimony on fire or explosion analysis, or both, in depositions?

Q: How many times have you given expert opinion trial testimony?

Q: In what subject areas have you given expert opinion trial testimony?

Q: How many times have you given expert opinion trial testimony on fire or explosion analysis, or both?

Q: Have you ever been offered to a court and been found not qualified to give expert testimony in a trial?

Q: Are you certified as a fire or explosion investigator, or both, by any organization or entity? By whom? What was required of you to earn that certification?

Q: Are you certified as a fire investigation instructor by any organization or entity? By whom? What was required of you to earn that certification?

Q: Are you certified as a fire protection specialist by the Certified Fire Protection Specialist Board?

Q: Are you licensed by any governmental subdivision to conduct fire or explosion investigations, or both?

Q: Do you hold any licenses, registrations, or certifications in your profession?

Q: Please describe your fire science laboratory?

Q: Please describe your fire science reference library?

[*Some of the reference works counsel might expect a professional fire investigator to have in his or her library include the following texts:*]

DeHaan, Kirk's Fire Investigation (6th ed 2007)

NFPA 921: Guide for Fire and Explosion Investigations (2008)

Icove & DeHaan, Forensic Fire Scene Recontruction (2d ed 2008)

Kennedy & Kennedy, Fires and Explosions: Determining Cause and Origin (1985)

Quintiere, Principles of Fire Behavior (1997)

Babrauskas, Ignition Handbook: Principles and Applications to Fire Safety Engineering, Fire Investigation, Risk Management and Forensic Science (2003)

NFPA, Fire Protection Handbook (20th ed 2008)

Williams, Understanding the Arsonist: From Assessment to Confession (2005)

U.S. Department of Justice, Fire and Arson Scene Evidence: A Guide for Public Safety Personnel (2000)

U.S. Department of Justice, A Guide for Explosion and Bombing Scene Investigation (2000)

For discussion of determining and establishing an expert's qualifications, see §§12.51-12.68.

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Source: Criminal Law/Scientific Evidence in California Criminal Cases/12 Origin and Cause of Fire/§12.71 2. Professional Education and Training

§12.71 2. Professional Education and Training

Q: What specific training have you had in the following subject areas:

Fire investigation?

Explosion investigation?

Fire science and technology?

Fire dynamics?

Explosion dynamics?

Fire pattern analysis?

Heat and flame vector analysis?

Electrical fire causes?

Model fire codes?

Model building codes?

Fire protection?

Fire protection engineering?

Computer fire modeling?

Fire science research?

Materials flammability?

Failure analysis?

Q: When was the first class you attended in these subject areas?

Q: When was the most recent class you attended in these subject areas?

Q: Have you attended any classes or training programs in fire investigation and analysis sponsored by any of the following organizations:

National Fire Protection Association?

National Institute of Standards and Technology?

National Bureau of Standards—Center for Fire Research?

NOTE: The National Bureau of Standards (NBS) became the National Institute of Standards and Technology (NIST) in 1988. See http://www.100.nist.gov/directors.htm (visited June 2, 2010).

Building and Fire Research Laboratory?

National Association of Fire Investigators?

International Association of Arson Investigators?

International Society of Fire Service Instructors?

Society of Fire Protection Engineers?

U.S. Fire Administration?

National Fire Academy?

Investigations Institute?

National Conference on Fire Investigation Instruction?

State Fire Marshals' offices?

FBI Academy?

Bureau of Alcohol, Tobacco, Firearms and Explosives?

Federal Law Enforcement Training Center?

Local fire departments?

Colleges or universities?

Q: Do you hold any college degrees in fire investigation, fire protection engineering, fire engineering technology, or fire science?

Q: Have you written any published articles, books, treatises, codes, or standards on any of the following or related subjects:

Fire investigation?

Explosion investigation?

Fire science and technology?

Fire dynamics?

Explosion dynamics?

Fire pattern analysis?

Heat and flame vector analysis?

Electrical fire causes?

Model fire codes?

Model building codes?

Fire protection?

Fire protection engineering?

Computer fire modeling?

Fire science research?

Materials flammability?

Failure analysis?

Q: When and by whom were these writings published?

Q: Have you taught or lectured to organized groups in any of the following or related topics:

Fire investigation?

Explosion investigation?

Fire science and technology?

Fire dynamics?

Explosion dynamics?

Fire pattern analysis?

Heat and flame vector analysis?

Electrical fire causes?

Model fire codes?

Model building codes?

Fire protection?

Fire protection engineering?

Computer fire modeling?

Fire science research?

Materials flammability?

Failure analysis?

Q: When and by whom were these lectures or programs sponsored?

Q: What training or experience have you had in fire or materials testing?

Q: What training or experience have you had in fire modeling?

Q: What training have you had in advanced mathematics, including calculus?

Q: What training or experience have you had in laboratory processes, techniques, and procedures?

Q: What training or experience have you had in interpreting the results of laboratory tests?

Q: What training or experience have you had in electrical engineering?

Q: What training or experience have you had in mechanical engineering?

Q: What training or experience have you had in structural engineering?

Q: What training or experience have you had in materials engineering?

Q: What training have you had in fluid dynamics?

Q: What is fluid dynamics? Can you tell me how the principles of fluid dynamics relate to fire scene investigation?

NOTE: On model fire and building codes and fire protection topics generally, see http://www.nfpa.org. Discussion of some of the other topics set forth in the sample questions and answers above can be found in NFPA 921 (see §§12.1-12.3) and DeHaan, Kirk's Fire Investigation (6th ed 2007) (see §12.1).

For information on some of the professional organizations set forth in the sample questions and answers above, see the following:

- National Fire Protection Association (NFPA)
(see http://www.nfpa.org);

- National Institute of Standards and Technology (NIST)
(see http://www.nist.gov);

- Building and Fire Research Laboratory (BFRL)

(see http://www.bfrl.nist.gov);

- National Association of Fire Investigators (NAFI)
(see http://www.nafi.org);

- International Association of Arson Investigators (IAAI)
(see http://www.firearson.com);

- International Society of Fire Service Instructors (ISFSI)
(see http://www.isfsi.org);

- Society of Fire Protection Engineers (SFPE)
(see http://www.sfpe.org);

- U.S. Fire Administration (USFA)
(see http://www.usfa.dhs.gov);

- National Fire Academy (NFA)
(see http://www.usfa.dhs.gov/about/orgchart/nfa.shtm);

- FBI Academy
(see http://www.fbi.gov/hq/td/academy/academy.htm);

- Bureau of Alcohol, Tobacco, Firearms and Explosives (ATF)
(see http://www.atf.gov); and

- Federal Law Enforcement Training Center (FLETC)
(see http://www.fletc.gov).

For discussion of determining and establishing an expert's qualifications, see §§12.51-12.68.

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Source: Criminal Law/Scientific Evidence in California Criminal Cases/12 Origin and Cause of Fire/§12.72 3. Professional Organizations

§12.72 3. Professional Organizations

Q: In which professional organizations do you hold membership?

Q: Specifically, are you a member of the following organizations:

National Fire Protection Association?

Society of Fire Protection Engineers?

National Association of Fire Investigators?

International Association of Arson Investigators?

ASTM International?

NOTE: ASTM International was originally known as the American Society for Testing and Materials (ASTM) (see http://www.astm.org/ABOUT/aboutASTM.html).

International Society of Fire Service Instructors?

National Society of Professional Engineers?

National Academy of Forensic Engineers?

International Fire Marshals' Association?

American National Standards Institute?

Q: Are you a member of any technical committees, or specialized subcommittees or groups, within any of these organizations?

Q: Do you hold any office within any of these groups?

Q: Do you consider any of the following organizations authoritative in their fields:

National Fire Protection Association?

Society of Fire Protection Engineers?

National Association of Fire Investigators?

International Association of Arson Investigators?

ASTM International?

International Society of Fire Service Instructors?

National Society of Professional Engineers?

National Academy of Forensic Engineers?

International Fire Marshals' Association?

American National Standards Institute?

Q: Do you consider the codes, standards, or publications of the following organizations authoritative:

National Fire Protection Association?

Society of Fire Protection Engineers?

National Association of Fire Investigators?

International Association of Arson Investigators?

ASTM International?

International Society of Fire Service Instructors?

National Society of Professional Engineers?

National Academy of Forensic Engineers?

International Fire Marshals' Association?

American National Standards Institute?

Q: Are you familiar with the National Fire Codes (NFC)?

Q: Do you consider the NFC authoritative?

Q: Do you own copies of the NFC?

Q: Do you consider NFPA 1: Fire Code authoritative?

Q: Do you consider NFPA 54: National Fuel Gas Code authoritative?

Q: Do you consider NFPA 55: Standard for the Storage, Use, and Handling of Compressed Gases and Cryogenic Fluids in Portable and Stationary Containers, Cylinders, and Tanks authoritative?

Q: Do you consider NFPA 70: National Electrical Code authoritative?

Q: Do you consider NFPA 77: Recommended Practice on Static Electricity authoritative?

Q: Do you consider NFPA 101: Life Safety Code authoritative?

Q: Do you consider NFPA 704: Standard System for the Identification of the Hazards of Materials for Emergency Response authoritative?

Q: Do you consider NFPA 921: Guide for Fire and Explosion Investigations authoritative?

Q: Do you consider NFPA 1033: Standard for Professional Qualifications for Fire Investigator authoritative?

Q: What other works, standards, texts, or publications do you consider authoritative in the field of fire and explosion investigation and analysis?

On the NFC and other NFPA documents included in this question, see http://www.nfpa.org. For information on the professional organizations set forth in the sample questions and answers above, see the following:

- National Fire Protection Association (NFPA)
  (see http://www.nfpa.org);
- Society of Fire Protection Engineers (SFPE)
  (see http://www.sfpe.org);
- National Association of Fire Investigators (NAFI)
  (see http://www.nafi.org);
- International Association of Arson Investigators (IAAI)
  (see http://www.firearson.com);
- ASTM International (http://www.astm.org) (formerly American Society for Testing and Materials (ASTM)
  (see http://www.astm.org/ABOUT/aboutASTM.html));
- International Society of Fire Service Instructors (ISFSI)
  (see http://www.isfsi.org);

- National Society of Professional Engineers (NSPE)
(see http://www.nspe.org);

- National Academy of Forensic Engineers (NAFE)
(see http://www.nafe.org);

- International Fire Marshals' Association (IFMA)
(see http://www.nfpa.org/categoryList.asp?categoryID=234&URL=Membership/Member%20Sections/International%20Fire%20Marshals%20Association%20(IFMA)); and

- American National Standards Institute (ANSI)
(see http://www.ansi.org).

For discussion of determining and establishing an expert's qualifications, see §§12.51-12.68.

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Source: Criminal Law/Scientific Evidence in California Criminal Cases/12 Origin and Cause of Fire/§12.73 4. Fire Science and Dynamics

§12.73 4. Fire Science and Dynamics

It has become more common for fire experts to be cross-examined regarding their knowledge and understanding of the more technical aspects of their profession, including the scientific principles involved in fire science and dynamics. NFPA 921 defines "fire science" as the "body of knowledge concerning the study of fire and related subjects" (NFPA 921 §3.3.63) and "fire dynamics" as "[t]he detailed study of how chemistry, fire science, and the engineering disciplines of fluid mechanics and heat transfer interact to influence fire behavior" (see NFPA 921 §3.3.58). For discussion of basic fire science, see NFPA 921, chap 5.

Although such cross-examination may not convince a judge that the expert is insufficiently qualified to proffer opinion testimony, faltering on such questions in front of the jury cannot help but negatively impact the expert's credibility and persuasive power. In this regard, consider the sample questions below. Many of the sample answers below are from NFPA 921 (see §§12.1-12.3) and DeHaan, Kirk's Fire Investigation (6th ed 2007) (see §12.1).

Q: What is the technical definition of fire?

[A: Rapid oxidization process with the evolution of light and heat in varying intensities.]

Q: What is the technical definition of a fire plume?

[A: The column of hot gases, flames, and smoke rising above a fire. Also called convection column and thermal column.]

Q: How are fire plumes generated?

[A: From heat and hot gases rising above a fire in a column.]

Q: What is the technical definition of flame?

[A: The luminous portion of burning gases or vapors.]

Q: What is the technical definition of a flame plume?

Q: What is the technical difference between a fire plume and a flame plume?

Q: What property determines the height of a fire plume?

[A: Rate of heat release of the fuel.]

Q: What is the relationship between fire plume height and rate of heat release?

[A: Rate of heat release controls plume height.]

Q: What is a triangular-shaped fire plume?

Q: What is a columnar-shaped fire plume?

Q: What is a conical-shaped fire plume?

Q: What property determines the shape of a fire plume?

Q: What is the technical definition of air entrainment?

[A: The process of air or gases being drawn into a fire plume or jet.]

Q: What is the technical definition of a ceiling jet?

Q: What is the definition of a competent fuel source?

Q: What are the elements or characteristics used to evaluate whether or not a specific fuel source is competent?

Q: What is the definition of a competent ignition source?

[A: Must have sufficient temperature and energy and will be in contact with the fuel long enough to raise it to its ignition temperature?]

Q: What are the elements or characteristics used to evaluate whether or not a specific ignition source is competent?

[A: Generation of heat energy, transmission of energy to fuel source, heating of fuel by energy reaching it.]

Q: What is thermal inertia?

[A: Measure of the ability of a material to absorb and transmit heat within itself.]

Q: What is the formula for thermal inertia?

[A: kpc, k = thermal conductivity, p (Greek letter rho) = *density* specific heat, c = *specific* heat density.]

Q: How does the thermal inertia of a material affect its ability to be a competent fuel source?

[A: The higher the thermal inertia of a material, the easier to ignite.]

Q: What is the definition of the surface-to-mass ratio of a material?

Q: How does the surface-to-mass ratio of a material affect its ability to be a competent fuel source?

[A: The higher the ratio, the easier to ignite.]

Q: What is the definition of the heat of combustion of a material?

[A: Heat energy necessary to bring about ignition or combustion.]

Q: How does the heat of combustion of a material affect it as a fuel?

[A: The higher the heat of combustion, the more heat energy released when burned.]

Q: How does the heat of combustion of a material affect it as an ignition source?

[A: The higher the heat of combustion, the more heat energy released when burned.]

Q: What is the technical definition of the specific heat of a material?

[A: Amount of energy needed to raise its temperature.]

Q: What is the technical definition of the ignition temperature of a material?

[A: Minimum temperature for ignition in test with pilot flame.]

Q: What is the technical definition of the autoignition temperature of a material?

[A: Minimum temperature for ignition in test without pilot flame.]

Q: What is the difference between a material's ignition temperature and its autoignition temperature?

[A: Presence of a pilot flame in testing.]

Q: What is the technical definition of the minimum ignition energy of a material?

[A: Minimum amount of heat energy to raise temperature of material to ignition temperature.]

Q: What is the difference between the temperature of an ignition source and its heat energy?

Q: What is the definition of the rate of heat release of a material?

[A: Rate at which it gives off heat energy when burning.]

Q: What is the relationship between rate of heat release and a fuel source?

[A: Rate of heat release is different for each material.]

Q: What is the technical definition of flashover?

[A: Transition in a compartment when everything becomes ignited.]

Q: What is the minimum ceiling layer temperature that defines flashover?

[A: 1112°F or 600°C.]

Q: What are electromagnetic waves?

[A: Waves composed of undulating electrical and magnetic fields. The different kinds of electromagnetic waves such as light and radio waves form the electromagnetic spectrum.]

Q: How are electromagnetic waves related to radiated heat?

[A: Radiated heat travels by electromagnetic waves.]

Q: How is radiated heat related to flashover?

[A: Radiated heat is the main energy transfer mechanism leading to flashover.]

Q: What are the main components in the mathematical formula for flashover?

[A: Room size, vents, heat release rate of fuel, conductance of room surfaces.]

Q: How do fluid dynamics pertain to fire dynamics?

[A: Fire plumes are fluids.]

Q: What is computer fire modeling?

Q: What is the basis for computer fire modeling?

Q: Which computer fire models do you regularly use?

Q: Please describe your fire modeling computer hardware?

Q: What is the NIST?

[A: National Institute of Standards and Technology, formerly the National Bureau of Standards.]

Q: What is the BFRL?

[A: Building and Fire Research Laboratory of NIST, formerly the Center for Fire Research.]

Q: What is an FPE tool?

[A: Fire Protection Engineering tool, one of NIST's computer fire models.]

Q: What is FAST?

[A: A computer fire model.]

Q: What are HAZARD I and HAZARD II?

[A: Computer fire models.]

Q: What is the purpose of the computer fire model "U-Temp"?

[A: Computer fire model that tells upper layer temperatures and predicts flashover.]

Q: What is Thomas's Flashover Correlation?

[A: Computer fire model, which tells amount of heat release for flashover.]

Q: Explain how U-Temp and Thomas's Flashover Correlation work?

Q: What is the technical definition of radiant heat flux?

[A: Amount of radiant heat energy transfer.]

Q: What is the critical heat flux for flashover to occur?

[A: 20 kW/sq. m,.2 W/sq. cm]

Q: If flashover is sometimes defined as a point in a fire at which the radiant heat flux at the floor is equal to 2 kilowatts per square meter, what does this mean?

[A: Amount of heat flux at floor necessary for flashover.]

Q: What is the definition of upper layer temperature in a compartment fire?

[A: Average temperature of hot gas cloud in a room.]

Q: What is the generally accepted critical upper layer temperature for flashover to occur?

[A: 1112°F or 600°C.]

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Source: Criminal Law/Scientific Evidence in California Criminal Cases/12 Origin and Cause of Fire/§12.74 5. Principles of Fire Investigation

§12.74 5. Principles of Fire Investigation

NOTE: Many of the sample answers below are from NFPA 921 (see §§12.1-12.3) and DeHaan, Kirk's Fire Investigation (6th ed 2007) (see §12.1). For discussion of determining and establishing an expert's qualifications, see §§12.51-12.68.

Q: What is the definition of fire origin?

[A: The exact physical location where a heat source and a fuel come in contact with each other and a fire begins.]

Q: What is the definition of a fire pattern?

[A: The visible or measurable physical effects that remain after a fire.]

Q: What is a movement pattern?

[A: Patterns produced by growth and movement of fire and the products of combustion away from an initial heat source.]

Q: What is an intensity pattern?

[A: Fire patterns produced by the response of materials to the effects of various intensities of heat exposure.]

Q: What is the technical definition of heat shadowing?

[A: Heat shadowing results from an object blocking the travel of radiant heat, convected heat, or direct flame contact from its source to the material on which a heat-shadowing pattern is produced. Conducted heat does not cause shadowing.]

Q: How is a heat-shadowing pattern created?

Q: What is the fire investigation significance of a heat-shadowing pattern?

[A: Heat shadowing can change, mask, or prohibit the production of identifiable lines of demarcation that may have appeared on that material. These patterns may assist the investigator in the process of reconstruction during origin determination.]

Q: Did you use the analysis of a heat shadow pattern in this case?

Q: What is the technical definition of a protected area pattern?

[A: A pattern resulting from an object preventing the products of combustion from depositing on the material the object protects, or that prevents it from burning. For example: furniture on carpet.]

Q: How is a protected area pattern formed?

[A: See previous response.]

Q: What is the fire investigation significance of a protected area pattern?

[A: Can assist the investigator in the process of scene reconstruction.]

Q: Did you use the analysis of a protected area pattern in this case?

Q: What is the technical definition of a truncated cone pattern?

[A: Three-dimensional fire patterns displayed on both horizontal and vertical surfaces. Generally formed by fire plumes.]

Q: How is a truncated cone pattern created?

[A: Effects and shape of a fire plume. Found on ceilings.]

Q: What is the fire investigation significance of a truncated cone pattern?

[A: Can identify an area where burning created a plume. Possibly an area of origin.]

Q: What is the technical definition of a depth of char pattern?

[A: Char patterns are caused by the ignition of fugitive fuel gasses.]

Q: How is a depth of char pattern formed?

[A: When fuel gases are the initial fuel source, the burning can cause relatively even depths of char over the area the fuel covers.]

Q: What is the fire investigation significance of a depth of char pattern?

[A: When fuel gas is involved, deeper char will exist in the area of leakage. Depth of char alone is most useful in determining fire travel, not duration of burn.]

Q: Did you use the analysis of a depth of char pattern in this case?

Q: What is the technical definition of low burn pattern?

Q: How is a low burn pattern formed?

[A: Generally formed due to proximity to heat source.]

Q: What is the fire investigation significance of a low burn pattern?

[A: In pre-flashover, these patterns may identify an area of origin.]

Q: Did you use the analysis of a low burn pattern in this case?

Q: How is a fall down pattern formed?

[A: From burning debris falling to lower levels and continuing to burn.]

Q: What is the fire investigation significance of a fall down pattern?

[A: Can lead investigator to misidentify an area of origin. Some fall down debris can protect evidence at floor level as well.]

Q: Did you use the analysis of a fall down pattern in this case?

Q: What is the technical definition of fall down pattern?

[A: Burning debris falling to lower levels and continuing to burn.]

Q: How are fire patterns utilized to determine the origin of a fire?

[A: Fire patterns can be used to trace fire spread from an area of origin as well as to identify an area of origin.]

Q: What is the technical definition of a "V" pattern?

[A: Pattern created by flames convected or radiated heat from hot fire gasses and smoke within the fire plume.]

Q: How is a "V" pattern formed?

[A: See previous answer.]

Q: What is the "virtual source" of a "V" pattern?

Q: What is the fire investigation significance of a "V" pattern?

[A: Can assist in determining the area of origin but not the speed of fire growth.]

Q: Did you use the analysis of a "V" pattern in this case?

Q: What is the technical definition of an inverted cone pattern?

[A: Patterns commonly caused by the vertical flame plumes of burning volatile fuels not reaching the ceiling.]

Q: How is an inverted cone pattern formed?

[A: Generally, manifestations of relatively short-lived fires that did not progress to floor-to-ceiling burning or flame plumes that are not vertically restricted by a ceiling.]

Q: What is the fire investigation significance of an inverted cone pattern?

[A: Can indicate a short duration fire.]

Q: Did you use the analysis of an inverted cone pattern in this case?

Q: What is the technical definition of an hourglass pattern?

[A: Pattern formed by a hot gas zone shaped like a "V" with a flame zone at its base.]

Q: How is an hourglass pattern formed?

[A: If the fire is very close to or in contact with a vertical surface, the resulting pattern will show the effects of both the hot gas zone and the flame zone together as a large "V" above an inverted "V."]

Q: What is the fire investigation significance of an hourglass pattern?

[A: May indicate area of origin and burning against a vertical surface.]

Q: Did you use the analysis of an hourglass pattern in this case?

Q: What is the technical definition of a "U" pattern?

[A: Patterns similar to "V" patterns but displaying gently curved lines of demarcation and curved rather than angled lower vertices.]

Q: How is a "U" pattern formed?

[A: Created by the effects of radiant heat energy on vertical surfaces more distant from the same heat source displaying sharp "V" patterns.]

Q: What is the fire investigation significance of a ''U" pattern?

[A: Analyzed in the same fashion as "V" patterns with the additional aspect of noting the relationship between the height of the vertex of the "U" pattern as compared with the height of the vertex of all corresponding "V" patterns.]

Q: Did you use the analysis of a "U" pattern in this case?

Q: What is the technical definition of pointer and arrow pattern?

[A: Patterns commonly displayed on a series of combustible elements such as studs or wall furring strips whose service sheathing has been destroyed by fire or was nonexistent.]

Q: How is a pointer and arrow pattern formed?

[A: By fire spread.]

Q: What is the fire investigation significance of a pointer and arrow pattern?

[A: Can assist in tracking fire spread as well as tracking back to a heat source.]

Q: Did you use the analysis of a pointer and arrow pattern in this case?

Q: What is the definition of flame vector analysis?

[A: Analysis of flame spread using vector diagram.]

Q: What is a flame vector analysis diagram?

[A: Diagram using arrows to show flame spread direction.]

Q: Did you prepare a flame vector analysis diagram during your investigation?

Q: How do fire investigators determine the ignition factor or cause of a fire?

[A: Systematic scene examination using process of elimination.]

Q: How do fire investigators determine the development of a fire within a structure?

Q: What is emberous combustion?

[A: Actually glowing or smoldering combustion. Occurs with some fuels like cigarettes and charcoal. These materials can burn in solid phase. A flameless form of combustion.]

Q: What are the characteristics of emberous combustion?

[A: Flameless.]

Q: What is flaming combustion?

[A: Occurs when the fuel is in the gas or vapor state.]

Q: What are the characteristics of flaming combustion?

[A: Presence of a flame.]

Q: How do fire investigators determine the spread of fire within a structure after its ignition?

[A: Fire pattern and flame vector analysis.]

Q: What is the predominant factor or mechanism that affects the spread of fire within a compartment?

[A: Radiant heat.]

Q: Are there any other factors or mechanisms?

[A: Ventilation of compartment, heat release rate of fuels, location of fuels.]

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§12.75 6. Explosion Dynamics

NOTE: Many of the sample answers below are from NFPA 921 (see §§12.1-12.3) and DeHaan, Kirk's Fire Investigation (6th ed 2007) (see §12.1). For discussion of determining and establishing an expert's qualifications, see §§12.51-12.68.

Q: What is the technical definition of an explosion?

[A: The sudden conversion of potential energy (chemical or mechanical) into kinetic energy with the production and release of gases under pressure, or the release of gas under pressure. These high-pressure gases then do mechanical work such as moving, changing, or shattering nearby materials.]

Q: What is the definition of a mechanical explosion?

[A: Explosion in which a high-pressure gas produces a purely physical reaction.]

Q: What is the definition of a chemical explosion?

[A: An exothermic reaction resulting in the release of high-pressure gas. The fundamental chemical nature of the fuel is changed.]

Q: What is the definition of explosion dynamics?

Q: What is a low order explosion?

[A: A slow rate of pressure rise or low force explosion characterized by a pushing or dislodging effect on the confining structure or container and short missile distances.]

Q: What is a high order explosion?

[A: A rapid pressure rise or high force explosion characterized by a shattering effect on the confining structure or container and long missile distances.]

Q: What is the definition of the maximum theoretical explosion pressure of a fuel?

Q: What is the definition of the maximum rate of pressure rise of a fuel in an explosion?

Q: What determines the difference between a low and high order explosion?

[A: Rate of pressure rise below or above 900 psi/sec and maximum pressures of below or above 2 psi.]

Q: Which is more important in the determination of whether a low or high order explosion will occur, maximum pressure or rate of pressure rise?

[A: Rate of pressure rise.]

Q: What determines the rate of pressure rise in an explosion?

[A: Nature of the fuel.]

Q: What determines the maximum pressure achieved in an explosion?

[A: Minimum failure pressure of the container.]

Q: What is the blast pressure front?

[A: The expanding leading edge of an explosion reaction that separates a major difference in pressure between normal ambient pressure ahead of the front and potentially damaging high-pressure behind the front.]

Q: What is the theoretical shape of an explosion's blast pressure front?

[A: Spherical.]

Q: What is the positive pressure phase of an explosion?

[A: When the blast pressure front is moving away from the point of origin.]

Q: What is the negative pressure phase of an explosion?

[A: Phase when air rushes back to the area of origin to equilibrate the low air pressure condition caused by the positive pressure phase.]

Q: What factors control the force of an explosion?

[A: Strength and position of ignition source, fuel nature and mixture, size and shape of container, number and size of vents.]

Q: Did anyone assist you in determining the origin and cause of this explosion?

Q: What is the current state-of-the-art system for explosion analysis?

[A: Explosion force vector analysis.]

Q: Please identity an authoritative source for the current state-of-the-art system for explosion analysis?

[A: NFPA 921.]

Q: What is the definition of explosion force vector analysis?

[A: By use of a diagram, analysis of debris travel direction and relative force and distance debris were propelled.]

Q: What is an explosion force vector analysis diagram?

[A: Diagram documenting the previous Q&A.]

Q: Did you prepare an explosion force vector analysis diagram during your investigation?

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§12.76 7. Principles of Explosion Investigation

Q: How did you determine the origin of this explosion, or did you rely on the work of others?

Q: What was the origin of this explosion?

Q: What was the first fuel or material ignited?

Q: How did you determine that the first fuel or material ignited was a competent fuel source?

Q: What was the second fuel or material ignited?

Q: What specific explosion patterns were utilized to determine the origin of this explosion?

Q: Did you rely on witness statements in determining the origin of this explosion?

Q: Did you rely on any other information in determining the origin of this explosion?

Q: Did anyone assist you in determining the origin of this explosion?

Q: What is the current state-of-the-art system for explosion origin analysis?

Q: Please identify an authoritative source for the current state-of-the-art system for explosion origin analysis?

[A: NFPA 921.]

Q: How do explosion investigators determine the ignition factor or cause of an explosion?

Q: How did you determine the ignition factor or cause for this explosion, or did you rely on the work of others?

Q: What was the ignition factor or cause of this explosion?

Q: What was the first fuel ignited by the source of ignition?

Q: What physical evidence existed after the explosion to support the determination of the ignition factor (cause) of this explosion?

Q: Did you rely on witness statements in determining the ignition factor or cause of this explosion?

Q: Did you rely on any other information in determining the ignition factor or cause of this explosion?

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V. ELICITING THE EXPERT'S OPINION

§12.77 A. Addressing Technical Aspects of Fire Expert's Methodology

Once the expert's qualifications have been established and explored, the direct and cross-examination of this expert tends to delve deeply into his or her approach to the fire scene investigation, the various physical and logical steps followed to evolve his or her conclusions, the basis of those conclusions, and how he or she addressed and eliminated the other alternative explanations.

For example, a typical fire expert examination might flow through such topics as the following:

- The expert's (hopefully systematic) approach to the fire scene;
- The data and physical evidence collected, the documentation of the scene, the pertinent burn patterns, and other evidence relied on;
- The expert's conclusions regarding the origin of the fire, the basis for those conclusions, the other possible origins considered, and the reasons for ruling out those alternatives;
- The expert's conclusions regarding the cause of the fire, the basis for those conclusions, the other possible causes considered, and the reasons for ruling out those alternatives;
- Whether the ignition source identified by the expert was competent to ignite the first ignited fuel identified by the expert, and what brought that fuel and ignition source together;
- What the expected behavior of that first ignited fuel is and whether the burn patterns and other physical evidence are consistent or inconsistent with those expectations;
- What the fire spread expectations are, given factors such as the next available target fuels and ventilation, and whether the burn patterns and other physical evidence are consistent or inconsistent with those expectations; and
- Whether the observations of witnesses and other evidence gathered are consistent or inconsistent with the expert's conclusions, and what the expert did to resolve any inconsistencies.

For further detail, see sample questions in §§12.78-12.79.

In constructing such an examination, the proponent of the expert also likely will want to have the expert support and corroborate each important point in his or her analysis with citations to "generally accepted" resources such as NFPA 921 or DeHaan, Kirk's Fire Investigation (6th ed 2007), or both (see §§12.1, 12.48). For example, if the expert has concluded that a particular burn pattern is consistent with the application and ignition of an ignitable liquid on the target surface, then he or she might want to bolster that conclusion by referencing photographs of similar patterns and the discussions regarding such patterns in such generally accepted literature.

The opponent of the expert, conversely, will want to demonstrate the absence of such generally accepted corroborating proof, or use those same resources to undermine the methodology of the expert and the conclusion reached. In addition, as with most experts, the data collected and relied on (or not) often provide fertile ground for effective cross-examination. In other words, if the expert failed to collect or consider numerous items of important evidence, it becomes much easier to undermine the conclusions based on that incomplete data.

For discussion of expert methodology in determining the origin and cause of fire, see §§12.22-12.45.

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§12.78 B. Sample Questions on Fire Origin and Cause

The broad sample questions in this chapter do not attempt to address all of the aspects of an arson case (see §12.69). Instead, the sample questions in §§12.79-12.89 are provided to help counsel begin to address the more technical aspects of the fire expert's methodology. For sample questions relating to a fire expert's background and qualifications, see §§12.69-12.76. Considerably more questions may be required in a particular case. Counsel can develop additional detailed questions in conjunction with his or her own expert and reference works such as NFPA 921 (see §§12.1-12.3) and DeHaan, Kirk's Fire Investigation (6th ed 2007) (see §12.1). For discussion of expert methodology in determining the origin and cause of fire, see §§12.22-12.45.

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§12.79 1. Sample Questions: Methodology

Q: Describe your approach to the fire scene.

NOTE: Counsel should have the expert address in detail all aspects of his or her approach to and processing of the scene, including the initial survey and assessment of the scene; his or her observations, search patterns, and methodology in taking notes and photographs; whether the expert prepared any sketches or diagrams, and, if so, of what and when; the expert's dig out of the scene; his or her choices and techniques regarding evidence preservation and collection; and the expert's interviews of pertinent witnesses (including, but not limited to, fire suppression personnel, on-scene witnesses, and the owner or occupant).

Q: Did you employ any particular system or methodology in investigating this incident? If so, please describe your investigative methodology and approach.

Q: What steps did you take during your initial response to the scene?

Q: Did you make a preliminary scene assessment? When?

Q: Did you conduct an exterior examination of the scene? What did you do during the course of that examination?

NOTE: Counsel should explore the expert's exterior examination of the scene in detail. Topics to cover include the sequence of the initial survey and assessment of the scene; the expert's observations as he or she progressed through the exterior examination; the expert's methodology in documenting his or her observations, including notetaking and photographs; and whether the expert prepared any sketches or diagrams, and, if so, of what and when.

Q: Did you conduct a detailed interior examination of the scene? What did you do during the course of that examination?

NOTE: As with the exterior examination, counsel should explore the methodology and sequence of the expert's interior examination of the scene in painstaking detail. Topics to cover include the sequence of the initial survey and assessment of the interior; the expert's observations as he or she progressed through the examination of the interior of the structure; the expert's methodology in documenting his or her observations, including notetaking and photographs; whether the expert prepared any sketches or diagrams during this segment of the investigation, and, if so, of what and when; and the expert's choices and techniques regarding evidence collection and preservation.

Q: Did you make an attempt to reconstruct the fire scene?

Q: What information did you draw on in order to do that?

Q: What steps did you take?

Q: Did anyone assist you in that process?

Q: Did you review the results of your efforts with the owner or occupant?

Q: Did you document the results of your reconstruction effort? How?

Q: Did you develop a preliminary determination of fire origin? When? On what basis?

Q: What did you do to test that hypothesis?

Q: Did you consider any alternative hypotheses regarding the origin of the fire? What were they? What did you do to eliminate those alternatives? On what basis?

Q: Did you develop a preliminary determination of fire cause? When? On what basis?

Q: What did you do to test that hypothesis?

Q: Did you consider any alternative hypotheses regarding the cause of the fire? What were they? What did you do to eliminate those alternatives? On what basis?

For discussion of expert methodology in determining the origin and cause of fire, see §§12.22-12.45.

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2. Sample Questions: Data Relied On

§12.80 a. Fire Scene Response and Suppression Activities

The suppression response and activities can significantly affect the behavior and spread of the fire and the patterns (see §12.32) left behind afterwards. Thus, it is very important to explore with the expert in detail the information he or she gathered and relied on regarding these crucial activities.

Q: What information did you collect regarding the fire scene response and suppression activity? From what sources?

Q: Did you obtain any records or reports regarding fire scene response and suppression activity? What? From what sources?

Q: Did you obtain any photographs taken of or during the fire scene response and suppression activity? What? From what sources?

Q: Did you document the fire scene response and suppression activities? Where and how?

Q: Did you document any changes to the scene caused by the fire scene response and suppression activities? Where and how?

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§12.81 b. Prior Fire Scene Investigative Activities

Prior fire scene investigative activities can significantly affect the scene viewed by the investigator. Thus, it is very important to explore with the expert in detail the information he or she gathered and relied on regarding these crucial activities.

Q: What information did you collect regarding any prior fire scene investigative activities? From what sources?

Q: Did you obtain any records or reports regarding any prior fire scene investigative activities? What? From what sources?

Q: Did you obtain any photographs taken prior to, of, or during any prior fire scene investigative activities? What? From what sources?

Q: Did you document the extent of any prior fire scene investigative activities? Where and how?

Q: Did you document any changes to the scene caused by any prior fire scene investigative activities and the impact of those activities on your investigation? Where and how?

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§12.82 c. Information and Documents Regarding the Building, Its Contents, and Its Occupants

Q: What information did you obtain during the course of your investigation regarding the structure where this fire occurred?

Q: Did you obtain blueprints, schematics, or other diagrams of the structure? What? From what source?

Q: What information were you provided by the owner or occupants of the building?

Q: Did you have them help you prepare a contents diagram?

Q: Did you have them identify for you all fuel packages within the suspected area of origin?

Q: Did you have them identify for you all ignition sources within the suspected area of origin?

Q: Was there any information regarding the structure or its contents that you were not able to obtain? What efforts did you make to obtain that information?

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Source: Criminal Law/Scientific Evidence in California Criminal Cases/12 Origin and Cause of Fire/§12.83 d. Expert's Scene Processing and Investigation Activities

§12.83 d. Expert's Scene Processing and Investigation Activities

Q: Did you systematically document your processing of the scene through each stage of your investigation? How did you do that?

Q: With photographs? How many? Do we have them all?

Q: With sketches or diagrams? How many? Of what? Do we have them all?

Q: With field notes? Of what? Do we have them all?

Q: Did you interview any witnesses (*e.g.*, fire suppression personnel, owner or occupants, eye witnesses)? Who? When?

Q: Did you preserve the statements made by those witnesses? How?

Q: Did you utilize a hydrocarbon detector?

Q: Did you utilize a specially trained canine?

Q: Did you collect any physical evidence from the fire scene? What? How?

Q: Did you document your collection of that evidence? How?

Q: What did you do with that evidence?

NOTE: Counsel should cover in detail the collection of physical evidence from the fire scene. See NFPA 921, chap 16.

Q: Did you have any tests performed on any of the physical evidence collected? What tests? By whom? Was a report prepared regarding the results of the tests? Do we have all of that?

Q: Did you utilize the services or expertise of anyone else in connection with your work on this fire (*e.g.*, other fire investigators or other experts such as engineers or laboratory personnel)?

Q: Did you examine each door, window, and other route of possible ingress and egress?

Q: Did you document the condition of each such opening?

Q: Did you note and document whether the closure (*e.g.*, door or window) to that opening was open or closed, locked or unlocked?

Q: Did you reach any conclusion as to whether that opening was open or closed, locked or unlocked? Basis? Documentation?

Q: Was the structure equipped with an alarm? If so:

Q: Was the structure protected by any type of alarm system (*e.g.*, burglar or fire)?

Q: What information did you obtain regarding that system? From whom?

Q: Did you obtain any documents relating to that system? What?

NOTE: Records regarding such systems might include information regarding matters such as installation, components, zones, maintenance, and incident reports.

Q: What were the components of the system? Where were they located?

Q: How many coverage zones were there, and what portions of the building did they cover?

Q: Did the alarm have a central reporting function, or was it merely local?

Q: Was the alarm turned on at the time of the incident? How do you know that?

Q: Did the alarm register an incident in connection with this fire? What? From what zone? When?

Q: Was the structure equipped with a fire suppression system (*e.g.*, sprinklers, Halon, or dry powder)?

Q: What type of system?

Q: What were the components of the system?

Q: Where and how was each component installed?

Q: Was the system operational at the time of the incident? How do you know that?

Q: What impact did the system have on the development of this fire?

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Source: Criminal Law/Scientific Evidence in California Criminal Cases/12 Origin and Cause of Fire/§12.84 e. Documents Reviewed or Created

§12.84 e. Documents Reviewed or Created

Q: We want to inventory all of the documents that you reviewed, relied on, and created in connection with your work on this fire. As I ask you about each type of document or record, please identify for me whether or not you created, reviewed, or relied on any of that type of document. If so, we will then inventory each such document or record.

Q: Photographs? Videotape? Audiotape?

Q: Of fire department, media, public, witnesses, yours, other investigators, other?

Q: Photo log? Photo diagram?

Q: Building documents such as blueprints and schematics?

Q: Diagrams?

Q: Field notes?

Q: Witness interviews?

Q: Video or audiotape record? Written statement by the witness? (Signed by the witness?) Interview notes? (Reviewed or signed by the witness?)

Q: Prepare any reports?

Q: Correspondence, notes, memos, analysis or calculations, outlines?

Q: Models? Physical model? Computer model?

Q: Tests?

Q: Lab work? Reports?

Q: Computer fire modeling?

Q: Did you review or consult any authoritative treatise, publication, or research specifically in connection with your work on this fire, including, but not limited to:

NFPA 921?

DeHaan, Kirk's Fire Investigation?

Forensic Fire Scene Reconstruction (Icove & DeHaan)?

Fires and Explosions: Determining Cause and Origin (Kennedy & Kennedy)?

Principles of Fire Behavior (Quintiere)?

Ignition Handbook: Principles and Applications to Fire Safety Engineering, Fire Investigation, Risk Management and Forensic Science (Babrauskas)?

NFPA's Fire Protection Handbook?

Understanding the Arsonist: From Assessment to Confession (Williams)?

Fire and Arson Scene Evidence: A Guide for Public Safety Personnel (U.S. Department of Justice)?

A Guide for Explosion and Bombing Scene Investigation (U.S. Department of Justice)?

NOTE: For additional information on these publications, see §12.70.

Q: Did you review the work, work product, conclusions, or opinions of any other professional or expert regarding this fire? Did you rely on any of that in forming your opinions? What? How? Did you reject or disagree with any of their conclusions? What? Why?

Q: Did you collaborate with any other professional or other expert in developing your opinions or conclusions regarding this fire? Who? Describe in detail.

Q: Did you receive any assistance from anyone else while developing your opinions or conclusions regarding this fire? Who? Describe in detail.

Q: Did you create a timeline of events relating to this fire?

Q: Did you prepare any report regarding your investigation, analysis, or conclusions?

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3. Sample Questions: Expert's Conclusions

§12.85 a. Origin of Fire

Q: Did you reach a final conclusion regarding the area (or point) of origin of this fire?

Q: Please list for us each fact on which you based that conclusion.

Q: What specific fire patterns were utilized to determine the origin of this fire?

Q: Please identify for us each assumption you have made in reaching that conclusion.

Q: Did you find any facts inconsistent with your conclusion? What?

Q: Did you attach any significance to those facts? What?

Q: Did you discount those facts or disregard them entirely? Why?

Q: What significance did you attach to those facts? Why?

Q: Did you identify any other possible areas (or points) of origin?

Q: Did you rule out each of those other possible areas (or points) of origin?

Q: Please list for us each fact on which you relied in ruling out each of those other possible areas (or points) of origin?

Q: Please identify for us each assumption you have made in ruling out each of those other possible areas (or points) of origin.

Q: Did you find any facts inconsistent with ruling out each of those other possible areas (or points) of origin? What?

Q: Did you attach any significance to those facts? What?

Q: Did you discount those facts or disregard them entirely? Why?

Q: What significance did you attach to those facts? Why?

Q: For purposes of this next question, please assume that the origin of the fire was [*one of the areas described by the expert as a possible area of origin considered, but rejected*].

Q: Assuming that the origin of the fire was [*one of the areas described by the expert as a possible area of origin considered, but rejected*], what fire patterns and other evidence would you have expected to see?

Q: Assuming that the origin of the fire was [*one of the areas described by the expert as a possible area of origin considered, but rejected*], please describe how the fire patterns and other evidence would have been different from the fire scene you investigated and documented.

For discussion of expert methodology for determining the origin of a fire, see §§12.23-12.33.

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Source: Criminal Law/Scientific Evidence in California Criminal Cases/12 Origin and Cause of Fire/§12.86 b. Cause of Fire

§12.86 b. Cause of Fire

The following are among the host of issues specific to the expert's investigation of and conclusions reached regarding the fire in question that counsel generally will want to explore in detail:

- The expert's conclusions regarding the cause of the fire, the basis for those conclusions, the other possible causes considered, and the reasons for ruling out those alternatives; and
- Whether the ignition source identified by the expert was competent to ignite the first ignited fuel identified by the expert, and what brought that fuel and ignition source together.

Some general questions that may be of interest include the following:

Q: Did you reach a final conclusion regarding the cause of this fire?

Q: Please list for us each fact on which you based that conclusion.

Q: What specific fire patterns were utilized to determine the cause of this fire?

Q: Please identify for us each assumption you have made in reaching that conclusion.

Q: Did you find any facts inconsistent with your conclusion? What?

Q: Did you attach any significance to those facts? What?

Q: Did you discount those facts or disregard them entirely? Why?

Q: What significance did you attach to those facts? Why?

Q: What physical evidence existed after the fire to support the determination of the ignition factor (cause) of this fire?

Q: Did you identify any other possible causes of this fire?

Q: Did you rule out each of those other possible causes of this fire?

Q: Please list for us each fact on which you relied in ruling out each of those other possible causes of this fire?

Q: Please identify for us each assumption you have made in ruling out each of those other possible causes of this fire.

Q: Did you find any facts inconsistent with ruling out each of those other possible causes of this fire? What?

Q: Did you attach any significance to that/those fact(s)? What?

Q: Did you discount those facts or disregard them entirely? Why?

Q: What significance did you attach to those facts? Why?

Q: For purposes of this next question, please assume that the cause of this fire was [*one of the causes described by the expert as a possible cause considered, but rejected*].

Q: Assuming that the cause of this fire was [*one of the causes described by the expert as a possible cause considered, but rejected*], what fire patterns and other evidence would you have expected to see?

Q: Assuming that the cause of this fire was [*one of the causes described by the expert as a possible cause considered, but rejected*], please describe how the fire patterns and other evidence would have been different from the fire scene you investigated and documented.

Q: In reaching your conclusion regarding the origin and cause of this fire scene, did you evaluate the heat transfer damage caused by fire plumes and gases?

Q: How?

Q: What observations did you make in that regard?

Q: How did you document those observations?

Q: How did those observations impact your analysis and conclusions?

Q: In reaching your conclusion regarding the origin and cause of this fire scene, did you take into account and correlate the human observations and factors?

Q: What sources did you consider?

Q: What impact did that information have on your analysis and conclusions?

For discussion of expert methodology for determining the cause of fire, see §§12.34-12.38.

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Source: Criminal Law/Scientific Evidence in California Criminal Cases/12 Origin and Cause of Fire/§12.87 c. Expert's Bases for Conclusions Regarding Origin and Cause

§12.87 c. Expert's Bases for Conclusions Regarding Origin and Cause

Q: In reaching your conclusion regarding the origin and cause of this fire scene, did you systematically document the processing of the scene through each stage of the investigation, from initial suppression response to the conclusion of your investigation?

Q: How did you do that?

Q: How did you use that information in your analysis and in reaching your conclusions?

Q: In reaching your conclusion regarding the origin and cause of this fire scene, did you document the fire patterns and other evidence relied on?

Q: How did you do that?

Q: How did you use that information in your analysis and in reaching your conclusions?

Q: In reaching your conclusion regarding the origin and cause of this fire scene, did you establish the starting conditions that led to the fire, including, but not limited to, the location, distribution, and type of all available fuels and heat sources, the environment, and ventilation?

Q: How did you determine what the first ignited fuel was? Did you obtain any samples of that first ignited fuel? If not, why not?

Q: Did you determine the fuel characteristics of that first ignited material? Did you determine the ignition temperature of that fuel? How?

Q: Did you determine what type of ignition source could ignite that fuel? How?

Q: Did you determine whether the ignition source you say started this fire was competent to ignite that first ignited fuel? How?

Q: How long did that ignition take?

Q: How large a fire was produced by that initial ignition? Did you calculate the heat release rate produced by the ignition of that first ignited fuel?

Q: In reaching your conclusion regarding the origin and cause of this fire scene, did you attempt to confirm your conclusions with anyone else? Did anyone peer review your work or conclusions?

NOTE: A quality direct or cross-examination of a fire expert also will include a significant number of questions regarding the specific bases supporting the expert's conclusions. Those questions, however, are quite specific to the investigation conducted, the conclusions reached, and the bases for them. The examination should draw on such resources as NFPA 921 (see §§12.1-12.3) and DeHaan, Kirk's Fire Investigation (6th ed 2007) (see §12.1), and should compare the expert's work and opinions with the generally accepted principles and procedures set forth in those documents.

For discussion of expert methodology for the determination of the origin and cause of fire, see §§12.22-12.45.

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Source: Criminal Law/Scientific Evidence in California Criminal Cases/12 Origin and Cause of Fire/§12.88 d. Expert's Conclusions Regarding Fire Spread

§12.88 d. Expert's Conclusions Regarding Fire Spread

Counsel generally will want to explore the following in detail:

- The expert's conclusions regarding the spread of the fire; how those conclusions were impacted by factors such as (1) the type, location, and configuration of the next available target fuels (and the fire characteristics of those fuels in that configuration); and (2) ventilation; and
- Whether the burn patterns and other physical evidence are consistent or inconsistent with the expert's conclusions regarding the spread of the fire from the first ignited fuel to additional fuel packages and through the structure.

Some general questions that may be of interest include the following:

Q: How do fire investigators determine the spread of fire within a structure after its ignition?

Q: What is the predominant factor or mechanism that affects the spread of combustion products within a compartment?

Q: Are there any other factors or mechanisms?

Q: Did you make a determination as to the subsequent development of the fire and its progression through the involved structure?

Q: What did you base this determination on?

Q: How did you determine the spread of this fire in the involved structure?

Q: How did you determine the development of this fire in the involved structure?

Q: After ignition, what type of combustion occurred in this fire?

Q: From your point of origin, how did this fire spread through the involved structure?

Q: What specific fire patterns did you utilize to determine the spread of this fire through the involved structure?

Q: Did you rely on any physical evidence in determining the spread of this fire through the involved structure?

Q: Did you rely on any witness statements in determining the spread of this fire?

Q: Did you rely on any other information in determining the spread of this fire?

Q: Did anyone assist you in determining the spread of this fire?

Q: Did you determine what fuel package was next ignited by or after the initially ignited fuel? What was it?

Q: Did you collect samples of those materials? Did you conduct (or have you conducted) any tests of those materials?

Q: Did you determine the fuel characteristics of that next ignited material? Did you determine the ignition temperature of that next ignited fuel? How?

Q: Did you calculate whether the heat flux from the first ignited fuel was sufficient to ignite that next fuel package? Did you document that calculation? Where?

Q: Did you document the sequence of suppression activities utilized in fighting this fire? Where?

Q: If so: Please describe for us what impact [*pick a significant suppression activity (e.g., ventilation of the roof or attacking the fire only from one particular exposure)*] had on the development and spread of this fire.

Q: If not: Did you take into account the impact of suppression activities on the spread of this fire? How? Please describe what suppression activities had what effect on the development and spread of this fire. Then, more specifically, please describe for us what impact [*pick a significant suppression activity (e.g., ventilation of the roof or forcing open a window or door)*] had on the

development and spread of this fire.

Q: Did you conduct any tests to determine whether the impact you have described to that event was correct?

Q: Did you document the sequence of ventilation of the structure? Where?

Q: Did you take into account the impact of ventilation on the fire patterns and other evidence you relied on in reaching your conclusions? How [*in detail*]?

Q: If so: Please describe for us what impact [*pick a significant ventilation event (e.g., ventilation of the roof or forcing open a window or door)*] had on the development and spread of this fire.

Q: If no documentation regarding this: Did you take into account the impact of ventilation on the spread of this fire? How? Please describe what suppression activities had what effect on the development and spread of this fire. Then, more specifically, please describe for us what impact [*pick a significant suppression activity (e.g., ventilation of the roof or forcing open a window or door)*] had on the development and spread of this fire.

Q: Did you conduct any tests to determine whether the impact you have described to that event was correct?

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§12.89 e. Reconciliation With Other Evidence and Alternatives

Counsel generally will want to explore in detail how the expert's conclusions reconcile or conflict with all the other available evidence, and compare that same evidence with various alternative hypotheses regarding the origin, cause, and spread of the fire. Some general questions that may be of interest include the following:

Q: Are the observations of witnesses and other evidence gathered consistent or inconsistent with your conclusions? What did you do to resolve any inconsistencies between that evidence and your conclusions?

Q: Has the method, theory, or technique relied on to reach a determination of origin or cause been tested to determine its reliability?

Q: Has the method, theory, or technique relied on to reach a determination of origin or cause been subjected to peer review and publication to determine its reliability?

Q: Does the method, theory, or technique relied on to reach a determination of origin or cause have a known or potential error rate?

Q: Are there any generally accepted controlling standards that apply to the method, theory, or technique relied on to reach a determination of origin or cause?

Q: Is the method, theory, or technique relied on to reach a determination of origin or cause itself generally accepted by the fire investigation community? How do you know that?

Q: Can you identify any published authoritative treatise or research that confirms your assertion that this method, theory, or technique has, in fact, been generally accepted by the fire investigation community?

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13

Use of Forensic Accounting to Identify Evidence of Crime

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I. FORENSIC ACCOUNTANT'S ROLE AND INVESTIGATION PROCEDURES

§13.1 A. Forensic Accounting Defined

Forensic accounting is the integration of auditing, accounting, and investigative skills in investigations into financial or economic matters. Zysman, *Forensic Accounting Litigation Support (Forensic Accounting Demystified)* (updated 2006), available online at http://www.forensicaccounting.com. According to the American Institute of Certified Public Accountants (AICPA):

Forensic accounting services generally involve the application of specialized knowledge and investigative skills possessed by CPAs to collect, analyze, and evaluate evidential matter, and to interpret and communicate findings in court rooms, board rooms, and other legal or administrative venues.

AICPA *The Practicing CPA—The Evolution of the CFF Credential* (July/August 2009), available online at http://pcps.aicpa.org/NR/rdonlyres/32257943-C792-45C2-A87C-A5FCC7779C87/0/pcpa_jul_aug2009_4pp.pdf.

Unlike the periodic financial statement audits that are performed for public and some private companies, forensic accounting is not intended to provide an opinion on the fairness of a company's presentation of its financial statements taken as a whole. Rather, just as forensic scientists examine and interpret scientific evidence and offer expert opinions regarding their findings in courts of law, forensic accountants prepare accounting analyses that can be used to resolve specific issues in legal proceedings. Forensic accountants use accounting, auditing, and investigative skills to understand the nature of the financial transactions and how they are reflected within (or hidden from) financial records. They then summarize voluminous accounting records and detail and communicate this financial information clearly and concisely during the course of the investigation or when testifying in a court of law.

Forensic accounting is important in both civil and criminal cases that involve accounting, auditing, financial, economic, and fraud issues. In the civil arena, forensic accountants are frequently involved in helping counsel with complicated financial and accounting issues. For example, forensic accountants can be involved in evaluating claims in shareholder disputes relating to misstatements in financial reporting, or evaluating claims relating to accounting treatments in the acquired entity's books and records in a postmerger or acquisition dispute. Forensic accountants may become involved in criminal cases because their investigative and analytic skills make them qualified to evaluate whether inappropriate financial activity is taking place in a business and, if it is, to document what was done, when it was done, how it was done, who did it, and why it was done. A forensic accountant's investigation may provide the information necessary for counsel to bring criminal charges in cases involving complex fraud.

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§13.2 B. Forensic Accountant's Role in Criminal Prosecution

Forensic accountants may, and often do, play vital roles in criminal cases involving complex financial transactions. In a financial fraud case, forensic accountants are typically involved in the investigation long before any charges are even filed. Indeed, in many cases, a forensic accountant's investigation provides the evidence necessary to prove (or disprove) the existence of a fraudulent scheme and to identify individuals responsible for the activity. Once a case has been filed, forensic accountants may testify as experts in complicated fraud schemes as well as other cases in which financial issues are important. They may also serve as consultants throughout the preparation and trial of the case, helping the prosecution or defense understand the financial issues as well as organize and present the evidence in the most persuasive way. For example, in a prosecution of an employee for theft, an accountant who conducted an audit of the records for the business was permitted to remain in court during the testimony of other witnesses despite the defendant's motion to exclude witnesses from the proceedings. *People v Persky* (1959) 167 CA2d 134, 139, 334 P2d 219. In upholding the trial court's ruling, the reviewing court found it understandable that the district attorney would need an accountant at his side to advise him on the accounting aspects of the case. 167 CA2d at 139.

PRACTICE TIP: When proof of the defendant's involvement in a complex financial crime is at issue, counsel should have the advice of a forensic accountant from the outset of the case if it is financially feasible.

Victims in financial fraud cases are often business entities with the resources and interests to hire their own forensic accountants to conduct internal investigations or to pursue civil suits against the alleged perpetrators. See, *e.g., Hambarian v Superior Court* (2002) 27 C4th 826, 118 CR2d 725. A cooperative victim may offer helpful information from its own investigation. See *Hambarian v Superior Court, supra*. The prosecution's use of an expert that continues to be compensated by the victim, however, may raise potential conflict-of-interest issues. Compare *Hambarian v Superior Court, supra* (district attorney's use of forensic accountant paid for and jointly retained by victim; city government did not require district attorney's recusal), with *People v Eubanks* (1996) 14 C4th 580, 59 CR2d 200 (recusal appropriate when district attorney asked corporate victim to pay for expenses already incurred by district attorney's computer specialists).

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C. Forensic Accounting Investigation Procedures

§13.3 1. Determining Scope of Investigation

When commencing an investigation, a forensic accountant's first step is to determine the preliminary scope of the investigation based on the nature of the allegations. For example, an investigation in which there is an identified suspect will likely be narrower than one in which the available information indicates that several people had the access necessary to have carried out the suspect transaction or transactions. In a situation in which a business suspects that illicit financial activity has occurred, a forensic accountant might be asked to do one or more of the following:

- Demonstrate the loss;
- Identify missing or stolen assets;
- Identify individuals who could have taken the assets;
- Document ways the theft could have occurred;
- Document the manner in which the loss occurred;
- Identify methods the suspect could have used to conceal the fraud; and
- Identify methods the suspect could have used to convert the stolen assets to cash or personal use.

When asked to investigate an allegation of employee theft or fraud, the forensic accountant typically begins by focusing on the suspect's range of control or access and the manner in which the fraud or other irregularity manifested itself. This can be referred to as identifying the "sphere of influence."

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§13.4 2. Collecting Evidence

After the forensic accountant has identified the records that appear to be necessary to perform the investigation, the next step is to gather accounting, financial, operational, transactional, and business records as well as other documentary evidence that may help answer the questions posed in the investigation.

Accounting and other financial records are usually central to the forensic accountant's work, but forensic accountants often use other records in their investigation. For example, personnel files might provide evidence about a suspected employee's financial difficulties, prior allegations of wrongdoing, or negative attitudes toward the employer, and public records might provide relevant evidence about the suspect's lifestyle and spending habits.

This process inevitably involves reviewing electronic data stored on servers, personal computers of employees, and other hardware. Electronic data include not just accounting and financial information but also e-mails, supporting memorandums, and spreadsheets as well as contemporaneous communications and analyses that were performed by company personnel. During the electronic data collection process, the forensic accountant may be responsible for maintaining and recording the chain of custody to prevent claims of evidence tampering. Likewise, for hard copy document collection, original documents should be collected and copies should be made for the purpose of analysis. The ancillary information obtained through electronic and hard copy document collection can be important because it often sheds light on the financial or accounting issues that are being investigated.

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§13.5 3. Evaluating Evidence

Once the forensic accountant has assembled the information preliminarily identified as relevant, he or she analyzes the collected documents to determine whether they provide sufficient information to evaluate the allegations effectively. If documents that the forensic accountant expected to obtain are missing, it may be necessary to determine whether there is evidence of intentional or unusual document destruction outside the ordinary course of business or whether the business's document retention period has simply expired.

If the documents from a particular source are inadequate, the forensic accountant may need to explore other sources. For example, financial institutions provide customers with monthly statements of activity. These statements, plus the underlying documentation regarding cash or other transactions, may be useful when company accounting records are insufficient. For information on third party records, see §13.16.

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§13.6 4. Analyzing Financial Records

A forensic accountant may analyze a company's accounting, financial, and operational systems in a number of different ways, depending on what information is sought. For example, it is often important to trace the sources and uses of cash. This process involves analyzing bank statements, bank account activity, and the underlying documentation regarding the funds (*e.g.,* deposits, checks, wired funds, and transfers) to determine where the cash came from and where it went. In some matters, this process is critical to demonstrating the existence of the scheme itself. In other matters, it can be used to quantify a suspect's pattern of expenditures to ascertain whether there are unidentified sources of "income" or cash that may constitute illicit funds. This can be particularly useful when the analysis shows that an increase in a suspect's expenditures coincides with the alleged wrongdoing.

Forensic accountants may also use a company's accounting, financial, and operational data to identify trends that may represent evidence of wrongdoing. For example, analyzing sales and pricing trends (volume and amounts) may help determine whether certain vendors or customers are receiving special prices. Investigating and studying the trends of "credit memos" (volume, amounts, and dates of credits that reduce the invoices to customers and, thus, the accounts receivable) for accounts receivable may indicate potential misappropriation of receipts of cash. Evaluating trends in inventory reports (volume, amounts, and product number or dates of the receipt of inventory) may reveal potential misappropriation of inventory.

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§13.7 5. Conducting Interviews

As part of the information gathering and analysis process, forensic accountants often interview employees of the company being investigated. These interviews may shed further light on the documents already gathered to enable the forensic accountant to seek further documentation or perform additional analyses to support the findings of the investigation.

Generally, the initial interviews are with nonsuspect individuals to gather information, confirm evidence, and verify the evidence trail to the suspects. As the investigation progresses, the forensic accountant will interview individuals closer to the suspects. These individuals may include current and former employees as well as third parties such as bankers, vendors, or customers. Depending on scheduling issues and the availability of employees, the forensic accountant typically will interview suspects last, after the collection and analyses of hard copy and electronic documents.

PRACTICE TIP: Attorneys representing corporations should clarify the scope of their representation prior to engaging in substantive discussions with corporate employees. Specifically, the attorney should give a "corporate *Miranda*" warning informing the employee that the attorney does not represent him/her, that the employee's statements may be protected by the corporation's attorney-client privilege but is subject to waiver by the corporation in its sole discretion, and that the employee may wish to consult his or her own attorney with any concerns about personal legal exposure. See *U.S. v Ruehle* (9th Cir 2009) 583 F3d 600, 604 n3 (citing *Upjohn Co. v United States* (1981) 449 US 383, 66 L Ed 2d 584, 101 S Ct 677). Attorneys that seek to represent both the corporation and individual targets or defendants jointly should be aware of potential conflicts that may arise (such as disagreements over the disclosure of privileged information, *see Ruehle*, 583 F3d at 607) and, where possible, address them in retention agreements at the outset of the representation.

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§13.8 D. Types of Evidence Used by Forensic Accountants

The evidence that forensic accountants collect includes documents from the investigated company, suspects, and third parties. The investigated company's financial and accounting records are of primary importance in any accounting investigation, but other types of documents and information, including the company's internal memorandums, employee e-mails, and documents from third parties, that relate to the subject matter under investigation can also be useful.

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1. Financial and Accounting Records

§13.9 a. General Ledgers

The general ledger is the core financial record of a business. Operational and financial transactions of the business are recorded in the general ledger to accounts under the categories of assets, liabilities, equity, revenues, and expenses. Usually transactions recorded in the general ledger are derived from subsidiary ledgers for certain accounts. As discussed in §13.11, examples of typical subsidiary accounts include accounts receivable, accounts payable, and inventory. For any accounting period, the general ledger reflects the beginning balance of each account, the transactions posted to that account, and the ending balance of the account.

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§13.10 b. Trial Balance

The trial balance is a summary form of the general ledger and presents the ending balance of the accounts in the general ledger (*e.g.,* assets, liability, stockholders equity, revenue, and expense accounts). The trial balance should reconcile with the general ledger and form the bridge between the general ledger and the financial statements.

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§13.11 c. Subsidiary Ledgers

Many businesses have subsidiary ledgers for significant accounts, such as accounts receivable, accounts payable, or inventory transactions. The ledgers for each account will record details about individual transactions not reflected in the general ledger. For example, the accounts receivable ledger may reflect sales invoices, date and dollar amount information, payments, credit and debit memos by customer, and aging information. Another example is the accounts payable ledger, which may reflect information by vendor such as the invoice receipt date, payment date, amount, and other relevant information by vendor. A third example is the inventory ledger, which may reflect individual part numbers, purchase prices, last price paid, date of purchase, where the part is located, and whether it is in raw materials, works in progress, or finished goods. The subsidiary ledgers should agree with the general ledger, and any reconciling differences should be well documented and supported.

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§13.12 d. Journal Entries

The standard way to record entries in the general ledger or subsidiary ledgers is through direct posting of the transaction into the accounting system through automatic journal entries that are systematically generated by the company's accounting software. Another way is to record the transaction manually in a journal entry. Manual journal entries can be used to correct errors in previous entries and are often made to record adjustments that are necessary to close the books for an accounting period. For example, interest earned but not received during an accounting period, or an obligation accrued but not yet paid, might be recorded in a journal entry.

Journal entries can also be used to distort the accounting system, for example, by recording a transaction that does not exist or reversing something that a suspect wants to hide (*e.g.,* the theft of inventory or the theft of a customer's payment against its account receivable). A forensic accountant looks for journal entries that are recorded out of sequence, voided, or reflect abnormal items, particularly at the end of an accounting period. For further information about accounting records, see Kieso, Weygandt & Warfield, Intermediate Accounting (13th ed 2010).

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§13.13 e. Source Documents

Invoices, purchase orders, bank statements, contracts or agreements, shipping documentation, inventory receiving reports, canceled or original checks, checkbooks or records, approval documentation, and other supporting information underlying business transactions can be relevant in a forensic accountant's investigation.

These source documents may provide evidence of misappropriation of funds or inappropriate financial or accounting activity that is not initially apparent. Source documents may contain unusual items such as previously unidentified handwriting, second endorsements on checks, stale items on bank reconciliations, or other information that does not make sense.

Prenumbering transaction documents allows companies to track documents. When documents are numbered in sequential order, a company is able to identify approximately the date of use. When a company assigns document numbers to individuals, the sequence identifies who may have used the document. Suspects may have used a document or its number to transact an impropriety and then subsequently marked it void to hide its actual use. On later examination of the document, there may be no evidence that it was ever used for unauthorized purposes other than information provided from the sequence numbers.

Be aware that individuals can use a duplicate of a document to perpetrate a fraud. For example, if vendor invoices are not stamped "paid" when they are paid, an employee could resubmit them for payment, redirect the payment by modifying the mailing address, and cash the check for the duplicate payment. These schemes may be detected by running queries of the detailed vendor invoices looking for duplicative information (*e.g.,* dates, amounts, and invoice numbers) or by comparing vendor information to employee data such as employee names, addresses, or phone numbers in the payment fields for a vendor.

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§13.14 2. Internal Memorandums

A company's internal memorandums may document company policies, procedure, or practices. These memorandums can be useful in comparing what actually occurred to what should have occurred. They may provide supporting evidence that the acts or transactions under investigation violated company policies.

In addition, internal memorandums may contain personal or company strategies; complaints regarding employee, customer, or vendor behavior; or decisions as to why a certain vendor was selected during the bidding process, all of which may constitute potentially incriminating evidence.

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§13.15 3. E-mail Messages

E-mails can be the most illuminating evidence that the forensic accountant obtains. For example, e-mails may discuss details of a potential fraudulent scheme or transaction that may provide useful information for the forensic accountant, including information concerning other individuals involved in the scheme. Typically, the forensic accountant will run a list of keyword search terms against electronic data, including e-mail, to identify e-mails of potential interest. Moreover, e-mails can be tracked by the strings and threads they contain, allowing the forensic accountant to find all relevant e-mails as well as their senders and recipients. In addition to e-mails, other useful, relevant electronic information can be obtained from sources such as flash drives, instant message tools, and personal data assistants.

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§13.16 4. Third Party Records

Banks send monthly statements to their customers. A forensic accountant can use these statements to document historic financial transactions and compare this information to the company or employee records to detect modifications or anomalies. Records maintained by the company's customers or vendors can also supplement company records or provide a source of copies for missing or destroyed documents.

However, access to third party records will depend on the nature of the investigation, the rules and procedures surrounding discovery, and the willingness of third parties to cooperate in providing such documents. On obtaining documents, see §§13.28-13.29.

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§13.17 II. REPRESENTATIVE CRIMINAL CASES IN WHICH FORENSIC ACCOUNTANT USED

There are several types of criminal investigations or cases in which a forensic accountant can be useful. These include, but are not limited to, crimes involving bribery and corruption (Pen C §§92-100), money laundering (Pen C §186.10), larceny or theft (Pen C §§484-502.9), and embezzlement (Pen C §§503-515). The following sections provide a few examples of such matters, the role that the forensic accountant can play, and the evidentiary documents considered. See §§13.18-13.27.

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§13.18 A. Asset Misappropriation

Asset misappropriation is the theft or misuse of an organization's assets. Generally, forensic accounting investigations in this area involve funds tracing, asset identification, and recovery. These investigations involve determining the existence, nature, and extent of wrongdoing, and they may also include identifying a suspect. They often entail interviews of personnel who had access to the funds or assets and a detailed review of the accounting or business books and records, including but not limited to electronic information such as e-mails or the transactional evidence within the accounting or operational computer systems. The following sections discuss the role of the forensic accountant in investigating several different types of asset misappropriation involving both cash and noncash assets. See §§13.19-13.25.

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§13.19 1. Noncash Misappropriations: Inventory Theft

One common type of noncash misappropriation is the theft of a company's inventory, including finished goods, raw materials, and works in progress. Many inventory frauds start with employees either legitimately or illegitimately borrowing assets. Then, when the asset is not missed, the employee believes he or she will not be caught, and the borrowing escalates into intentional theft. Inventory fraud can also involve the fraudulent purchase of excess property, which the suspect then converts for his or her own benefit. Most inventory thefts are committed by people with access to the assets or to the relevant inventory accounting records—typically, inventory, shipping, receiving, and delivery personnel.

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§13.20 a. Evidence That May Be Relevant

Investigating an inventory misappropriation scheme may require the forensic accountant to consider information in the company's general ledgers, subsidiary inventory ledgers, and inventory reports. The forensic accountant may also wish to obtain the underlying journal entries and supporting documentation (*e.g.,* purchase records from vendors, receiving reports from the receiving department, shipping documents, and sales transactions records).

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§13.21 b. Evaluation of the Evidence

The inventory reports and ledgers may contain information about the beginning and ending balances of raw materials, works in progress, and completed inventory. The ledgers may reveal the existence of inventory transfers among related entities or parties and provide significant information about the value of those transfers. Comparing historical data with current inventory or financial reports may reveal a change in the gross margins or profitability.

A common inventory misappropriation scheme involves selling off inventory cheaply to third parties who are looking for a quick, highly profitable resale opportunity. The forensic accountant might look for evidence of such a scheme by examining scrap material reports or reports of obsolete or excess inventory for indications that inventory with obvious resale value has been written off as excessive or obsolete.

Once the scheme has been identified, the forensic accountant may use the company's payroll records to ascertain the suspect's income and compare this with the suspect's expenditures, as shown by his or her bank records. A potential indicator of a misappropriation scheme is the existence of "ill-gotten" gains, as shown by evidence that an individual's net worth exceeds the known legitimate sources of income.

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§13.22 2. Asset Misappropriation

The Association of Certified Fraud Examiners (ACFE) divides asset misappropriation into three categories: 1) schemes involving the theft of cash receipts such as skimming (when an employee steals money before it has been recorded in the company's books) or cash larceny (when an employee steals money after it has been recorded in the company's books); 2) schemes involving fraudulent disbursements such as payroll fraud or expense reimbursement fraud; and 3) other asset misappropriation schemes such as non-cash misappropriation (when an employee steals inventory from a warehouse or storeroom). See Association of Certified Fraud Examiners, *Report to the Nation on Occupational Fraud & Abuse* (2010), available online at http://www.acfe.com/rttn/rttn-2010.pdf.

This chapter discusses fraudulent disbursement schemes, which can take a number of forms. Three common types of schemes (payroll fraud, expense reimbursement fraud, and purchasing and vendor fraud) are discussed in §§13.23-13.25.

NOTE: The Association of Certified Fraud Examiners, *Report to the Nation on Occupational Fraud & Abuse* study is conducted every 2 years.

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§13.23 a. Payroll Fraud

Employees can use their company's payroll system to perpetrate fraud, which causes the company to pay out more in salary, commissions, or benefits than appropriate. A 2010 study of 1,843 fraud cases showed that 157 cases or 8.5 percent of the fraud cases were fraudulent payroll disbursements, with a median loss of $72,000 per company in the study. The study was based on information gathered from 1,843 cases of occupational fraud that were investigated between January 2008 and December 2009. All information was provided by the Certified Fraud Examiners who investigated those cases. See Association of Certified Fraud Examiners, *Report to the Nation on Occupational Fraud and Abuse* (2010), available online at http://www.acfe.com/rttn/rttn-2010.pdf.

Payroll fraud can occur in the following ways:

- Setting up a fictitious employee (sometimes called a "ghost" employee) and submitting false timecards, then cashing the payroll check or direct depositing the funds;
- Fraudulently submitting false timecards for a real employee or terminated employee;
- Fraudulently increasing the employee's pay rate or salary; or
- Overstating commissions by creating fictitious sales, altering sales prices or quantities on sales documents, or claiming the sales of other employees.

In payroll fraud schemes, a forensic accountant may focus on the accounting records related to the payroll accounting system, the timecards or personnel forms, the payroll bank account, canceled checks, or direct-deposit information. To examine potentially overstated commissions, the forensic accountant may analyze the sales data, including invoices, accounts receivable, and customer payment information as well as commission documentation, including the commission plan. The forensic accountant may compare the list of employees with the payroll listing, focusing on "employees" who do not elect insurance or other payroll withholdings. This may be indicative of a "ghost" employee, where there is no need for such deductions.

The forensic accountant may detect unusual patterns by comparing (1) the historic salaries as reflected in the income statement or payroll records with the number of employees; (2) the historic commissions and commission percentages as reflected in the income statements, sales records, or commission reports with the sales figures in the income statement; or (3) the historic number of sales personnel with the current number. In addition, the forensic accountant often analyzes the payroll processing records for unusual or duplicative employee addresses and Social Security or bank account numbers.

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§13.24 b. Expense Reimbursement Fraud

Expense reimbursement fraud is very common and can be difficult to detect. Losses are usually small, but if the scheme continues undiscovered, it can grow significantly. In the 1,843 cases studied by the Association of Certified Fraud Examiners (ACFE), fraudulent expense reimbursements comprised 278 cases or 15.1 percent of all fraud cases, with a median loss of $33,000 per company in the study. Association of Certified Fraud Examiners, *Report to the Nation on Occupational Fraud & Abuse* (2010), available online at http://www.acfe.com/rttn/rttn-2010.pdf.

The forensic accountant may discover trends within the company's expense reporting system by looking for unusual patterns or increases in expense activity. Expense reimbursement fraud may occur in the following ways:

- Submitting personal expenses for reimbursement as business expenses;
- Overstating the cost of actual business expenses by altering receipts;
- Submitting a receipt for items subsequently returned and not reporting that a refund occurred;
- Submitting an expense item paid for by someone else;
- Creating and submitting a fictitious business expense; or
- Submitting an expense item multiple times.

NOTE: Submission of personal expenses, the most common type of reimbursement fraud, is often perpetrated by high-level employees, owners, and officers.

In today's electronic age, many expense systems are computerized, and the forensic accountant may perform queries to identify unusual expenses, such as duplicative expenses, submitted invoices with duplicative or sequential numbering, or expenses just under approval thresholds. A forensic accountant will also analyze the expense reports and supporting documentation, including original expense statements or invoices from third parties such as credit card or travel companies. The expense documents are then compared with the original third party documents to identify whether there has been document manipulation. Review of the suspect's calendar and travel schedule may also prove useful in evaluating an expenditure's propriety.

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§13.25 c. Purchasing and Vendor Fraud

There are three main forms of purchasing and vendor fraud:

- **Employee responsible for purchasing.** For example, the employee may set up a fictitious vendor and the company will pay fictitious invoices for goods never received.
- **Vendor working in concert with an employee.** For example, the vendor may collude with the employee to ship too many boxes of product and the employee may divert excess boxes to his or her own address.
- **Vendor working alone to defraud the company.** For example, a provider of services may pad the bill with extra hours or expenses.

NOTE: Unless the service provider bills for amounts of time that are suspicious on their face (*e.g.,* 100 hours for a single employee in a week), excess service fraud is much harder to detect than invoice frauds involving physical goods because time is intangible and, therefore, more difficult to trace.

In evaluating the financial records for purchasing frauds, a forensic accountant may review the general ledger expense account detail for unusual items or make queries of the financial accounting system to detect anomalies in the transactions recorded. Another forensic analytic technique is to compare purchases or expenses with sales. If the comparison indicates that purchases and expenses are higher than sales, this may be an indication of excess or fictitious purchases with vendors.

Other financial and business records, such as the contracts, purchase orders, invoices, and confirmation information from the vendor, may also be helpful in investigating purchasing fraud. However, when reviewing documents created by the suspected outside parties, the forensic accountant should maintain a high degree of skepticism. The forensic accountant should seek to understand who created the documents, who had access to the documents, and how the records could have been altered. It is also important for the forensic accountant to determine how these records can be verified by other reliable documents or parties. See Klink, *Using the Law to Fight Fraud—Conducting Kickback Investigations* (paper presented at the 15th Annual Fraud Conference of the Association of Certified Fraud Examiners, Las Vegas, NV, July 2004).

A review of the historic purchases from the suspect vendor as reflected in the accounts payable system (including purchasing volumes, pricing, and discounts) may demonstrate that this vendor has become the "favored" vendor despite the fact that the pricing over time from the suspect vendor is higher than that from competitors. Once such a trend is identified, the forensic accountant will often look at the underlying financial records, proposals, bids, and pricing documentation in addition to the purchase orders and invoices. Information about the financial condition of suspected employees, their family members, and their relationship with the vendor (as well as a review of the expense reports (*e.g.,* for entertainment of the suspect vendor), phone records, and electronic information on the employee's computer) may also be useful in pulling together the relevant facts.

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§13.26 B. Corruption

A common type of criminal fraud involves accepting or making payments to influence corporate decisions. A 2010 study by the Association of Certified Fraud Examiners revealed that corruption was one of the most common fraud schemes, occurring in 27 percent of the 1,843 cases analyzed in the study. See Association of Certified Fraud Examiners, *Report to the Nation on Occupational Fraud & Abuse* (2010), available online at http://www.acfe.com/rttn/rttn-2010.pdf.

Corruption in companies can be particularly prevalent in the purchasing area, with one of the most common schemes involving a purchasing agent accepting kickbacks to favor an outside vendor in buying goods or services. See Klink, *Using the Law to Fight Fraud—Conducting Kickback Investigations* (paper presented at the 15th Annual Fraud Conference of the Association of Certified Fraud Examiners, Las Vegas, NV, July 2004). Kickback payments may be made directly to the employee, or through third parties, in cash or in other property. Kickbacks generally lead to damages resulting from higher prices, low quality product, or unnecessary purchases. Kickbacks can be accomplished in different ways:

- The employee diverts company business to a certain vendor and, in return, the employee receives some type of payment, either money, gifts, travel, or entertainment (usually lavish);
- The employee diverts the business while accepting payments made to an entity that he or she has established to receive and conceal the fraud; or
- The employee colludes with a vendor to overbill the company or to provide inferior quality goods for full price, while the employee and his or her collaborators pocket the difference.

Generally, funds used for an illicit payment are not reflected on the company's books and records, which makes it difficult to identify and analyze these transactions. If the vendor's records are available (*e.g.,* a provision in the purchasing agreement may give the buyer access to the vendor's records pertaining to the contract, or access may otherwise be compelled), then the forensic accountant should obtain and review the vendor's records pertaining to contracts, purchase orders, invoices, and confirmation information and should compare this information to the company's copies of such records. The forensic accountant should perform this analysis with skepticism and should be made to corroborate the records with more reliable third party documentation.

Reviewing pertinent financial and business records of the company purchasing the goods may also yield clues. Signs of corruption in the purchasing area may include evidence of favoritism toward one vendor, often to the exclusion of other qualified suppliers; evidence that goods bought from the suspect vendor were purchased at higher-than-market prices; and evidence that the company's suspected employee maintains a lavish lifestyle. See Wells, *Occupational Fraud: The Audit as Deterrent,* J of Accountancy (April 2002), available online at http://www.acfe.com/fraud/view.asp?ArticleID=26.

As in a purchase fraud investigation (see §13.25), the forensic accountant will evaluate the historic purchases from the suspect vendor (including purchasing volumes, pricing, and discounts), looking for trends that might show favoritism toward the vendor that do not appear to be justified by the needs of the business. After identifying these trends, the forensic accountant will look at the underlying records to evaluate the business relationship with the vendor. Information regarding the financial condition of the suspect, the vendor, and their relationship with one another will also be useful, as will an analysis showing any changes in the employee's personal assets and financial resources.

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§13.27 C. Ponzi Schemes

A Ponzi scheme involves a business taking money from later investors to pay off former investors, rather than the business itself generating income. New investors are attracted to the scheme by the high or "guaranteed" rates of return. This type of scheme will inevitably collapse as investors demand repayments in excess of the funds available, because the pool of funds is only growing by the amount of new investors' money, as there is no other source of income. This type of fraud, was named for a famous fraudster known as Charles Ponzi.

In 1920, Ponzi told investors that he could turn a profit by buying International Postal Reply Coupons (IPRCs), which in turn could be redeemed for stamps in other countries. For example, he claimed that by purchasing the IPRCs in a weak-currency country and then redeeming them at a higher price in the United States, he could make a profit because of the currency exchange benefit. He solicited money from investors by promising that they would realize a 50-percent return from their investment within 45 days, when normal interest rates were just 5 percent. He increased the frenzy by giving some early investors the 50-percent returns promised, using the money of new investors to pay them off. He assured new investors that they would receive even higher returns of, eventually, up to 100 percent. Within a year, Ponzi had taken in 10 million dollars from investors. Rowe, *Ponzi Schemes,* Utah State University Extension's Financial Fitness Fact Sheet (Feb. 2000), available online at http://extension.usu.edu/bankruptcy/files/uploads/fl-ff05.pdf. See also *Cunningham v Brown* (1924) 265 US 1, 68 L Ed 873, 44 S Ct 424. A Boston newspaper published "a series of articles exposing the facts and pointing out the simple impossibility of Ponzi's enterprise." Massachusetts Foundation for the Humanities, *Mass Moments: Ponzi Scheme Begins to Unravel* (July 24, 1920), available online at http://www.massmoments.org/moment.cfm?mid=215. Since that time, the term "Ponzi scheme" has been used to refer to "any operation that pays off old investors with money from new investors." Rowe, *Ponzi Schemes*. See also *People v Smith* (2009) 179 CA4th 986, 994, 102 CR3d 177 (describing Ponzi scheme).

The Securities and Exchange Commission (SEC) has investigated numerous alleged Ponzi schemes and multiple Ponzi scheme complaints have been filed over the last few years. For example, in December 2008, the SEC filed a complaint against Bernard L. Madoff alleging that he had admitted to one or more employees that he had been operating an estimated $50 billion Ponzi scheme through his asset management company, charges to which he has since pleaded guilty. See SEC complaint available online at http://www.sec.gov/litigation/complaints/2008/comp-madoff121108.pdf.

In investigating Ponzi schemes, the goal of the forensic accountant is to evaluate whether the business operates with legitimate income (sales or revenue) and business expenses. In a Ponzi scheme, the only principal "income" source is new investment funds, while the repayment of investment funds comes out of capital rather than investment gains. Additionally, expenses may include lavish lifestyle expenditures by the perpetrators. The forensic accountant collects financial data, including information relating to the cash flows, that aid in evaluating the financial condition and operation of the business.

The forensic accountant may gather bank records, including bank statements and underlying deposit and withdrawal information, to analyze the cash receipts coming into—and the cash disbursements going out of—the account. These documents will be classified as to their nature (*e.g.,* operational versus investment), and analyzed for their appropriateness. The forensic accountant assembles the underlying accounting records, such as the general ledger that the company has maintained, to analyze how the transactions were recorded in the financial statements. The forensic accountant may also collect the investment solicitation materials to determine what the disclosed uses and sources of funds were and then compare those with the bank records and with the company's accounting records. The forensic accountant will then need to evaluate discrepancies between the disclosed uses and sources of funds and the actual uses and sources. The forensic accountant may also be involved in assisting with the asset tracing and valuation of any remaining assets of the scheme.

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III. DISCOVERY

§13.28 A. Voluntary Production of Documents in Certain Cases

When a corporation engages the services of a forensic accountant, the corporation's officers or its board of directors will likely give the forensic accountant access to the accounting records necessary to begin the investigation. A corporation or individual seeking to cooperate with a government investigation may also voluntarily produce data. However, when consent is not forthcoming or when an investigation requires access to third party records or a suspect's private records, counsel in criminal investigations and prosecutions will need to issue formal discovery requests (or in the case of law enforcement searches, seek a warrant) to obtain necessary documents.

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§13.29 B. Use of Formal Discovery Methods

When litigation is pending, accounting records can usually be obtained through discovery. In criminal cases, accounting records in the possession of a party may be subject to discovery under Pen C §1054.1 (discovery by defense) or §1054.3 (discovery by prosecution). A subpoena duces tecum may be used to obtain records from a nonparty. See Pen C §§1326-1327. For discussion of discovery in criminal cases, see California Criminal Law Procedure and Practice, chap 11 (Cal CEB Annual).

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§13.30 C. Types of Records to Discover

The types of accounting records that may be relevant to a particular case will depend on the types of transactions and particular facts at issue. Common types of records to consider include general business records, financial and accounting records, records reflecting assets, records reflecting liabilities, records reflecting revenues, and records reflecting costs and expenses. Obtaining electronic versions of these financial records is often more helpful than the hard copy documents for the purpose of performing data analytics. See §§13.31-13.36.

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§13.31 1. General Business Records

General business records may consist of the following:

- Internal management and consultant reports, studies, prospectuses, correspondence, and presentation outlines of business; marketing, planning, and budgeting reports for the subject products;
- Reports, reviews, valuations, appraisals, and audits by outside accountants, appraisers, and consultants, including all supporting workpapers, calculations, notes, reference documents, management letters, and other related correspondence;
- All industry data from other sources (*e.g.*, trade associations, periodicals, and magazines) related to the subject industry;
- Corporate minutes book or board of directors meeting minutes; and
- Corporate organization chart.

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§13.32 2. Financial and Accounting Records

Financial and accounting records may consist of the following:

- Consolidated and unconsolidated balance sheets for the entire company or, if generated, for the division at issue, including all annual and quarterly notes to the financial statements;
- Consolidated and unconsolidated income statements for the entire company or, if generated, for divisions at issue, including all annual and quarterly notes to the financial statements;
- All 10-K (annual business and financial report filed by public companies with SEC) and 10-Q (quarterly report similar to 10-K) reports of the company;
- Detailed general ledgers, for all periods;
- Consolidated and unconsolidated trial balances for relevant periods, including all adjustments, reconciliations, eliminations, and other calculations; and
- Ledgers, journals, journal entries, vouchers, files, correspondence, memorandums, and other records indicating the dates, amounts, and nature of the intercompany transfers and transactions between and among the company and any of its subsidiaries, divisions, investments, or related entities.

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§13.33 3. Records Reflecting Assets

Records reflecting assets may consist of the following:

- Accounts receivable listings, journals, and aging schedules indicating customer name, description of receivable amounts, and the dates that the amounts were incurred and due, including all calculations and adjustments for bad debts for sales;
- Bank statement details and supporting documents (deposits and withdrawals, including checks and wire transfers); and
- Inventory listings and journals, including a breakdown by inventory classifications (work in progress (WIP), raw materials, and finished goods).

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§13.34 4. Records Reflecting Liabilities

Records reflecting liabilities may consist of the following:

- Accounts payable listings, journals, and aged schedules indicating vendor name, description of payable amounts, and the dates that the amounts were incurred and due; and
- All contracts, agreements, or purchase orders for relevant transactions.

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§13.35 5. Records Reflecting Revenues

Records reflecting revenues may consist of the following:

- Sales reports, summaries, and analyses by type, product or service, customer, period, and locations;
- Sales journals, transaction or invoice registers, and sales invoices indicating, for each sale, product or services sold, unit quantities, unit prices, date of sale, and any credit terms, discounts, or other adjustments made;
- Sales and service orders, contracts, and agreements indicating customer, product or service to be supplied, delivery or service schedule, period, payment and credit terms, all representations of performance and quality, all correspondence and modification; and
- All revenue projections or forecasts, or budgets with revenue projections.

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§13.36 6. Records Reflecting Costs and Expenses

Records reflecting costs and expenses may consist of the following:

- Analyses, summaries, and descriptions of the individual components of cost of sales and operating;
- Distribution or vendor agreements between the company and its vendors;
- Purchase ledgers, journals, and registers indicating supplier or vendor, nature of purchase, date, and amounts purchased; and
- Purchase contracts and orders, supply agreements, and invoices for all materials, equipment, and other purchases made.

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IV. EVIDENCE ISSUES REGARDING ACCOUNTING RECORDS

§13.37 A. Secondary Evidence Rule

Under the secondary evidence rule, Evid C §1521, a party may prove the content of a writing "by otherwise admissible secondary evidence" unless the court determines that "[a] genuine dispute exists concerning material terms of the writing and justice requires the exclusion" or "[a]dmission of the secondary evidence would be unfair." Evid C §1521(a).

NOTE: In 1998, the secondary evidence rule replaced the so-called "best evidence rule" (former Evid C §§1500-1511). Because the best evidence rule had extensive exceptions, the new rule is "not a major departure from former law, but primarily a matter of clarification and simplification." Comment to Evid C §1521.

NOTE: Under Evid C §1522(a), secondary evidence, other than duplicates and certain specified copies, may be excluded in criminal cases when the proponent of the evidence has custody or control of the original and has not made the original reasonably available for inspection.

Because accounting records are often voluminous, parties dealing with forensic accounting issues should consider what types of summaries can be compiled to present the evidence more effectively. A properly authenticated written summary of accounting records is admissible secondary evidence under Evid C §1521. See *Vanguard Recording Soc'y, Inc. v Fantasy Records, Inc.* (1972) 24 CA3d 410, 418, 100 CR 826 (decided under former best evidence rule). In addition, although oral testimony is ordinarily inadmissible to prove the contents of a writing unless neither the original nor a copy is available, oral testimony can be used to prove the content of an available writing under Evid C §1523(d) when "the writing consists of numerous accounts or other writings that cannot be examined in court without great loss of time, and the evidence sought from them is only the general result of the whole." See Evid C §1523; *Heaps v Heaps* (2004) 124 CA4th 286, 293, 21 CR3d 239 (schedule of assets, which was compilation of documents that could not conveniently be examined individually by court, held admissible under Evid C §1523(d)).

Copies of accounting records may generally be used instead of originals. See, *e.g.*, *People v Vuksanovich* (1982) 136 CA3d 65, 185 CR 842. But see *Ruberto v Commission of Internal Revenue* (2d Cir 1985) 774 F2d 61, 64 (cited in Comment to Evid C §1521) (photocopies of canceled checks properly excluded given problems in matching backs of checks with fronts). The secondary evidence rule does not eliminate the need for authentication. Evid C §1521(c). For discussion, see §13.38.

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§13.38 B. Authentication

Before a writing, or secondary evidence of writing, is admissible, the proponent must offer evidence of its authenticity, *i.e.,* evidence that the offered writing is what the proponent claims it to be. See Evid C §§1400-1401. A proponent can authenticate a writing in many ways. See Evid C §§1410-1421; Jefferson's California Evidence Benchbook, chap 31 (4th ed CJA-CEB 2009). Testimony by an individual with firsthand knowledge of the records or of the business's practices in keeping the records is usually sufficient for accounting records. See, *e.g., People v Stewart* (1931) 115 CA 681, 692, 2 P2d 195 (comptroller of bank, who was in charge of bank's records and supervised persons who made records, could authenticate accounts). But see *People v Doble* (1928) 203 C 510, 265 P 184 (summary of financial transactions inadmissible when authenticating testimony showed gaps in firsthand knowledge during relevant period).

PRACTICE TIP: Typically, the employee responsible for entering the data into the records, or the supervisor of that employee, may authenticate accounting records.

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§13.39 C. Hearsay

Accounting records are frequently admitted under the business records exception to the hearsay rule. Evid C §§1270-1272. See *People v Clancy* (1960) 184 CA2d 403, 405, 7 CR 532 (records admitted on testimony of bookkeeper that he made entries as to amount paid and by whom at direction of defendant, and there was no issue as to accuracy of entries); *U.S. v Catabran* (9th Cir 1988) 836 F2d 453, 456.

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V. ADMITTING ACCOUNTING EXPERT TESTIMONY

§13.40 A. Expert Accounting Testimony Routinely Admitted

The use of accounting experts in court cases dates back at least as far as a Scottish bankruptcy case in 1817, and today is fairly common in white collar criminal matters. Crumbley, *Forensic Accounting*: *Older Than You Think,* 2 J Forensic Acct 181 (Dec. 2001).

In California, Evid C §§720 (qualifications of expert witness) and 801 (opinion testimony by expert) govern the admissibility of opinion testimony by forensic accountants. The heightened reliability standards applicable to new scientific techniques under *People v Kelly* (1976) 17 C3d 24, 130 CR 144, and *People v Leahy* (1994) 8 C4th 587, 34 CR2d 663, do not appear to apply to expert accountant testimony. See, *e.g., People v McDonald* (1984) 37 C3d 351, 372, 208 CR 236, overruled on other grounds in *People v Mendoza* (2000) 23 C4th 896, 914, 98 CR2d 431 (distinguishing between expert testimony, which generally is not subject to *Kelly* rule, unless based on new scientific techniques, and scientific evidence, which is). For detailed discussion of *Kelly,* see chap 2. Thus, courts routinely admit expert testimony on accounting issues in criminal prosecutions involving financial matters. See, *e.g., People v Hagen* (1998) 19 C4th 652, 657, 80 CR2d 24; *People v Weitz* (1954) 42 C2d 338, 345, 267 P2d 295; *People v Honig* (1996) 48 CA4th 289, 345 n25, 55 CR2d 555; *People v Coke* (1964) 230 CA2d 22, 40 CR 649.

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§13.41 B. Selecting a Forensic Accounting Expert

Many prosecuting agencies now have their own in-house accounting experts. For other counsel, many accounting firms offer well-supported forensic investigative services. There are also many consulting firms that specialize in forensic accounting services. In selecting an expert, however, counsel should consider the credentials of the individual forensic accountant. Several professional organizations for accountants and forensic accountants (*e.g.,* the Association of Certified Fraud Examiners (ACFE), the Institute of Internal Auditors (IIA), and the American Institute of Certified Public Accountants (AICPA)) offer certifications in various aspects of accountancy. In addition, many forensic accountants in private practice have previous job experience as forensic accountants with the SEC, FBI, Department of Justice, or other law enforcement or regulatory bodies.

Other factors to consider include the following:

- Previous experience investigating the specific crime or industry at issue;
- Ability to work with attorneys or law enforcement agents to collect and explain necessary documents, including evidence offered by the opposing party;
- Interviewing skills;
- Familiarity with basic elements of the crime or crimes charged;
- Familiarity with legal procedures and evidentiary requirements;
- Ability to document findings accurately, concisely, and persuasively;
- Sufficient support staff available to control and manage large quantities of documents and maintain chain of custody; and
- Experience testifying in legal proceedings and the ability to withstand cross-examination. Of particular importance in jury trials is the ability to explain complicated accounting principles or procedures in a simple manner.

PRACTICE TIP: Because the skills needed to investigate and develop the facts are not necessarily the same skills needed to explain complex concepts to lay people, counsel may want to consider retaining both a consulting and testifying expert if resources permit.

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§13.42 C. Qualifying Expert

Like other experts, a forensic accountant can be found qualified to testify by virtue of "special knowledge, skill, experience, training or education sufficient to qualify him as an expert on the subject to which his testimony relates." Evid C §720. No particular credential is required; instead, the requisite combination of training or experience will depend on the specific circumstances of the case. On this point, the reasoning of similar federal cases provides helpful examples. See, *e.g., Maiz v Virani* (11th Cir 2001) 253 F3d 641, 666 (partner at accounting firm qualified as forensic accounting expert with expertise in detecting and tracing misappropriation of funds in complex financial transactions allowed to state reasonable assumptions regarding contracts in order to opine on accounting issues); *Protocomm Corp. v Novell Advanced Servs., Inc.* (ED Pa 2001) 171 F Supp 2d 473, 478 (accounting experts for both plaintiffs and defendants were qualified in terms of credentials and experience and relied on relevant case documents); *In re Bonham* (Bankr Alaska 2000) 251 BR 113 (court admitted experts with relevant experience, even though they were not certified public accountants). On the qualifications of an expert witness generally, see chap 3. On factors to consider in selecting a forensic accountant, see §13.41.

NOTE: The courts in *Maiz, Protocomm Corp.,* and *Bonham* applied the standard for admissibility of expert testimony set forth in *Daubert v Merrell Dow Pharms., Inc.* (1993) 509 US 579, 125 L Ed 2d 469, 113 S Ct 2786, and *Kumho Tire Co., Ltd. v Carmichael* (1999) 526 US 137, 143 L Ed 2d 238, 119 S Ct 1167, a standard California courts do not follow. For discussion of *Daubert,* see chap 2. The facts and reasoning of these cases, however, provide helpful examples of "special knowledge, skill, experience, training or education" for a qualified expert.

In selecting a forensic accounting expert, look for an individual with qualifications substantially above the bare minimum required for admissibility, especially experience in the particular accounting issue at hand. See, *e.g., In re Bonham, supra* (court gave particular credence to expert with relevant experience). Conversely, in challenging an expert, consider whether an apparently well-credentialed accountant may be offering opinions outside the scope of his or her area of expertise. See, *e.g., Maiz,* 253 F3d at 666 (noting, but ultimately rejecting, challenges that accounting expert was offering impermissible legal opinions).

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§13.43 D. Basis of Expert's Opinion

Like other expert testimony not governed by the *Kelly* rule (for discussion, see §13.40, chap 2), the opinion of a forensic accountant should be admissible if it is "based on matter … that is of a type that reasonably may be relied upon by an expert in forming an opinion upon the subject to which his testimony relates." Evid C §801(b). For discussion of challenges to admissibility based on the basis of a forensic accountant's opinion, see §13.48.

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E. Sample Questions for Proponent of Evidence

§13.44 1. Qualifying the Forensic Accountant

The following are sample questions to qualify the forensic accountant:

Q: What is your profession?

Q: What certifications do you have in the accounting field?

Q: What organization(s) issued the certification(s)?

Q: What training and testing did you have to undergo to obtain the certification(s)?

Q: What other formal training do you have in accounting?

Q: What certifications and training do you have in forensic accounting?

Q: How many years have you worked as a forensic accountant?

Q: Please describe your prior experience as a forensic accountant for ___[*specify, such as the SEC, FBI, or IRS*].

Q: How many forensic accounting investigations have you conducted?

Q: How many investigations have you conducted regarding the type of crime charged here?

Q: How many investigations have you conducted in the industry at issue here?

Q: How many classes have you taught or lectures have you given on forensic accounting issues?

Q: How many texts or articles have you written on forensic accounting issues?

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§13.45 2. Forensic Accountant's Investigation and Basis for Opinion

Because there is a wide array of subjects on which a forensic accounting expert could testify, counsel must tailor questions to the specific issues the expert will address. Generally, the expert should explain what information he or she gathered and reviewed, what the relevant records show, and what resulting conclusions the expert drew. For example, in the prosecution of an employee who engages in purchasing fraud by causing the company to pay phony invoices, a forensic accounting expert might be asked to testify based on the following questions:

Q: Please describe the scope of what you were asked to investigate in this case.

Q: Please give us a general overview of how you conducted your investigation.

Q: What records did you review in your investigation? How did you gather these?

Q: Did you interview any witnesses? Who were they?

Q: I'm handing you Exhibit A. Is this one of the invoices that you found in the company's accounting department? What is the invoice for? From whom is the invoice purportedly sent? How much is the invoiced amount for?

Q: Were you able to determine if the company ever paid this invoice? How did you determine that?

Q: I'm handing you a document that was previously admitted as Exhibit B. Is this the company check register that you examined?

NOTE: A company employee may need to lay the foundation for the admissibility of the check register under the business record hearsay exception (see Evid C §§1270-1272) (for discussion, see §13.39). For sample questioning for admitting accounting records, see §13.46.

Q: Were you able to determine if the company ever received the widgets billed for in Exhibit A? Would you describe the steps you took to make that determination?

Q: I'm handing you a document that was previously admitted as Exhibit C. Is this the inventory report that you examined? Are there any entries for widgets received from January 1 through January 31, 2006?

NOTE: Here, again, a company employee may need to lay the foundation for the admissibility of the report under the business record hearsay exception (see Evid C §§1270-1272) (for discussion, see §13.39). For sample questioning for admitting accounting records, see §13.46.

Q: Were you able to identify the bank account to which the company's payment was made? How did you do that?

Q: I'm handing you a document that was previously admitted as Exhibit D. Is this the bank account statement that you examined? Does it show a deposit in the amount of $5000? Is that the same amount that was billed for in Exhibit A? When was that deposit made?

NOTE: A bank employee may need to lay the foundation for the admissibility of the account statement under the business record hearsay exception (see Evid C §§1270-1272) (for discussion, see §13.39). For sample questioning for admitting accounting records, see §13.46.

Q: Were you able to identify who opened the account described in Exhibit D? How did you do that? What records did you review?

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§13.46 3. Admitting Accounting Records

To admit an accounting record, such as the check register identified as Exhibit B in §13.45, counsel could question a company employee with personal knowledge of the record as follows:

Q: What is your position in the company? How long have you been in this position with the company? What job functions do you perform?

Q: Do you have access to the company's records regarding checks issued by the company?

Q: Do you recognize the document that has been marked as Exhibit B? What is it?

Q: Did you make the entries in Exhibit B? If not, do you know who did?

Q: What do the entries show?

Q: What are the procedures for making entries into Exhibit B?

Q: Was Exhibit B created in the regular course of the company's business?

Q: When are the entries made in Exhibit B in relation to when the checks are issued?

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VI. CHALLENGING ACCOUNTANT EXPERT TESTIMONY

§13.47 A. Challenges Based on Expert's Qualifications

Challenges to a forensic accounting expert's qualifications under Evid C §720 will depend largely on examining whether those qualifications are relevant to the specific issues on which the expert is opining. In general, a good forensic accountant will have training and experience in both relevant accounting principles and forensic investigation techniques. Counsel should inquire whether the expert is a certified public accountant or has other accounting certifications. When relevant, an expert may also need broader experience in finance or economics. Potential areas for challenging forensic qualifications include lack of certifications, training, work experience, or government experience.

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§13.48 B. Challenges Based on Basis of Expert's Opinion

Challenges to the admissibility of a forensic accountant's testimony are more likely to be made on the basis of the expert's opinion under Evid C §801(b) than with regard to the expert's qualifications. In *In re Bonham* (Bankr Alaska 2000) 251 BR 113, the court excluded the opinion of an expert who had "substantial experience and impressive qualifications and credentials" (251 BR at 118) because his report "[was] based on substantial factual mistakes, speculation, innuendo, and inferences which [were] not supported by full explanations and analysis. It [was] not worthy of an expert of his caliber" (251 BR at 136). Compare *In re Bonham* with *Bisno v U.S.* (9th Cir 1961) 299 F2d 711, 714 (finding FBI accountant's testimony based on review of defendant's records admissible). Although the court in *In re Bonham* applied the federal standard for the admissibility of expert testimony promulgated in *Daubert v Merrell Dow Pharms., Inc.* (1993) 509 US 579, 125 L Ed 2d 469, 113 S Ct 2786, and *Kumho Tire Co., Ltd. v Carmichael* (1999) 526 US 137, 143 L Ed 2d 238, 119 S Ct 1167, and was not followed by California courts, it would be reasonable to argue that an opinion based on factual mistakes, speculation, innuendo, and unsupported inferences is not based on matter that "reasonably may be relied upon by an expert" and is, therefore, inadmissible under Evid C §801(b). For discussion of *Daubert*, see chap 2.

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C. Sample Questions for Opponent of Evidence

§13.49 1. Challenging Qualifications

The following are sample questions to challenge qualifications:

Q: You're not a CPA, are you?

Q: You're not a certified fraud investigator?

Q: You have no previous training or experience in forensic accounting?

Q: You haven't written or taught in forensic accounting?

Q: You've never worked in this particular industry? Or conducted an investigation in this industry?

Q: How many times have you appeared as an expert? Have you always worked for the prosecution [*or the defense*]?

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§13.50 2. Challenging Investigation or Basis for Opinion

Bases for challenging a forensic accounting expert's opinion will depend on the specific steps taken and records examined; but, in general, the challenger should question assumptions made about the accuracy or completeness of documentation and who had access to, or the ability to, change records. For example:

Q: How much time did you spend on your investigation? Did you personally look for documents, or did someone else conduct the searches?

Q: Did you know that the company recorded receipts of widgets in records besides Exhibit C? Did you look for or review these other records? Why not? When you conducted investigations in the past, you looked for these other backup documents didn't you? Had you known that these records existed, would that have changed your opinion?

Q: Do you know how Exhibit C was created? Did you know that Employee Y was responsible for making changes to Exhibit C? Did you interview Employee Y? Why not? Would your opinion be different if you knew that there was a 1-week time lag between when the widget shipments came in and when Employee Y updated Exhibit C?

Q: Did you know other employees had access to, and the ability to alter, the records in the accounting department?

Q: Did you document the steps you took in your investigation? Why not? Why isn't the location at which these documents were found or your conversation with Employee Z recorded in your notes?

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§13.51 3. Challenging Accounting Records

When the proponent seeks to introduce accounting records under the business record hearsay exception (see Evid C §§1270-1272) (for discussion, see §13.39), potential areas to challenge include the following:

Q: Does the company typically keep these records? Why not? So, the company doesn't make these records in the regular course of business?

Q: When were the entries in this exhibit made? So, there was some period of time that elapsed between when checks were written and when the entry was recorded in the check register?

Q: Do you know who made these entries? Were the employees trained as to how to record the entries? Was there any supervision or double checking of the entries?

Q: Where were these records kept? Who had access to them? So, anyone could have opened this document and made an entry?

Q: How do you know how the entries were made? You didn't make them yourself? You don't have any personal knowledge of the process for making the entries in this exhibit?

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14

Computer Forensic Investigations in Corporate Environments

John Janes, Deloitte Financial Advisory Services, LLP
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§14.1 I. WHAT IS COMPUTER FORENSICS?

Computer forensics is a specialized set of knowledge and procedures involved in recovering, preserving (including maintaining the accuracy of), and analyzing electronic information for use as evidence in legal proceedings. See generally Saferstein, Criminalistics: An Introduction to Forensic Science, chap 17 (9th ed 2007). Computer forensics may include locating "deleted" or damaged electronic files and file fragments as well as gathering readily available "live" data and metadata (*i.e.,* information about the creation, editing, and lifetime of an electronic document that is stored with that document, but typically is hidden from the document's author or reader). Forensic technologists with special training in computer forensics (see §14.2) gather evidence using methods designed to satisfy evidentiary rules and, therefore, must adhere to procedures that are more rigorous and detailed than those used generally for routine storage of electronic data.

This chapter discusses collecting and analyzing electronic evidence—referred to generally in this chapter as "computer forensic evidence"—as well as its admission in court, primarily in the context of criminal cases, with a focus on evidence from corporate environments.

For a general discussion of collection and analysis of computer evidence in the *discovery* context, see California Civil Discovery Practice, chap 4 (4th ed Cal CEB 2006). On the admissibility of computer simulations or models created for litigation, see Weinstein's Federal Evidence §900.07[7] (2d ed, rev 2008); Imwinkelried, Evidentiary Foundations §4.09[4] (6th ed 2005). For information and white papers on electronic discovery compiled by the Sedona Conference—an organization of professionals dedicated to clarifying and assisting in the process of electronic discovery—see http://www.thesedonaconference.org. For general information on subjects relevant to electronic evidence, see http://www.discoveryresources.org.

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II. CLASSIFICATION AND FUNCTIONS OF FORENSIC TECHNOLOGISTS

§14.2 A. Classification as "Forensic Technologist"

Practitioners of computer forensics come within a general category of professionals known as "forensic technologists." For purposes of this chapter, "forensic technologists" are technical personnel with investigative or litigation support experience who assist in an investigation and generally have expertise in the architecture of information systems and familiarity with a wide variety of business hardware and software. Many of these professionals also have expertise in the preservation, acquisition, and analysis of electronic data for use in legal proceedings, including training in documentation and authentication procedures useful for ensuring the admissibility of electronic evidence in court.

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§14.3 B. Certification

No standard curriculum for training forensic technologists exists yet, and to the authors' knowledge there are no organizations that simply certify an individual as a "forensic technologist." However, within the field of computer forensics, some professional organizations provide certification. One particularly relevant certification discussed below is that of a "certified forensic computer examiner." Because not all forensic technologists are certified in that or another subspecialty, counsel should not assume that someone who is self-styled as a "forensic technologist" also has a specialized certification.

Organizations such as the International Association of Computer Investigative Specialists (IACIS), the High Technology Crime Investigation Association (HTCIA), and the Scientific Working Group for Digital Evidence (SWGDE) have written general guidelines appropriate for becoming a certified computer forensic examiner and maintaining that certification. Typically, a computer forensic examiner will have accreditation or be associated with one of these organizations. Additionally, computer forensic examiners may be members of the Association of Certified Fraud Examiners (ACFE).

Among the certifications potentially available to forensic technologists and the organizations that provide certification are the following:

- EnCase Certified Examiner (EnCE);
- Certified Information System Security Professional (CISSP);
- Certified Computer Examiner (CCE) from the International Society of Forensic Computer Examiners (ISFCE);
- Certified Fraud Examiner (CFE) from the Association of Certified Fraud Examiners (ACFE);
- Certified Forensic Computer Examiner (CFCE) from the International Association of Computer Investigative Specialists (IACIS);
- AccessData Certified Examiner (ACE) from AccessData; and
- Security+, Network+, or A+ (all from CompTIA)—these are not computer forensic certifications but indicate a deep understanding of computer and network security (Security+), network operating systems and hardware (Network+), and personal computer operating systems and hardware (A+).

Not all of the above-listed certifications are computer forensics certifications, and some forensic technologists have both forensic and nonforensic certifications. For example, Deloitte Financial Advisory Services, LLP, encourages its computer forensics professionals to acquire at least the A+ certification and the EnCE as part of the process of acquiring a forensic examiner designation.

Note also that there is no industry-standard certifying organization that defines a computer forensic specialist. The certifying organizations are typically software vendors that have computer forensic data acquisition and analysis software. Consequently, it is more difficult to measure the skills or proficiency of an individual computer forensic examiner on the basis of only one computer forensics certification.

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§14.4 C. Importance of Certification

Certification as a computer forensic expert is particularly important if that individual will testify in court because it indicates a certain level of proficiency and experience in performing as a specialist within the field of computer forensics. The EnCase Certified Examiner (EnCE) and Certified Forensic Computer Examiner (CFCE) (see §14.3) are two credentials that have an established program for attaining the credential. The Certified Fraud Examiner (CFE) (see §14.3) is a general fraud examiner certification that requires knowledge in several areas of investigation, including accounting, interviewing, criminology, and technology; however, it does not indicate a specialty in any of those areas.

It is a good idea for the attorney to scrutinize a certification to dispel any doubts or questions regarding a professional's qualifications. Most forensic technology professionals are happy to provide proof of certification and an explanation of that certification. Forensic technologists who have testified in court usually will also advise counsel of this to bolster their experience and skill levels.

A forensic technologist's prior experience in law enforcement (such as with the FBI, IRS, or police agencies with specialized computer crime divisions) can provide valuable training and may be useful to look for in evaluating that person's qualifications. However, experience with the specific type of case in question is preferable in hiring a forensic technologist to assist with that case.

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D. Functions of Forensic Technologists

§14.5 1. Support Investigation

Virtually every business today has at least a portion of its records and other data in electronic form; in fact, most corporations store the majority of that information electronically. A major challenge facing attorneys and investigators (including, *e.g.*, law enforcement personnel and forensic accountants) in criminal cases that involve electronic evidence is to understand the technology used by the organization being investigated. Fundamental technology architecture may vary drastically from one organization to another. Even two companies of similar size in similar industries are likely to have widely disparate network architectures, e-mail systems, network designs, and record retention policies. Unless the forensic technologist knows and understands the many places where electronic evidence may be found, the investigation will likely be less productive and far more expensive.

One of the basic roles of the forensic technologist is to help the attorneys, investigators, and others involved in an investigation determine not only what data exist but also in what form they exist. Once the data are identified, the forensic technologist should act as a guide by providing a plan of how data or evidence will be acquired and how much time or effort will be required in doing so. An attorney who is handling a case in which electronic evidence may be important should consider consulting with a forensic technologist—and preferably one certified as a computer forensic examiner (see §14.2)—as soon as the need for acquiring and analyzing electronic evidence becomes apparent.

A forensic technologist with appropriate computer-related training and certification (see §§14.2-14.3) potentially can be of assistance in a criminal matter in ways such as the following:

- Understanding the technology infrastructure an organization that is the subject of an investigation uses to create and store its data;
- Determining what relevant information is likely to exist, what form it might take, and where it might be found;
- Preserving the integrity of potentially relevant electronic data before its collection;
- Creating an exact duplicate of the data on a forensically clean storage medium and "write-protecting" the duplicate;
- Extracting data, including from active files, password-protected and encrypted files, compressed files, deleted or damaged files, file fragments, metadata, and data in "file slack" (see §14.26);
- Locating and recovering deleted or damaged files and file fragments;
- Analyzing electronic data for anomalies, inconsistencies, and patterns that may be indicative of fraud or attempted deletion, or analyzing data to confirm that financial transactions are in accordance with corporate policies or regulations; and
- Documenting the entire data acquisition process with an eye to ensuring the admissibility of relevant data at trial.

NOTE: Documenting the various steps in finding and preserving electronic data or other information gives a clear history of the case from a forensic technologist's viewpoint. Documentation of the process and the repeatability of the process by a neutral third party are key components of computer forensic methodologies. For an overview of the difficulties entailed in obtaining and managing electronic evidence, see generally Kashi, *Systematic Discovery and Organization of Electronic Evidence,* Law Practice Today (Feb. 2003); for the online version of this article, go to http://www.abanet.org/lpm/lpt/articles/tch0214031.html. See also Brown, Computer Evidence: Collection & Preservation (2006) (aimed at computer forensic professionals); Saferstein, Criminalistics: An Introduction to Forensic Science, chap 17 (9th ed 2007).

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§14.6 2. Provide Understanding of Environment Being Investigated

A skilled forensic technologist can significantly aid an investigation of computer-related crime in a corporate environment by helping the attorneys and associated investigators understand the technological layout of the organization being investigated, including the relevant hardware and software being used.

Although some investigations involving electronic evidence are limited to a single individual's personal or workplace computer, most investigations in the corporate setting—which often are the most complex—involve analysis of numerous computers. The most common technologies used by corporations and other businesses are the following:

- Financial systems;
- Automation applications, such as word processing, spreadsheets, and presentation software; and
- Messaging systems, including e-mail, instant messaging (IM) logs, voicemail, and Internet web browsers.

In an investigation involving allegations of fraud or money-laundering, the most significant data is likely to come from the corporation's financial systems. E-mail provides another fertile source of potential evidence, particularly when the aim is to determine whether known individuals are involved in illicit activity. See §14.13-14.15.

Some pertinent aspects of financial systems, automation applications, and messaging systems are explored in §§14.7-14.17.

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§14.7 a. Corporate Financial and Enterprise Resource Planning Systems (ERPSs)

The number and variety of corporate financial systems have slowly started to consolidate over the last 5-10 years, in part because of the transitional concerns for computers that were posed in the year 2000. Forensic technologists should either be database developers or database analysts familiar with different types of financial system technologies, or have access to such individuals for consultation.

Today's corporations generate vast amounts of data in managing corporate functions. Enterprise resource planning systems (ERPSs) manage all basic functions of a corporation by integrating the data and processes of an organization into a unified system. Typical ERPSs will use multiple components of computer software and hardware to achieve the integration. A key ingredient of most ERPSs is the use of a unified database to store all data for the organization's various business functions in software modules, such as the following:

- Manufacturing (*e.g.*, cost of material, workflow management, quality control, manufacturing process);
- Supply chain management (*e.g.*, inventory, purchasing);
- Financial accounting (*e.g.*, general ledger, accounts payable, accounts receivable);
- Human resources (*e.g.*, personnel administration, payroll, time and attendance, employee benefits); and
- Data warehouse, marketing, and various self-service interfaces for customers, suppliers, and employees.

The volume of data retained in these ERPSs dictates the use of sophisticated tools to identify and analyze the relevant data as part of the investigation process.

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§14.8 (1) Need for Anomaly Detection

The ultimate goal of the forensic technologist is to be able to analyze the data for specific types of transactions or trends that may be indicative of fraud or other criminal activity. Anomaly detection is a developing computer science field used in fraud, securities, and anti-money laundering (AML) investigations that can find and analyze unusual transactions and trends in both corporate financial and general ledger systems. See §14.31.

NOTE: Database specialists typically are experienced in using applications such as Microsoft's SQL Server (pronounced "sequel"), Oracle by Oracle Corporation, and to a lesser extent, IBM's DB2 (and Informix, which is now owned by IBM). There are a number of other database applications, such as Microsoft Access. In addition to understanding database development languages and applications, a forensic technologist typically will need familiarity with report writing applications, such as Crystal Reports, from Business Objects, Inc. For projects that do not involve massive amounts of information, Access provides not only a database but also a report writing functionality that may be a less expensive way to provide analysis and reporting capabilities. Deciding which tools are appropriate is one of the duties of the forensic technologist.

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§14.9 (2) Proliferation of Systems

The proliferation of different enterprise resource planning systems (ERPSs) complicates the task of finding and querying information relevant to an investigation because of the different database platforms in operation and the various choices corporations make in implementing an ERPS. A forensic technologist often has to collect data generated over many years during which time a corporation may have utilized more than one ERPS, making the querying process more complex. Furthermore, the availability of almost unlimited storage space for electronic data has encouraged the retention of huge amounts of information that was not routinely stored when records were largely kept on paper. Therefore, ERPSs can be very complex, and a database for a large corporation can contain millions of records.

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b. Corporate Office Systems and Related Electronic Data

§14.10 (1) Word Processing

Forensic technologists generally are skilled in identifying and understanding various types of word-processing software applications and can provide an investigative team with insight about how these applications have been used within the company being investigated.

Documents produced by the use of word-processing software often contain information of significance to the criminal investigation of a corporation. First, and most obviously, the contents of the documents themselves may have evidentiary significance. In addition, although documents created through word processing are considered "unstructured" (*i.e.*, they generally are not formatted into specific fields), the documents commonly contain valuable metadata that can enable an investigator to determine the time of their creation, modification, or deletion—and potentially who created, modified, or deleted them. Word-processed documents also commonly contain data concerning their page length as well as the number of keystrokes, lines, words, and characters in them.

NOTE: If "revision tracking" was activated when a document was created, the metadata should contain all revisions to the document, comments from authors and editors, names of previous authors, and the dates and times on which the revisions were made. Many of the search tools (software) include the ability to search through and display the metadata. A forensic technologist will know how to find, search within, and display metadata.

In the current environment of instant communication over the Internet, documents typically contain information or evidence that would not have been available as recently as 15 years ago. Some people who use computers to commit crimes may believe either that their word-processed documents will not be found, or that encryption will make them impossible to read. In reality, once electronic documents are created, they are almost impossible to completely destroy without leaving some trace or copy. Unlike earlier times in which corporate documents were routinely created on paper using typewriters and a typist could physically control whether carbon copies (or photocopies) were made, in the modern era initial and backup copies of electronic documents are routinely made and stored by a corporate computer's operating system without the knowledge of the documents' authors.

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§14.11 (a) Word-Processing Software

One factor to consider in attempting to analyze documents is the software that was used to create the documents. Microsoft Word is one of the most widely used office word-processing applications in corporate America. Corel's WordPerfect is also still commonly used. Because an investigation, however, might include not only documents created using a corporation's designated software but also documents created on the Internet or on a home computer using any number of shareware or freeware applications, an analysis of the documents can become complicated. The complicating factor in analyzing documents created by a variety of software programs is the difference in formatting, searching, and metadata created by the different programs. It may not be possible to search on "last edited date" in some documents because the software that created those documents did not store or track that metadata. A related factor that may complicate the analysis of documents is their conversion between various software programs.

Another factor to consider is whether a document was encrypted using the word-processing software that was used to create the document or encrypted using a separate encryption application. Typically, the encryption available in word-processing software is not as effective as that provided by commercial software that focuses specifically on encryption. Also, it is important to know whether the document had revision tracking turned on (knowingly or unknowingly) by the author, and what other data elements may be contained in or embedded in a document, such as comments from authors or editors, red-line edits, formulas, and speaker notes. The forensic technologist's job is to make all of this information searchable and available for review.

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§14.12 (b) Tools for Decrypting or Restoring Corrupted Files

There are a number of tools available to a forensic technologist for decrypting or restoring corrupted files. Some of these tools are proprietary in nature and are developed for specific organizations and the investigations they perform. However, the ability to decrypt a file may be expensive and is sometimes impossible if the file was encrypted using particularly "strong" (*i.e.*, advanced) encryption software. Accordingly, the attorneys, accountants, and other investigators involved in a case should discuss with a forensic technologist what possible scope of effort is needed to restore or decrypt large numbers of documents. In a particular case, it may not be necessary to perform this operation in view of time deadlines and the scope of the investigation.

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§14.13 (2) E-mail

E-mail is almost universally used by businesses. Although the sheer volume of e-mail would seem to necessitate a strict policy on records management and retention, many companies do not have such policies or, if they do, they do not or cannot enforce them. Thus, in many instances, e-mail messages of employees are saved on their individual office computers and copies of those messages are also on a central, corporate e-mail server or servers. In addition, even when a business keeps e-mail on a central server, e-mail management is often left up to the individual employee. Also, although many businesses take on the task of e-mail management, e-mail messages are typically retained for a much longer period than they are needed because it takes enormous resources to categorize, store, and delete them on a regular records retention schedule. The benefit of these practices to a forensic technologist is that a copy of an e-mail message of significance to an investigation is likely to exist somewhere. Even if a suspect wants to delete a particularly incriminating e-mail message, he or she is unlikely to find, without technical assistance, all the copies of that message that have been stored.

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§14.14 (a) Major Considerations Regarding Corporate E-mail

There are two major considerations in searching for and analyzing corporate e-mail messages in an investigation. The first consideration is the type of e-mail software that is used. Microsoft Exchange and Outlook are the most commonly used e-mail systems in the business world. Consequently, most e-mail search and analysis programs are compatible with the Microsoft e-mail structure. There are a number of different web-based e-mail "clients" (software programs used for sending, storing, and receiving e-mail messages). As long as all the different e-mail clients in use at an organization are identified, a forensic technologist can apply the appropriate tools for searching or even converting the messages to a Microsoft format. If they are converted to a Microsoft format, there may be less (or more) metadata available for searching based on how much and what types of metadata the original e-mail client stores.

The second consideration is whether the investigated company maintains e-mail messages on centralized servers or individual employee workstations and laptop computers. If e-mail is kept primarily on servers, it is likely that many potentially relevant e-mail messages will be stored on backup tapes (see §§14.27-14.29). If so, these tapes will then need to be preserved or restored and analyzed. The existence of backup tapes may make the investigation more complex simply because all users' e-mail will likely be available and the investigation team, with the assistance of the forensic technology team, will have to carve out the e-mail messages for just those users or custodians who are the subjects of the investigation. Backup tapes will also provide far more information than workstations or laptops. Among other reasons, this is because employees in general and those targeted in an investigation are more likely to delete or alter documents that are stored on their local computers than on a corporate network, either in the ordinary course of business or as intentional attempts to hide wrongdoing. Nevertheless, some organizations choose to keep very little data in the form of documents or e-mail messages on their network servers, instead utilizing the local hard drives of their employees' computers as the primary storage.

NOTE: This discussion assumes that the company maintains its own e-mail servers. Access to an employee's personal e-mail account or e-mail servers maintained by third party vendors rather than the corporation itself raises different issues under the Stored Communications Act (SCA), as well as privacy concerns. See §§14.52-14.53.

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§14.15 (b) Effect of Employees Using "Unofficial" Software

Besides using e-mail and office software provided by their employers for word-processing documents and spreadsheets, some employees might also use Internet-based e-mail applications (*e.g.*, Yahoo! or Google) as their personal e-mail systems. If Internet e-mail systems are used by an employee in the workplace, there typically will be traces of that activity in the cache memory and in general artifacts of the file management system of the employee's computer workstation. In many instances, most of the text from Internet-based e-mail messages that were sent or received using the company computer can be recovered. Even if there is little useful information on the computer, a forensic technologist can often determine the e-mail account information of such an e-mail user who is the target of an investigation. If necessary, counsel can then use this e-mail account information to attempt to gain access to e-mail messages relating to the person investigated from the Internet service provider (ISP). Typically, a forensic technologist will also search for traces of Internet e-mail accounts in order to locate names and e-mail accounts for others involved in the suspected criminal activity.

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§14.16 (3) Graphical Images and Other "Unstructured" Files

In a particular case, employees may have on their office computers various types of electronic files that are created and stored as graphical images, such as pictures or photographs (in formats such as Joint Photographic Experts Group: JPG or JPEG), facsimiles or e-faxes (in formats such as Tagged Image File Format: TIF or TIFF), and certain nonmodifiable documents (in portable document format: PDF). A skilled forensic technologist can identify these types of files as part of an investigation of criminal wrongdoing within a company.

These types of files present a different challenge in that they typically do not have much text or metadata associated with them. They can, however, have evidentiary value, and software tools are available that use pattern recognition to assist in finding relevant photographs or faxes.

NOTE: For example, law enforcement agencies often keep libraries of child pornography "signatures" or "hashes" in order to identify child pornography without having to look at each image on an individual's computer. This speeds up the process of finding evidence.

Once found, however, most image files, including fax files, will have to be manually reviewed to determine whether they are relevant.

With PDF files, an investigator can use tools that will perform an optical character recognition (OCR) process on the file and produce a searchable text file. OCR is the machine recognition of printed characters. See Freedman, The Computer Desktop Encyclopedia (9th ed 2001). OCR systems can recognize many different OCR fonts as well as typewriter and computer-printed characters. Advanced OCR systems can recognize hand printing.

When a text document is scanned into a computer, it is turned into a bitmap, which is a picture of the text. OCR software analyzes the light and dark areas of the bitmap to identify each alphabetic letter and numeric digit. When it recognizes a character, it converts it into ASCII text (pronounced "ask-key"). Hand printing is much more difficult to analyze than machine-printed characters. Old, worn, and smudged documents are also difficult. Scanning documents and processing them with OCR is sometimes as much an art as it is a science.

Other files. There are a number of "unstructured" file types, such as presentation software, spreadsheets, and graphics tools (such as Microsoft Visio) that companies use. These files all contain types of metadata that are similar to that found in word-processing documents.

Spreadsheets in their native form contain formulas, which are often helpful to counsel or investigating accountants. Knowing when a spreadsheet was edited can be useful when comparing that data with, for instance, a financial report from an enterprise resource planning system (ERPS) (see §14.7). A forensic technologist can aid in understanding these formulas and determining when editing has taken place.

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§14.17 (4) Data Files Containing Information in Fielded Structure

Data records that are generated from database programs tend to be segmented into fields such as client name, accounts receivable totals, and disbursement details. Data in this format may be part of an enterprise software application or a personal database maintained by an employee in a corporate accounting department. The key to understanding these data is that some logic has been applied to structuring the data that gives it meaning or value, and a skilled forensic technologist typically can grasp the nature of the data and provide an understanding of it to the team investigating the corporation.

EXAMPLE: The use of enterprise systems to track employees; provide payroll, check writing, and disbursement functions; and produce purchase cards and vendor history typically creates a vast amount of financial history within a corporation. The volume of data retained in these systems dictates the use of sophisticated analytical tools to sort the databases for relevant evidence. Current anomaly detection services (see §14.31), for example, can provide powerful visual reporting tools that highlight anomalous trends in both corporate financial and general ledger systems.

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3. Provide Insight Into Available Technology Tools

§14.18 a. Specialized Software Applications

A forensic technologist with training in computer examination typically will use specialized software applications to acquire and preserve electronic evidence, and he or she can educate an attorney and others involved in a criminal investigation about the nature of these tools and the results that flow from their use.

The tools available to a forensic technologist are too numerous to be comprehensively listed in this chapter, but a sample of standard software applications that are used by many forensic technologists is provided below. This sample is intended to provide an attorney or forensic accountant with insight into the possibilities for finding, analyzing, and reporting on data that can be acquired from an organization that is being investigated. Software commonly used by forensic technologists includes the following:

- Concordance Software from DataFlight Software, Inc., and Summation from Summation Legal Technologies, Inc., are database tools developed to enable attorneys to manage electronic discovery. Both databases have powerful text retrieval and searching tools that allow users to locate information quickly and precisely using a variety of different search techniques. These features make them useful as investigation tools as well.

- Discovery Cracker from DocuLex is a tool used by some forensic technologists to extract, sort, and review documents and other forms of electronic evidence, particularly e-mail (see Note below). The program facilitates the collection of data in multiple file formats by capturing all forms of electronic files and then converting them to industry-standard image file formats such as tagged image file format (TIFF) and portable document format (PDF). The program also generates an index that provides a listing of all words used in the files collected, thereby enabling faster location of words than individual word or character searches. The program also generates a database of the metadata associated with each file that, for example, provides a rapid way of finding all documents or e-mails that were edited between two dates.

- OutIndex from the English company of the same name is a similar tool that allows a forensic technologist to combine different file types into a common database for searching and analysis. OutIndex also can be used to output data into a common format for loading onto a web-based document review and production service.

NOTE: OutIndex and Discovery Cracker are used to extract e-mails from their native storage in Microsoft Outlook and put them into a format that can be loaded into a database program. Investigators can then use programs such as Concordance, Summation, Ringtail, and Stratify to review and mark documents.

The development of secure websites for document repositories has made it possible to use websites for document review and production. The use of the Internet in this manner makes data and documents available for review by attorneys and forensic accountants no matter where they are located. It is therefore possible, for example, that e-mail messages and documents being reviewed could be hosted on computer servers in Australia while the attorneys and investigators may be dispersed around the rest of the globe. Typically, all that is required is a high-speed Internet connection and secure access to the website or other repository. Secure access can be provided either through software (*e.g.*, by encryption or passwords) or through the use of hardware tokens that generate secure random passcodes in synchronization with the software running on the website or repository. This greatly reduces the complexity of making electronic data available for review, especially in large-scale investigations.

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§14.19 b. Importance of Peer Review

Peer review of a computer forensic examination helps ensure that software and hardware tools and the forensic technologist's individual methodology are all proven to be consistent, and that a second party can achieve the same results using the same tools and methodology. To ensure that software and hardware are appropriately reviewed, every new version of software or hardware that will be used in the field for data acquisition or for examining an element of an individual corporation's system (*e.g.*, a computer hard drive) should be put through a thorough test procedure to make sure that the software or hardware is performing as expected. It is not uncommon for a new version of a proven software tool to introduce a new "bug" that causes a different result even though the methodology remains the same.

NOTE: There is a Yahoo! Internet discussion group for computer forensics tool testing that addresses this issue: http://tech.groups.yahoo.com/group/cftt/ (visited June 2, 2010). The goal of this group is to make sure that the tools used by computer forensics technologists give accurate and thorough results.

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§14.20 III. TASKS OF FORENSIC TECHNOLOGIST

Tasks commonly performed by forensic technologists in connection with the investigation of a corporation are discussed in §§14.21-14.32. If the investigation is centered around e-mail and documents only, it is likely that database developers will not be part of the investigative team. But if the investigation involves looking into corporate financial systems or will include large amounts of data that may be aggregated for statistical analysis, the team may need to include not only database developers and analysts but also economists. Economists typically are trained in the use of statistical analysis and associated software tools.

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§14.21 A. Preservation of Evidence

In any investigation, the first priority is the preservation of data or evidence. Based on an understanding of the technologies discussed in §§14.7-14.17, a forensic technologist can help develop a plan for quickly determining where evidence may reside and start the process of acquiring that evidence.

Because any use of a computer changes certain portions of its contents and, therefore, potentially alters or destroys evidence, it is important to take steps to preserve relevant electronic data as soon as its potential evidentiary value becomes apparent. See Saferstein, Criminalistics: An Introduction to Forensic Science, p 535 (9th ed 2007). Therefore, one of the first tasks a forensic technologist performs in many investigations to help preserve evidence is ensuring that no information is lost or altered. The best advice to attorneys and corporate IT personnel is to leave a computer turned off until a forensic examiner can make a forensic image of the computer's disk drive. The act of turning on a computer will alter many files that otherwise might provide significant evidentiary information or value.

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§14.22 1. Non-Networked Computers Belonging to Individuals

When the device containing potential evidence is a stand-alone, non-networked computer belonging to an individual, taking physical possession of the computer may be all that is needed to preserve the data until it can be examined by a forensic technologist.

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§14.23 2. Networked Computers Belonging to Corporation

When the potentially relevant data is on a corporation's networked information system, it may be advisable to consult with a forensic technologist on the best preservation method as soon as the need for preservation of evidence is known. In addition, a major issue for the corporation will be preserving the data with potential evidentiary value while minimizing disruption to business operations. A forensic technologist who is familiar with business system hardware and software (and familiar with the most likely sources of data having evidentiary value), alone or in consultation with the corporation's IT department, can be of great assistance in structuring an investigation that preserves the required data sources and minimizes disruption to operations. An experienced forensic technologist will look to use data acquisition software tools that can run on the corporate network, thereby making forensically sound copies of relevant data while having a minimal impact on the company's operations.

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§14.24 3. Consideration of Need for Warrant

In criminal matters that involve electronic evidence, it may be necessary to obtain a search warrant in order to seize a suspect's (including a corporate suspect's) computer equipment. See generally Pen C §1524. The National Institute of Justice (NIJ) recommends that, in this situation, the investigating law enforcement agency include a computer forensic examiner on the team that is sent to seize evidence or secure a crime scene, or at least have an expert on call to answer questions about preserving the data. See generally NIJ, *Electronic Crime Scene Investigation: A Guide for First Responders* (July 2001); for the online version of this article, go to http://www.ncjrs.org/pdffiles1/nij/187736.pdf. On search warrants, see §§14.54-14.58.

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§14.25 B. Acquisition of Evidence

Evidence acquisition in the corporate environment usually involves collecting data from relevant sources such as computer disk drives, network servers, e-mail servers, backup tapes, personal electronic devices, voicemail servers, and hardcopy file cabinets (including those that may hold compact discs (CDs) and other loose electronic storage media). The somewhat ethereal nature of electronic evidence creates a need for computer forensic experts to continually work toward ensuring that they are using a tried and proven set of procedures in acquiring and handling electronic information.

When there are no concerns regarding the authenticity or accuracy of digitally-stored information, ordinary copies or printouts of digital files may suffice. However, when the authenticity or accuracy of the data is questionable or details about the data's creation or alteration are important, it may be necessary to make a forensic (mirror) image (also called a "bitstream copy") of a computer's disk drive or other digital storage medium. Unlike the copy of an electronic file that a computer user can obtain by using the "copy" command—which reproduces only the intentionally stored data in the file—a forensic image is an exact duplicate of every bit recorded on a disk drive or other digital storage medium. See §14.26.

The recommended approach is to assume that the authenticity or accuracy of digitally stored information will be questioned at some point in time, so it is advisable to take a forensically sound approach whenever possible. If data are not acquired in a forensically sound manner early in the case, it is quite often impossible to go back at a later date and create a forensically sound copy of the data.

To understand the importance of the forensic image in forensic work, it is necessary to have a general understanding of the way computers store data. For an introduction to that process, see California Civil Discovery Practice, chap 4 (4th ed Cal CEB 2006).

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1. Disk Drives

§14.26 a. Computer Disk Drives

Technologies are available that forensic technologists can use to recover data from any area of a computer disk drive and "write it" to a new electronic file, including files and text fragments that would not otherwise be recoverable by the computer's operating system or that were "deleted."

A technique used by forensic technologists in connection with the data recovery process is to create a forensic (mirror) image—also called a bitstream image or copy—of a computer's disk drive (whether in a workstation, laptop computer, or as a freestanding disk drive). Because a forensic image preserves literally every bit of information on that disk drive, such a copy can be used to retrieve deleted, inadvertently saved, and intentionally hidden data. See, *e.g., U.S. v Criminal Triumph Capital Group, Inc.* (D Conn 2002) 211 FRD 31, 48 (forensic mirror image of disk drive "includes all the scattered clusters of the active and deleted files and the slack and free space"). For a technical discussion of forensic images, see Saferstein, Criminalistics: An Introduction to Forensic Science, p 535 (9th ed 2007).

A forensic technologist can choose from a number of digital imaging tools to create a bitstream image. Two well-known commercial products are EnCase, manufactured by Guidance Software, and SafeBack, made by New Technologies, Inc. In addition, at the time of this writing, some disk imaging tools could be downloaded for free with the Linux and freeBSD operating systems. The Computer Forensic Tool Testing (CFTT) project, jointly sponsored by the National Institute of Justice (NIJ) and the National Institute of Standards and Technology (NIST), has tested versions of all four of these imaging tools. Test results can be accessed at http://www.cftt.nist.gov/disk_imaging.htm (visited June 2, 2010). Similar tools also enable centralized evidence acquisition from computers that are attached to a network.

Because of changes to the contents of a computer's hard drive when the computer is booted up, the hard drive's contents should be copied *without* booting up the computer. All of the data on the drive is recorded ("written") in a special file, including deleted files, files in "file slack" (*i.e.*, text fragments within the area allocated to another file), and unallocated drive space (*i.e.*, the area of the drive that is not currently being used, but may contain previously deleted files). The file to which the data is written is "hashed" (*i.e.*, a mathematical signature of the file is computed) to ensure that the contents are not changed after the image has been created. The forensic technologist computes a "hash value" for the copied drive before beginning the duplication process, and computes a hash value for the copy after the process is complete. These values or digital signatures should be the same. Hashing uses an algorithm known as a "hash function" to transform (or "chop and mix") a string of characters—in this situation, the entire contents of the hard drive—into a fixed value that is much shorter than the input value.

NOTE: Hash functions are commonly used as "keys" in databases to speed up data retrieval. Certain hash functions, notably the MD-5 algorithm and secure hash algorithm (SHA) family, which were developed initially for use in cryptography, have two characteristics that make them extremely useful in forensic applications. First, it is "computationally infeasible" (statistically very unlikely) to derive the original value (*i.e.*, the drive's contents) from the hash value. Second, it is "computationally infeasible" to obtain the same hash value from different input characters. This means that it is not possible to reverse the process and somehow figure out what data was on the disk drive by knowing the hash value. Also, one is extremely unlikely to be able to compute the same hash value from two different disk drives, because changing even one letter or character on the disk would change the resulting hash value. In laboratory settings it has been shown that the same hash value can be created from different input streams but it is "computationally infeasible" or extremely unlikely to happen in a real world scenario.

Throughout the data acquisition process, the image is continually verified by certain calculations. These "checksums" are calculated periodically to catch any errors in order to prevent the situation in which an entirely new copy or image would have to be made, after hours of copying, because of an error made early in the process. Many forensic technologists make two bitstream copies: one to analyze (the working copy) and another to preserve as evidence that no data was altered in the analysis process. Because the two copies are both exact (bit-for-bit copies of the original target disk drive), the hash values or digital signatures should always match. If there is a question of alteration or deletion of data from the working copy, a comparison may be made of the hash values of the two drives to confirm that the values are still the same.

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b. Hard Disk Drives on Network E-mail Servers and Data Storage Arrays

§14.27 (1) Network E-mail Servers

Depending on a company's e-mail storage procedures, there may be large volumes of e-mail stored on the company's network e-mail servers. If this information must be preserved and acquired, imaging procedures similar to those described in §14.26 may be used to copy this data for sorting, culling, and analysis in the investigation of the company.

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§14.28 (2) Network Data Storage Arrays

Many organizations store shared electronic files that consist of documents, reports, and research information on network servers. If these documents, reports, or other information are deemed to hold potentially important evidence, they will need to be imaged (see §14.26) for further analysis and possible presentation in court.

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§14.29 2. Magnetic Tapes and Network Backup Systems

Corporate computer network backup systems usually store data from the organization on media other than disks, such as magnetic tape. This data will consist of user files, e-mail, corporate financial database transactional information, and other organizational information generated by the computers in that organization. Backup systems are notorious for both their complexity and fallibility. Consequently, it is not uncommon to find that backup tapes that have been stored for many months or years have become unusable because of deterioration of the media or corruption of information as a result of being stored in an unsuitable environment.

A well-organized corporate IT department typically will test the restoration process periodically to determine whether the software, hardware, and backup processes are likely to work when needed in the future. Even with periodic testing of the backup systems, it is common to find individual backup tapes that present difficult challenges when trying to obtain information from the tapes. Because of the fragile nature of backup tapes, it may be recommended that a forensic technologist create an exact duplicate of the backup tapes before trying to create a catalog (or index) of the tapes.

Restoring backup tapes, however, can be an expensive and time-consuming process, because reading a tape on a tape drive other than the one that was used to create the tape can be not only difficult but also sometimes impossible. If an organization has a large number of backup tapes, it can take more than a year to fully restore all of the tapes, analyze the data, and pull out the relevant documents.

NOTE: A forensic technologist usually will be able to master the tape restoration process and gather information or evidence from the backup tapes, but it is not unusual to spend more than $500 per tape to carry out the restoration process.

The expense involved raises the associated issue of who will pay for the restoration. An argument is plausible that a corporation that is the subject of an investigation may be compelled to make the relevant backup tapes available for inspection, but that the requesting party should be required to pay the cost of any special processing needed to access the data on them (by analogy to CCP §§2031.060(e), 2031.280(e)). For related discussion, see chap 13.

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§14.30 C. Restoration of Lost, Deleted, Altered, or Corrupted Data and Documents

After computer hard disk drives, backup tapes, and other information storage devices of a corporation have been imaged and analyzed, a decision must be made whether to attempt restoration of lost, deleted, altered, or corrupted data. Forensic technologists have a number of software tools to restore documents, e-mail, and other electronic files for analysis (see §14.12). These tools change rapidly as a result of the changes in computer operating systems and hardware used in corporate settings. Many of these tools are proprietary tools developed for specific types of computer or e-mail systems.

Depending on the scope of the investigation, a forensic technologist may attempt to restore all deleted data or only information for the primary target of the investigation. The approach taken will depend on whether the investigation is wide-ranging (with numerous investigation targets) or focused on a particular individual (a single target) or small group of individuals. Often, the restoration of deleted information from one or two targets will provide sufficient evidence or justify expanding the restoration attempts to other targets.

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§14.31 D. Analysis of Data Using Anomaly Detection

There is an emerging science of anomaly detection that is used in fraud and anti-money laundering investigations. A forensic technologist involved in such an investigation will make use of software to detect anomalies in general ledger and financial systems.

In a typical case of suspected fraud or other criminal activity, a forensic technologist, in collaboration with a forensic accountant or an attorney, analyzes an organization's financial data located within the organization's enterprise resource planning system (ERPS) by looking for anomalies. Finding anomalies requires these collaborative professionals to design queries that are applied to the ERPS. Because ERPSs are logically structured and designed to facilitate the retrieval of information, querying an ERPS for specific information or with specific criteria in mind can enable a forensic accountant to precisely locate information that would take days or weeks to find if paper records had been used by the corporation.

For example, in a money laundering investigation, a forensic accountant would first determine what information is needed for the investigation and the forensic technologist would determine whether this information or data is contained within the ERPS. The forensic accountant, attorney, and forensic technologist would then collaborate on how this information needs to be queried and presented.

Anomaly detection tools are usually proprietary. They range from simple database tools (used for disbursement or accounts payable analysis) to highly developed fraud, waste, and abuse anomaly detection services used for analyzing an organization's financial or other data for fraudulent transactions. The most developed of these services uses automation and database analysis tools to review every transaction within a corporation's financial records over several years. This technology can be used, for example, to link "ghost" or fake employees, false vendors, or fraudulent payments with detailed transactions.

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§14.32 E. Generation of Reports

A forensic technologist may be asked to provide a report on his or her findings or analysis. If the report is intended to cover a forensic computer examination of matters such as what was found on the computer, how was the evidence found, and what conclusions may be drawn, then the examiner will need to do a thorough job of documenting the examination process—from how the computer was acquired to what steps were taken, and what tools were used in the examination.

Typically, this report would be peer reviewed by another forensic examiner to determine if the same results could be repeated using the same procedures. This type of report, although necessary, sometimes can be quite costly, because the expertise necessary to do the examination is basically duplicated by the person doing the peer review. However, when a forensic examiner is expected to testify, it is recommended that this extensive procedure be followed.

If, on the other hand, the investigation requires an analysis of a corporate database system or an enterprise resource planning system (ERPS) (see §14.7), the reporting process is not as clearly defined. In that instance, the investigators will have to work with the forensic technologists to determine what data are relevant to the investigation and how might those data be presented as evidence. Nevertheless, if there is a need for testimony about how the data was acquired or analyzed, the forensic technologist will have to carefully document the procedures used and still make the report clear and meaningful to a lay person. If large amounts of data are being aggregated or analyzed, it is common for an economist who is familiar with statistical analysis tools to review the data and present an economic model in a report.

If the investigation is centered on e-mail, text documents, and spreadsheets, it is much more common for counsel and forensic accountants who review the documents to prepare and present their evidence and to discuss the importance of the evidence than to rely on a forensic examiner's report.

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IV. DISCOVERY

§14.33 A. Discovery From Parties Involved in Case

Electronic evidence in the possession of a party to a case may be subject to discovery by statute or under due process principles. See Pen C §§1054(e), 1054.1 (discovery by defense), 1054.3 (discovery by prosecution). Among other things, defendants may obtain electronic evidence from the prosecution that constitutes "relevant real evidence seized or obtained as a part of the investigation of the offenses charged" or "exculpatory evidence." Pen C §1054.1(c), (e). Defendants may also obtain relevant reports of forensic technologists whom the prosecutor intends to call at trial, "including any reports or statements of experts made in conjunction with the case, including the results of physical or mental examinations, scientific tests, experiments, or comparisons which the prosecutor intends to offer in evidence at the trial." Pen C §1054.1(f). Similarly, prosecutors may obtain electronic evidence that a defendant intends to offer in evidence at trial as well as relevant reports from forensic technologists whom the defendant intends to call as witnesses. Pen C §1054.3.

The specific electronic evidence sought will depend on the crime charged and the particular circumstances of the case. Computer hardware (including desktops, laptops, servers, and other storage media) may need to be examined if it is itself contraband or an instrumentality of a crime (*e.g.,* as a means to provide child pornography). In other cases, the relevant evidence might be e-mail messages or other electronic files stored in a computer system that relate to a crime (*e.g.,* records of financial transactions). Counsel should look for such records in whatever media they may be stored in, including CDs and floppy disks, portable hard and flash drives, and PDAs (personal digital assistants).

NOTE: The Penal Code restricts an attorney's ability to disclose child pornography evidence to a defendant and others. See Pen C §1054.10(a).

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§14.34 B. Discovery From Third Parties

In addition to evidence in the possession of a party to the case (see §14.33), prosecutors and defense attorneys should consider what electronic evidence may be in the possession of third parties. For example, victims or other witnesses may have sent or received relevant e-mail messages that no longer exist in the computer system of a defendant or other entity that is the subject of an investigation. Relevant electronic data, like other types of evidence, generally may be sought from third parties through a subpoena duces tecum. See Pen C §1326 (providing for application of Evid C §1560(b)). Third parties may oppose such demands as they do with any other subpoenas by moving to quash. See CCP §1987.1.

Third party e-mail providers or services that store other types of electronic data for individuals or companies may hold a great deal of relevant electronic evidence, including data that may not be available directly from the individual who originally generated or received the data. However, the federal Stored Communications Act (SCA) (18 USC §§2701-2712), which was enacted as part of the Electronic Communications Privacy Act (ECPA), limits information that may be obtained from persons or entities that provide "an electronic communication service" (18 USC §2510(15)) or a "remote computing service" (18 USC §2711(2)) to the public. Specifically, the SCA prohibits such providers from disclosing the contents of communications they hold (and in some circumstances, information about a subscriber) except under certain enumerated exceptions. 18 USC §2702. See *O'Grady v Superior Court* (2006) 139 CA4th 1423, 1440, 44 CR3d 72; see also *Quon v Arch Wireless Operating Co.* (9th Cir 2008) 529 F3d 892, 900, rev'd on other grounds in *City of Ontario v Quon* (June 17, 2010, No. 08-1332) 2010 US Lexis 4972 (violation for vendor to provide text messages to company paying for service that was not addressee or intended recipient of message). In particular, note that although prosecutors may obtain communications or other records through warrants, subpoenas, or court orders in certain circumstances (18 USC §§2702(b)-(c), 2703), the SCA does not provide such mechanisms for criminal defendants or private civil litigants. See 139 CA4th at 1440; U.S. Department of Justice, *Searching and Seizing Computers and Obtaining Electronic Evidence in Criminal Investigations,* App B, C, E (3d ed., Sept. 2009), available at http://www.cybercrime.gov/ssmanual/index.html (sample prosecution subpoena language under 18 USC §2703); Zwillinger & Genetski, *Criminal Discovery of Internet Communications Under the Stored Communications Act: It's Not a Level Playing Field,* 97(2) J Crim L & Criminology, 569 (Winter 2007). For an overview of the SCA, see Kerr, *A User's Guide to the Stored Communications Act, and a Legislator's Guide to Amending It*, 72(6) Geo Wash L Rev, 1208 (Aug. 2004).

Other provisions of the ECPA address the monitoring of electronic communications in transit and the use of pen registers and trap devices. See, *e.g.,* 18 USC §§3121-3127; U.S. Department of Justice, *Searching and Seizing Computers and Obtaining Electronic Evidence in Criminal Investigations,* App D (3d ed., Sept. 2009), available at http://www.cybercrime.gov/ssmanual/index.html.

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V. EXPERT TESTIMONY

A. Preparing and Qualifying Computer Forensics Expert

§14.35 1. Preparing Expert

If an investigation involving a corporation leads to a criminal case that goes to trial, computer forensic experts may be called on to testify regarding electronic evidence in the case. Experts might include forensic technologists who were retained at an early stage by the corporation and who have participated in the initial collection and analysis of evidence. Alternatively, when evidence is first identified or seized by police authorities, either the proponent or opponent of that evidence might separately hire an expert to interpret the data and testify about it in court. See *People v Hawkins* (2002) 98 CA4th 1428, 1437, 121 CR2d 627 (discussing testimony of computer expert who assisted District Attorney's investigator). The expert should, therefore, be able to explain the software and other tools used in understandable layperson's terms. As discussed further in §14.43, however, admissibility of computer records may require the testimony of persons who created or maintained the records in addition to, or instead of, the forensic technologist or law enforcement agent who discovered them.

In preparing an expert to testify about an investigation, the key is to have the expert provide enough detail about the relevant steps in the investigation so that a lay fact-finder can follow the process and see that it is reliable and logical (and that the expert is knowledgeable and credible)—but not to inundate the fact-finder with technical minutiae that will distract and bore. Facts to review with the expert include the following:

- What is the evidence? Does it consist of data that a person specifically created and stored in the computer, or data that the computer automatically generated through its operation?
- Where was the evidence collected (*e.g.,* in individual workstations, loose media, or a central server)?
- How was the evidence collected? For example, were mirror images made? Were they done onsite or in a lab? What tools were used?
- Who collected the evidence and for what purpose?
- Can a chain of custody of the evidence be established? If it can, what is the chain? Where was the evidence kept? Who had access to it? What steps were taken to prevent tampering?

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§14.36 2. Qualifying Expert

In preparing questions to qualify an individual in court as a computer forensics expert, counsel should focus on the following subject areas:

- Is the expert accredited by or associated with recognized computer forensic examination organizations (see §14.2) such as IACIS, HTCIA, or ACFE (see §14.3)? How did the expert acquire any certifications?
- What training does the expert have in computer forensics? Did the expert take specific classes or receive on-the-job training, or both?
- Does the expert have previous experience in computer crime law enforcement? If so, in what area? For how long? What specific tasks did he or she perform?
- Does the expert have previous experience in the specific type of case at issue? If so, in how many cases? What did he or she do in these cases?
- Does the expert have previous experience testifying as a computer forensics expert? Can he or she explain complicated procedures and technical concepts in a way that is easily understandable by, and interesting to, a judge or lay jury?
- Has the expert published articles (including on the Internet) or texts regarding computer forensics? Counsel should review these for content as well as for style of communication.
- Has the expert taught classes or given public presentations on the subject?

NOTE: Conversely, in cross-examining an opposing expert, these same questions may reveal lack of relevant experience.

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§14.37 B. Challenging Expert's Methodology

Besides challenging an expert's qualifications (see §14.36), eliciting testimony about gaps in the processes used by the expert to collect and analyze the proffered evidence and the expert's lack of understanding of the process may help blunt what may otherwise sound like technical gospel. Counsel should seek assistance from his or her own expert in identifying specific areas of weakness to expose when the witness testifies in court.

Topical areas to explore on cross-examination of an expert who has testified for a proponent of computer forensic evidence might include, for example:

- What steps did the expert take in his or her examination? Did he or she omit or vary from generally accepted procedures?
- Did the expert document the steps taken? What do his or her notes show? Were there any important omissions from or contradictions to oral testimony?
- Where did the expert look for evidence (*e.g.,* which electronic folders or directories in the computer were examined)? Why did he or she omit certain folders or directories? Could evidence in these areas perhaps lead to a different conclusion?
- When was the examination done? Could the system have been tampered with or altered beforehand? What steps, if any, did the expert take to investigate or prevent this possibility?
- Are there limitations on his or her findings? Data may show that certain alterations were made, but do they reliably show who made them and when? Did multiple users have access to the data? Could computer passwords have been stolen, could a workstation have been left unattended, or could the system have otherwise been breached?

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VI. ADMITTING EVIDENCE

§14.38 A. Computer Records as "Writings"

Different evidentiary foundations may need to be laid to admit each of the two types of records that may be involved in cases involving computer forensics (*i.e.*, user-generated data entered into and stored in a computer and computer-generated data of the operations of the computer itself). See §§14.42-14.43.

In general, however, both types of computer evidence fall within the broad definition of "writings" under the Evidence Code, which includes all means of recording, "regardless of the manner in which the record has been stored." Evid C §250. Computer evidence thus raises the same basic evidentiary issues presented by other kinds of writings, and in particular, authenticity and hearsay.

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§14.39 B. Secondary Evidence Rule

A printout or other viewable computer output shown to accurately reflect data stored in a computer is considered an "original" for purposes of the Evidence Code. Evid C §255. Therefore, even before the replacement of the best evidence rule with the secondary evidence rule, computer printouts were ordinarily admissible. For related discussion of the secondary evidence rule, see §13.37.

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§14.40 C. Authentication

Authentication of a writing requires either evidence sufficient to sustain a finding that the writing is what the proponent claims it is or establishing that fact by any other lawful means, such as a stipulation or presumption. Evid C §1400; see Comment to Evid C §1400. A writing must be authenticated before it, or secondary evidence of its content, can be received into evidence. Evid C §1401. For further discussion, see §§14.41-14.44. On the authentication of writings in general, see Jefferson's California Evidence Benchbook, chap 31 (4th ed CJA-CEB 2009).

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§14.41 1. Computer Printout Presumption Under Evid C §1552(a)

Typically, computer evidence is presented in the form of a printout. A printout of computer information or a computer program is presumed to be an accurate representation of the data contained in the computer. Evid C §1552(a). Relying on this presumption, California courts have treated computer printouts as "self-authenticating" (*Ampex Corp. v Cargle* (2005) 128 CA4th 1569, 1573 n2, 27 CR3d 863), at least for purposes of establishing that the "computer's print function has worked properly." *People v Hawkins* (2002) 98 CA4th 1428, 1450, 121 CR2d 627. See *Aguimatang v California State Lottery* (1991) 234 CA3d 769, 797, 286 CR 57 (relying on predecessor statute to Evid C §1552(a)); see *People v Lugashi* (1988) 205 CA3d 632, 642, 252 CR 434 (discussing presumption of predecessor statute to Evid C §1552(a)).

However, the presumption described in Evid C §1552(a) does not apply to computer-generated official records that are certified under Evid C §452.5 (certain computer-generated official court records concerning criminal convictions) or §1530 (certain writings in custody of public entities). Evid C §1552(b). A court may, however, take judicial notice of those records. Evid C §452.5.

PRACTICE TIP: The Evid C §1552(a) presumption "operates to establish only that the computer's print function is working properly" (*i.e.,* that the data in the printout accurately represents the data contained in the computer). *People v Hawkins,* 98 CA4th at 1449. It relieves a proponent who seeks to admit a printout into evidence of the burden of laying a foundation to show that the printout accurately represents the data contained in the computer. However, there is no presumption that the *data itself* is accurate or reliable. The proponent of the evidence should be prepared for challenges to the data itself. For further discussion of Evid C §1552(a), see Jefferson's California Evidence Benchbook §§32.44-32.45, 32.47, 33.11 (4th ed CJA-CEB 2009).

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2. Other Authentication Issues

§14.42 a. Computer-Generated Data

When the underlying electronic data that is sought to be admitted in court is "computer-generated" (*e.g.*, data regarding the date and time a file on the computer was accessed), the authenticity of the data depends on the accuracy of the computer's operations. Thus, if admission of the data is challenged, the proponent of "computer-generated" evidence "must offer foundational evidence that the computer was operating properly." *People v Hawkins* (2002) 98 CA4th 1428, 1450, 121 CR2d 627. For example, in *Hawkins*, printouts of computer file access dates were properly admitted when the prosecution's expert testified that "as far as [he] could tell," the computer's clock was functioning properly when the files were accessed. 98 CA4th at 1448. Even though the expert acknowledged that someone could have changed the time on the computer's clock (98 CA4th at 1437), the court found that "[t]hese limits on the probative value of the printouts affected their weight, not their admissibility." 98 CA4th at 1452. For sample questions to authenticate a printout of a computer log file, see Overly on Electronic Evidence in California §8:6 (2005).

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§14.43 b. User-Generated Data

When the underlying electronic data that is sought to be admitted is generated or manipulated by a computer user and stored in the computer, more "traditional" methods of authentication may be appropriate. For example, a writing may be authenticated by "anyone who saw the writing made" (Evid C §1413) or by evidence of any of the following (Evid C §§1414, 1420-1421):

- The opposing party has admitted its authenticity or acted on it as authentic;
- The writing responded to a communication sent to the purported author; or
- The writing refers to matters that are unlikely to be known to anyone other than the purported author.

E-mail messages, for example, can be authenticated by their authors, like other types of correspondence. See Overly on Electronic Evidence in California §§8.5-8.6 (2005). An expert may also be able to trace the computer or account from which an electronic communication is sent. Overly §§8:2-8:3; Imwinkelried, Evidentiary Foundations §4.03[4][b] (6th ed 2005).

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§14.44 c. No Assumption of Unreliability

California courts (like most other courts) do not assume that computer records are less reliable than other types of records and do not require a proponent "to disprove the possibility of error" in order "to meet the minimal showing required for admission." *People v Lugashi* (1988) 205 CA3d 632, 640, 252 CR 434. Instead, they require only a showing "sufficient" to establish authenticity and to allow the fact-finder to decide ultimately how much weight to give the evidence based on its reliability. This generally means that a person who understands the system's operations and possesses sufficient skill and knowledge to properly use and explain the data can authenticate the computer records. See 205 CA3d at 641.

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D. Hearsay Exceptions

§14.45 1. Business Records Exception

Under the business records exception to the hearsay rule, the proponent of a writing must show the following (Evid C §1271(a), (c)):

- That the writing was made in the regular course of business at or near the time of the act, condition, or event being recorded; and
- The sources of information on which the writing is based and the method and time of preparation establish the writing's trustworthiness.

In addition, the custodian of records or another qualified witness must testify to the writing's identity and mode of preparation. Evid C §1271(b).

Computer-stored records are often admissible under the business records exception to the hearsay rule. See, *e.g.*, *People v Lugashi* (1988) 205 CA3d 632, 640, 252 CR 434. See also *Aguimatang v California State Lottery* (1991) 234 CA3d 769, 797, 286 CR 57; Jefferson's California Evidence Benchbook, chap 4 (4th ed CJA-CEB 2009); 1 Witkin, California Evidence, *Hearsay* §230 (4th ed 2000).

The leading California case is *People v Lugashi* (1988) 205 CA3d 632, 252 CR 434, in which the trial court admitted as business records evidence of transactions obtained from a bank computer system. In affirming the overall judgment (while modifying a portion of the judgment concerning a probationary sentence), the court of appeal concluded that the computer evidence was admissible under Evid C §1271 without foundational testimony on the reliability of the computer's hardware and software. 205 CA3d at 640. The appellate court further concluded that testimony from a computer expert was unnecessary to establish the admissibility of the records because "[a] person who generally understands the system's operation and possesses sufficient knowledge and skill to properly use the system and explain the resultant data, even if unable to perform every task from initial design and programming to final printout, is a 'qualified witness' for purposes of [Evid C] §1271." 205 CA3d at 640. The court also determined that a witness was not disqualified from authenticating the records simply because her knowledge of the system was partly based on hearsay. 205 CA3d at 641. See also *People v Jones* (1998) 17 C4th 279, 307, 70 CR2d 793.

To satisfy the business records exception, the proponent need not demonstrate that a printout was made at or near the time of the events recorded, so long as the data reflected in the printout were so recorded. *Aguimatang v California State Lottery* (1991) 234 CA3d 769, 798, 286 CR 57. In *Aguimatang,* the relevant information was recorded on magnetic tapes as it was generated. Therefore, the relevant writing for purposes of the business records exception was the magnetic tape—not the printout. 234 CA3d at 798.

The federal business records exception, Fed R Evid 803(6), is closely analogous to Evid C §1271, and thus cases construing the federal rule may also be helpful in applying §1271 to electronic business records. See, *e.g., U.S. v Linn* (9th Cir 1989) 880 F2d 209, 216 (hotel director of communications was qualified witness to testify regarding automatically generated telephone records); *U.S. v Catabran* (9th Cir 1988) 836 F2d 453, 457 (when computer-generated general ledger met requirements for business records exception, questions about accuracy of data went to weight, not admissibility).

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§14.46 2. Official Records and Other Exceptions

Although the business records exception to the hearsay rule (see §14.45) is the most common hearsay exception invoked to support the introduction of computer records, other hearsay exceptions may also apply. Thus, for example, computer records have been found to satisfy the official records exception to the hearsay rule in California under Evid C §1280. *People v Martinez* (2000) 22 C4th 106, 119, 91 CR2d 687. See also *Lee v Valverde* (2009) 178 CA4th 1069, 1077, 100 CR3d 867; *Miyamoto v Dep't of Motor Vehicles* (2009) 176 CA4th 1210, 1220, 98 CR3d 459.

Federal courts have also found computer records to satisfy the official records exception to the hearsay rule under the analogous Fed R Evid 803(8). See, *e.g., Hughes v U.S.* (9th Cir 1992) 953 F2d 531, 539.

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E. Nonhearsay Use of Evidence

§14.47 1. Use of Records to Show Computer's Operations

"Computer-generated" data—such as data showing the date and time computer files were accessed—are not considered "statement[s]" by a person (see Evid C §1200) and therefore are not hearsay evidence. *People v Hawkins* (2002) 98 CA4th 1428, 1449, 121 CR2d 627 (involving printouts showing when computer files were accessed, and expert testimony showing that when files were accessed, computer's clock apparently was functioning normally). On the need for foundational evidence showing that a computer was operating properly, see §14.42.

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§14.48 2. Use of Records to Show Certain Operative Facts

Like other writings and out-of-court statements, computer records (other than those generated by the computer itself; see §14.42) are hearsay only if they are used to prove the truth of the statements they are asserting. Evid C §1200; *Aguimatang v California State Lottery* (1991) 234 CA3d 769, 797, 286 CR 57. If offered as evidence for a nonhearsay purpose, they should not have to come within a hearsay exception. See generally *People v Bolden* (1996) 44 CA4th 707, 714, 52 CR2d 485.

Thus, for example, under this concept, computer records are not hearsay if they are used to show operative facts. See generally *Simon v Steelman* (1990) 224 CA3d 1002, 1006 n3, 274 CR 218 (reciting general rule on nonhearsay use of evidence). See also Overly on Electronic Evidence in California §10.2 (2005) (e-mail accepting contract and records used to show nature of relationship and not matter stated in documents are not hearsay).

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VII. CHALLENGING EVIDENCE

A. Challenge Based on Evidence Code

§14.49 1. Authentication and Hearsay Violations

Some courts and commentators have noted that computer evidence may raise heightened concerns regarding authentication compared with hard copy records because electronic documents are easier to alter without detection. See *American Express Travel Related Servs. v Vinhnee (In re Vinhnee)* (BAP 9th Cir 2005) 336 BR 437, 445; Overly on Electronic Evidence in California §8:1 (2005); Imwinkelried, Evidentiary Foundations §4.03[2] (6th ed 2005). Thus, for example, in *Vinhnee,* a bankruptcy court held (and an appellate panel affirmed) that a proponent of computer-stored records had not authenticated the records because the proponent did not make a sufficiently detailed showing of the steps taken to prevent alteration of those records after they had been entered into the computer. Note, however, that although *Vinhnee* discusses authentication of computer records for purposes of admissibility, the case involved a bench trial "in which the roles of court and trier of fact are merged." Thus, the *Vinhnee* analysis is arguably better understood as an ultimate resolution of the authenticity question rather than a preliminary ruling on admissibility. See 336 BR at 443 n3. Nonetheless, an opponent of a particular piece of computer evidence should consider the issues raised in *Vinhnee* to at least minimize the weight of such evidence if it is admitted.

Furthermore, otherwise inadmissible hearsay does not become admissible just because it is stored in and printed out from a computer. In *People v Hernandez* (1997) 55 CA4th 225, 240, 63 CR2d 769, for example, a trial court admitted, under the business records exception, testimony about a database containing information on sexual assaults derived from police reports. In holding that the trial court improperly admitted this evidence, an appellate court reasoned that although the police reports may have been compiled in the ordinary course of business, the sources of information for the reports—victims and witnesses who had no duty to observe and report the relevant facts—did not indicate the trustworthiness of the information under Evid C §1271(d). 55 CA4th at 240. See also *Monotype Corp. PLC v International Typeface Corp.* (9th Cir 1994) 43 F3d 443, 450 (upholding exclusion of e-mail message and distinguishing e-mail messages and messaging systems from "systematic business activity" represented by maintaining bookkeeping records).

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2. Violation of Evidentiary Privileges

§14.50 a. Potentially Privileged Documents Stored in Computers

Information stored in computers may be subject to evidentiary privileges. Although ordered depublished, a 2005 California appellate decision raises issues that counsel should be aware of when dealing with potentially privileged documents stored in computers. *People v Jiang* (withdrawn Sept. 28, 2005; former opinion at 131 CA4th 1027, 33 CR3d 184). More recently, the New Jersey Supreme Court analyzed similar issues. See *Stengart v Loving Care Agency, Inc.* (NJ 2010) 990 A2d 650 (citing cases).

In *Jiang,* the court of appeal held that documents a defendant prepared at the direction of his attorney and stored on a laptop computer issued by his employer were protected by the attorney-client privilege, even though the defendant had signed an agreement with his employer acknowledging that he had no expectation of privacy in the employer's property. 131 CA4th at 1045. The defendant had protected the documents with passwords and segregated them in an electronic folder entitled "Attorney" (131 CA4th at 1051), and the agreement he signed was designed to protect the company's intellectual property and did not preclude personal use of the laptop. 131 CA4th at 1052 (distinguishing *TBG Ins. Servs. Corp. v Superior Ct.* (2002) 96 CA4th 443, 117 CR2d 155).

The appellate court in *Jiang* also concluded that the defendant had not waived the privilege by failing to object to the prosecutor's seizure and review of the documents copied from the laptop onto a CD, because of erroneous representations by the prosecutor and erroneous assumptions by the defense attorney. Both the prosecutor and defense counsel had initially assumed that hard copy printouts (which the defendant's attorney had reviewed for privilege) constituted the entire contents of the CD. *People v Jiang,* 131 CA4th at 1045. In later reviewing of the CD, the prosecutor discovered documents that had blocked access and were not included in the printouts and eventually informed defense counsel of the existence of, and her intent to review, these newly discovered documents. However, the defense counsel mistakenly believed that the prosecutor was referring to another CD of earlier e-mail messages (between the defendant and the victim) obtained from another laptop. 131 CA4th at 1047. Defense counsel immediately objected on receiving copies of the new documents. 131 CA4th at 1048.

Although the *Jiang* court found that the prosecutor's misleading statements about the printouts had "lulled" the defense counsel into believing no privileged documents had been produced (131 CA 4th at 1055), the case highlights the importance of computer literacy for criminal lawyers. Prosecutors and defense counsel alike should be aware that printouts, even if accurate in what they depict, do not necessarily reveal all electronic information that may be available. Electronic versions of documents (or at least of selected key documents) should therefore be reviewed when available. Given that one CD or magnetic tape can look like any other, the contents of electronic media should always be verified and tracked.

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§14.51 b. Mingling of Privileged Materials and Other Data

Federal cases have also noted issues encountered when potentially privileged materials are intermingled with other data on a computer that has been legitimately seized under a warrant. Courts have approved procedures in which the prosecutors took steps to avoid reviewing any potentially privileged documents, including having an attorney who was not part of the prosecution team segregate potentially privileged documents and confer with defense counsel. See, *e.g., U.S. v Kaufman* (D Kan 2005) 2005 US Dist Lexis 18207.

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B. Challenge Based on Privacy Rights or Search and Seizure Issues

1. Privacy Rights

§14.52 a. Growing Body of Law

Advancements in technology associated with electronic information pose new questions about what expectations of privacy courts are prepared to accept as reasonable and protected by the Fourth Amendment to the Constitution. See generally Kerr, *Searches and Seizures in a Digital World*, 119(2) Harv L Rev 531 (Dec. 2005). Although few California courts have addressed these issues, a growing body of federal law has developed (particularly in the context of child pornography cases), and this federal law may provide a viable analytical framework for California state court cases.

In addressing the issue of expectation of privacy in a digital world, courts often analogize to traditional Fourth Amendment cases, especially those involving closed containers. *Trulock v Freeh* (4th Cir 2001) 275 F3d 391, 409. See generally U.S. Department of Justice, *Cybercrime Manual: Searching and Seizing Computers and Obtaining Electronic Evidence in Criminal Investigations* (July 2002); for the online version of this manual, go to www.cybercrime.gov/s&smanual2002.htm. As some courts have recognized, however, a computer can store far more varied and personal information than traditional "containers," and thus additional considerations may be appropriate. In addition, statutes may provide additional privacy protections. See, *e.g.,* §§14.34 (Stored Communication Act), 14.53A (Privacy Protection Act).

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§14.53 b. Reasonable Expectation of Privacy in Computer Use

The initial question counsel should consider in a government agent's seizure or search of computers (or other electronic storage media like CDs or hard drives) is whether the owner or user of the computer has a reasonable expectation of privacy in the computer or its contents, *i.e.,* a subjective expectation of privacy that society is prepared to accept as objectively reasonable. See, *e.g.*, *U.S. v Ziegler* (9th Cir 2007) 474 F3d 1184, 1189. See also *U.S. v Chan* (ND Cal 1993) 830 F Supp 531, 534 (defendant had reasonable expectation of privacy in information electronically stored in pager). In the absence of a reasonable expectation, Fourth Amendment protections are simply not implicated. See *U.S. v Zeigler,* 474 F3d at 1189. This consideration is particularly important in workplace searches and seizures because an employee may have a reasonable expectation of privacy in his or her workplace, even when that workplace is shared with others. *O'Connor v Ortega* (1987) 480 US 709, 717, 94 L Ed 2d 714, 723, 107 S Ct 1492 (public employee); *Mancusi v DeForte* (1968) 392 US 364, 369, 20 L Ed 2d 1154, 1160, 88 S Ct 2120 (private employee). However, what that expectation encompasses depends on a variety of factors and must be decided on a case-by-case basis. *O'Connor,* 480 US at 717, 94 L Ed 2d at 723. See also, *U.S. v SDI Future Health, Inc*. (9th Cir 2009) 568 F3d 684, 698 (individual challenging search of workplace areas beyond own office must show "personal connection" to places searched and materials seized).

With regard to searches and seizures of workplace computers, courts have generally looked at whether the employer has policies limiting employees' personal use of the computers and regularly monitors or audits such use. In the absence of such policies and monitoring, courts have generally found that employees have a reasonable expectation of privacy in their workplace computers, even for non-work-related materials. See, *e.g., U.S. v Slanina* (5th Cir 2002) 283 F3d 670, 676, vacated on other grounds in *U.S. v Slanina* (2002) 537 US 802, 154 L Ed 2d 3, 123 S Ct 69; *Leventhal v Knapek* (2d Cir 2001) 266 F3d 64, 73 (public employee retained limited expectation of privacy in contents of computer when he had exclusive use of office and computer and did not share use of computer with other employees). See also *U.S. v Heckenkamp* (9th Cir 2007) 482 F3d 1142, 1146 (student who connected his computer to university's network retained privacy expectation, although expectation may be reduced if advised of monitoring policy).

On the other hand, when employers have implemented policies to restrict personal use of company computers and monitor such use, courts have generally found that employees lack any reasonable expectation of privacy in their use of the computers. See, *e.g., U.S. v Angevine* (10th Cir 2002) 281 F3d 1130, 1134 (professor lacked reasonable expectation of privacy in images downloaded from Internet because university policy reserved right to monitor Internet use and explicitly warned users that prosecution could result from violations of federal law); *U.S. v Simons* (4th Cir 2000) 206 F3d 392, 398. See also *U.S. v Borowy* (9th Cir 2010) 595 F3d 1045, 1048 (defendant who installed file-sharing software on computer that allowed others to access to computer had no reasonable expectation of privacy); *U.S. v Ganoe* (9th Cir 2008) 538 F3d 1117, 1127 (same). An FBI agent's keyword search and analysis of hash marks retrieved by a nonpublic forensic software program used to locate possible pornography in publicly available files does not violate a defendant's Fourth Amendment rights. *Borowy,* 595 F3d 1045, 1048. So long as a government official has probable cause, downloading publicly available, suspicious files (including some files that triggered a red flag indicating pornographic material) does not constitute an unconstitutional seizure of property. *Borowy,* 595 F3d at 1049. Employees in these situations may not reasonably expect privacy in their computer use even if they retain a general expectation of privacy in their physical office spaces. *Simons,* 206 F3d at 399. But see *U.S. v Zeigler,* 474 F3d at 1190 (because employee has reasonable expectation of privacy in office, search of computer in office must comply with Fourth Amendment).

The U.S. Supreme Court thus far has declined to specifically rule on the parameters of public employees' reasonable expectation of privacy in work-related electronic communications. *City of Ontario v Quon* (June 17, 2010, No. 08-1332) 2010 US Lexis 4972. Nonetheless, in reversing an earlier Ninth Circuit decision finding a government employer's search of employee text messages violated the Fourth Amendment, the Court noted that "employer policies concerning communications will of course shape the reasonable expectations of their employees, especially to the extent that such policies are clearly communicated." *Id.,* slip op. at 11. The Court also set forth examples of other factors that "would … bear on the legitimacy of an employee's privacy expectation," such as whether the employer had modified its policy orally or in practice or whether the employer's review of the messages might be justified for reasons such as performance evaluations, litigation, or compliance with open records laws. *Id.,* slip op. at 10.

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§14.53A c. Privacy Protection Act

The Privacy Protection Act (PPA) (42 USC §2000aa-2000aa-7) imposes additional limitations on government searches and seizures of materials "possessed by a person reasonably believed to have a purpose to disseminate to the public a newspaper, book, broadcast, or other similar form of public communication." 42 USC §2000aa(a)-(b). The PPA forbids such searches and seizures subject to certain exceptions, including when "there is probable cause to believe that the person possessing such materials has committed or is committing the criminal offense to which the materials relate." Although violation of the PPA is not grounds for suppression of evidence, it can subject governmental entities and their officers and employees to civil damages. 42 USC §2000aa-6(a),(e). Also, as the PPA only addresses searches and seizures, it does not limit law enforcement's ability to request materials through a subpoena.

The PPA has not been extensively litigated to date, but the rapid expansion of technology since the PPA was enacted in 1980 raises questions concerning whether persons creating websites, blogs, or other forms of electronic communications may be deemed protected by the Act. For a more detailed discussion of the Act, see U.S. Department of Justice, *Searching and Seizing Computers and Obtaining Electronic Evidence in Criminal Investigations* (3d ed., Sept. 2009), available at http://www.cybercrime.gov/ssmanual/index.html.

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2. Search and Seizure Issues

§14.54 a. Public and Private Searches

If an employee has a reasonable expectation of privacy in his or her computer use (see §14.53), the next question in a Fourth Amendment analysis is who is doing the searching or seizing. When a public employer is investigating employment-related issues, even if criminal conduct is also implicated, no warrant or probable cause is required and the search of a public employee's workplace computer will be upheld if it is reasonable. *City of Ontario v Quon* (June 17, 2010, No. 08-1332) 2010 US Lexis 4972; *U.S. v Slanina* (5th Cir 2002) 283 F3d 670, 679; *U.S. v Simons* (4th Cir 2000) 206 F3d 392, 400. See *U.S. v Heckenkamp* (9th Cir 2007) 482 F3d 1142, 1147 (warrantless search of student's computer by public university system administrator justified by need to protect university computer system).

Law enforcement agents may also utilize evidence obtained from private searches without a warrant in certain cases. See *People v Wilkinson* (2008) 163 CA4th 1554, 78 CR3d 501 (police officer's viewing of web cam images that private searcher had already viewed was within scope of private search, but officer's viewing of any additional images that private searcher had not previously viewed and had shown to officer at officer's direction constituted warrantless governmental search subject to Fourth Amendment). See also *U.S. v Runyan* (5th Cir 2001) 275 F3d 449, 464 (when private searchers had accessed some files on defendant's disks, police did not exceed scope of private search by looking at additional files but did exceed scope by looking at other disks that private searchers had not examined). Information otherwise properly gathered in such investigations later may be used as evidence in criminal proceedings or potentially may provide a basis for law enforcement agents to obtain a warrant for further searching. However, when law enforcement agents direct private employees to conduct a search, such employees are treated as de facto government agents conducting a government search. *U.S. v Ziegler* (9th Cir 2007) 474 F3d 1184, 1190. On the need for a search warrant by a government agent, see §14.55.

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§14.55 b. Need for Search Warrant and Exceptions

When a reasonable expectation of privacy is implicated (see §14.53) and law enforcement agents are conducting a criminal investigation, courts have generally held that the search and seizure of a computer must be authorized by a warrant unless there is an exception to the warrant requirement. See, *e.g., U.S. v Carey* (10th Cir 1999) 172 F3d 1268, 1273 (suppressing evidence when search of computer file exceeded scope of warrant); *U.S. v Arnold* (9th Cir 2008) 533 F3d 1003, 1007 (approving laptop search conducted without warrant at international border under "border search" exception); *U.S. v Romm* (9th Cir 2006) 455 F3d 990, 997 (same); *People v Endacott* (2008) 164 CA4th 1346, 79 CR3d 907 (same).

One common exception to the warrant requirement is voluntary consent. With regard to workplace computers, the Ninth Circuit in *U.S. v Ziegler* (9th Cir 2007) 474 F3d 1184, held that an employer who exercises "common authority" over an employee's office and computer may validly consent to a search of the employee's computer, even when the employee has a reasonable expectation of privacy in his or her office. In *Ziegler*, the company's IT personnel had access to all employees' computers, the company routinely monitored employee use of the Internet, and the company informed employees on their hiring that company computers were monitored and not to be used for personal activities. The defendant's downloading of personal items to the computer did not destroy the employer's common authority. 474 F3d at 1191.

For a more detailed discussion of other exceptions to the warrant requirement, see 4 Witkin & Epstein, California Criminal Law, *Illegally Obtained Evidence* §§194-326B (3d ed 2000). For discussion of common issues that arise with warrants for computer seizures and searches, see §§14.56-14.58.

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§14.56 c. Warrant's Specificity and Breadth

Although a warrant must be sufficiently particular in describing the material that is sought so as not to authorize a "general" search, courts generally do not require a warrant to specify particular computers or media to be searched or seized so long as the warrant is limited to evidence of specified types of crimes. See *U.S. v Brobst* (9th Cir 2009) 558 F3d 982, 993; *U.S. v Banks* (9th Cir 2009) 556 F3d 967, 972; *U.S. v Adjani* (9th Cir 2006) 452 F3d 1140, 1147; *U.S. v Meek* (9th Cir 2004) 366 F3d 705, 715; *U.S. v Hay* (9th Cir 2000) 231 F3d 630, 637; *U.S. v Lacy* (9th Cir 1997) 119 F3d 742, 746. Thus, for example, in *Hay,* the Ninth Circuit approved the seizure of the defendant's entire home computer system, relying on a warrant that authorized the search for evidence of child pornography. 231 F3d at 637. See also *Meek,* 366 F3d at 715 (warrant limited to search for evidence of child exploitation); *Lacy,* 119 F3d at 747 (warrant limited to search for evidence related to particular computer bulletin board). Similarly, California appellate courts have permitted the seizure of a laptop computer when the warrant authorized seizure of items showing "dominion and control" of the premises. See *People v Varghese* (2008) 162 CA4th 1084, 1100, 76 CR3d 449; *People v Balint* (2006) 138 CA4th 200, 207, 41 CR3d 211. For a case in which a seizure was found invalid, see *U.S. v Kow* (9th Cir 1995) 58 F3d 423, 427 (warrant effectively authorizing seizure of every document and computer file and failing to indicate alleged crimes to which they pertained was not sufficiently particular). But see *U.S. v SDI Future Health, Inc.* (9th Cir 2009) 568 F3d 684, 702 n12 (Supreme Court's opinion in *U.S. v Grubbs* (2006) 547 US 90, 98, 164 L Ed 2d 195, 205, 126 S Ct 1494, could affect preference expressed in *Kow* that warrant describe specific crimes of which government suspects defendant).

A broad authorization to seize computers in a particular location can include computers belonging to persons other than the individual targeted for investigation. In *Adjani,* for example, the police seized not only the computer of the person who was the subject of the warrant, but also the computer of that person's roommate. This seizure was permissible because the warrant authorizing a search for evidence of "transmitting threatening communications with intent to commit extortion" was supported by probable cause. 452 F3d at 1144.

In allowing broad warrants for the seizure of computer media, courts have recognized that it may not be possible for law enforcement agents to know precisely where relevant data may be stored. *Lacy,* 119 F3d at 747; *People v Ulloa* (2002) 101 CA4th 1000, 1006 n5, 124 CR2d 799 (noting that "the only physical way to search a computer system for evidence is to seize the whole system"). See also *U.S. v Banks* (9th Cir 2009) 556 F3d 967, 973 (supporting affidavit cites tendency of pornographer to conceal electronic evidence by storing "it in random order with deceptive file names," which requires "expert skill and a properly controlled environment" to uncover). However, the affidavit supporting the warrant should explain the necessity for a blanket seizure. *U.S. v Comprehensive Drug Testing, Inc.* (9th Cir 2009) 579 F3d 989, 998; *U.S. v Hill* (9th Cir 2006) 459 F3d 966, 976. In addition, courts may require other precautions in segregating specific evidence supported by probable cause from other data in the computer, such as having personnel other than the investigating agent perform the segregation. *Comprehensive Drug Testing,* 579 F3d at 1006.

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§14.57 d. Scope of Search Under Warrant

Although a warrant must specifically identify what is to be searched for, the search itself can be broad enough to "cast a sufficiently wide net to capture evidence that is sought." *U.S. v Adjani* (9th Cir 2006) 452 F3d 1140, 1149 (rejecting argument that search should have been restricted to e-mail messages with addressees specifically cited in warrant). In searching for specified evidence, broad searches of unobvious material may be justified because "[c]omputer files are easy to disguise or rename." 452 F3d at 1150. However, as previously noted (see §14.56), government agents may be required to adopt certain protocols in executing the searches. *U.S. v Comprehensive Drug Testing, Inc.* (9th Cir 2009) 579 F3d 989, 999; *U.S. v Greathouse* (D Or 2003) 297 F Supp 2d 1264, 1275 (acknowledging testimony of defendant's forensics expert and noting that there may be situations in which use of preview software to more narrowly tailor computer search is required).

A different issue arises, however, if in the course of conducting an authorized search of computer media for evidence of one crime (*e.g.,* drug sales), investigators discover evidence of a different crime (such as child pornography). The Tenth Circuit has held that investigators should suspend a search to obtain a new warrant when data indicating criminal activity beyond the scope of the previous warrant is inadvertently revealed. *U.S. v Walser* (10th Cir 2001) 275 F3d 981, 987 (approving seeking warrant based on inadvertent discovery of child pornography while searching for evidence of drug trafficking); *U.S. v Carey* (10th Cir 1999) 172 F3d 1268, 1273 (warrant to search hard drive for evidence on drug sales or distribution did not authorize search for child pornography; court essentially viewed each file as separate closed container in which defendant had reasonable expectation of privacy). Similarly, the Ninth Circuit upheld the district court's denial of a defendant's motion to suppress when the government obtained a separate warrant to search for child pornography after inadvertently discovering pictures of children during an authorized search of a computer for records, images, and pictures related to the manufacture of false identification cards. *U.S. v Giberson* (9th Cir 2008) 527 F3d 882, 889. See also Comprehensive Drug Testing, 579 F3d at 998 (plain view doctrine should not be allowed in digital evidence cases); *U.S. v Tamura* (9th Cir 1982) 694 F2d 591, 595 (suggesting that when documents described in warrant are inextricably mingled with other documents, government agents should seal and hold material pending magistrate's approval of further search). But see *U.S. v Williams* (4th Cir 2010) 592 F3d 511, 520 (images of child pornography contained on DVD sufficiently relevant to crimes designated in warrant and also could be seized under plain view doctrine); *U.S. v Runyan* (5th Cir 2001) 275 F3d 449, 464 (treating disk as one "container" and once some files in container were viewed, defendant had no reasonable expectation of privacy in other files in same container).

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§14.58 e. Removing Computers Offsite for Further Searches

A forensic examination of a computer can be quite time-consuming and require specialized tools. Courts, therefore, also have allowed government agents to remove computer systems from their original premises to be searched offsite "because of the time, expertise, and controlled environment required for a proper analysis." *U.S. v Hay* (9th Cir 2000) 231 F3d 630, 637. See also *U.S. v Hill* (9th Cir 2006) 459 F3d 966, 974 (noting risks of power failure and other malfunctions that may occur when accessing data onsite). Indeed, bringing the required equipment and personnel onsite may be even more intrusive, because, among other things, police authorities would have to bring computers equipped to read multiple media types and the process of searching can take a long time. 459 F3d at 974.

Nonetheless, besides searching a computer in the location where it is found or seizing the entire computer, another option for law enforcement agents is to make an exact duplicate of the computer's hard drive in question by creating a bitstream copy. On bitstream copies, see §14.26. Such copies may raise additional Fourth Amendment questions, including the following:

- Is there a seizure if an investigator simply accesses a computer's hard drive and makes a bitstream copy, leaving the computer and its hard drive exactly as they were, or could this procedure be properly likened to a temporary detention and authorized on the basis of something less than probable cause? See Kerr, *Searches and Seizures in a Digital World*, 119(2) Harv L Rev 531, 557 (Dec. 2005); Brenner & Frederiksen, *Computer Searches and Seizures: Some Unresolved Issues*, 8 Mich Telecomm & Tech L Rev 39, 106 (Fall 2001/Spring 2002) (citing *U.S. v Gorshkov* (WD Wash, May 23, 2001) 2001 US Dist Lexis 26306).

- Assuming that making a bitstream copy is a seizure, does the inherent fragility of digital data constitute an *exigent* circumstance that would permit law enforcement personnel to make a bitstream copy without first obtaining a search warrant? See *Schmerber v California* (1966) 384 US 757, 770, 16 L Ed 2d 908, 919, 86 S Ct 1826 (when officer reasonably believed motorist had been driving while intoxicated, warrantless seizure of blood did not violate Fourth Amendment because delay threatened destruction of evidence); *U.S. v Walser* (10th Cir 2001) 275 F3d 981, 985 (noting that "computer evidence is vulnerable to tampering or destruction"); *U.S. v Criminal Triumph Capital Group, Inc.* (D Conn 2002) 211 FRD 31, 55 (concern that computer data could be destroyed, altered, or tampered with constituted exigent circumstances justifying issuing subpoena without advance notice).

- Would the answer to the previous question vary depending on whether the computer was located in the suspect's home or workplace, or on the suspect's person, or in the suspect's car?

- If a bitstream copy can be made without a warrant, does searching the copy require a warrant? See *Kerr,* 119(2) Harv L Rev at 562.

NOTE: When the government seeks to compel a defendant to provide a password to access locked computer files, the defendant may seek to invoke the Fifth Amendment's protection against self-incrimination. At least one court has held that a defendant may not be so compelled. *U.S. v Kirschner* (ED Mich Mar. 30, 2010) 2010 US Dist Lexis 30603. On the other hand, a defendant may be required to produce an unencrypted version of the files where the government already knows of the existence and location of the files and will not use the act of production as evidence of authentication. *U.S. v Boucher* (D Vt Feb. 19, 2009) 2009 US Dist Lexis 13006. See also *U.S. v Pearson* (NDNY May 24, 2006) 2006 US Dist Lexis 32982.

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VIII. SAMPLE QUESTIONS

A. Admitting Evidence

§14.59 1. Admitting Computer Printout

To authenticate a computer printout showing when computer files were accessed similar to the printout admitted in *People v Hawkins* (2002) 98 CA4th 1428, 1449, 121 CR2d 627 (see §14.42), a proponent of admitting the printout as evidence might ask the forensic technician who prepared the printout questions such as those presented below. For additional checklists and sample direct and cross-examination questions regarding admitting business records, see Effective Introduction of Evidence in California, chap 13 (2d ed Cal CEB 2000); Anno, *Admissibility of Computerized Private Business Records,* 7 ALR4th 8, §2[b] (2005); Overly on Electronic Evidence in California §§10.5, 10.7-10.8 (2005).

Q: Do you recognize the computer printout marked as Exhibit A?

Q: From which computer was this printout made?

Q: Would you please explain the steps you took to prepare it?

Q: What commands did you run to display and print the access times?

Q: Was Exhibit A generated from these commands?

Q: Did you examine the computer's clock before you made the printout?

Q: If so, was the computer's clock functioning properly?

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§14.60 2. Admitting Bank Records

To admit bank records of credit card transactions similar to those at issue in *People v Lugashi* (1988) 205 CA3d 632, 642, 252 CR 434, under the business records hearsay exception, the proponent might ask the bank employee who prepared the printouts questions such as the following:

Q: What are your job responsibilities?

Q: Are you familiar with the bank's computer systems for tracking credit card transactions?

Q: Is tracking such transactions part of the bank's regular course of business?

Q: How do transactions get recorded into the system?

Q: When are transactions entered into the system?

Q: Do you recognize the computer printout marked as Exhibit B?

Q: Did you prepare the printout?

Q: If so, would you please explain the steps you took to prepare it?

Q: What queries did you run?

Q: Would you please explain what this printout shows?

Q: Does this printout show the transactions for account number *X*?

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B. Opposing Admission of Evidence

§14.61 1. Challenging Admission of Computer Printout

The threshold of reliability for admitting electronic evidence is relatively low. See §§14.38-14.48. Nonetheless, an opponent can challenge the persuasive weight of a printout similar to that offered in *People v Hawkins* (2002) 98 CA4th 1428, 121 CR2d 627, by asking questions such as those below. Note that although, apparently, the printout in *Hawkins* did not provide user information, other programs or systems may reveal more extensive data.

Q: Do you know if the computer's clock was working properly at the time the files were accessed (as opposed to the time when you created the printout)?

Q: Can you tell if there have been any system "crashes"?

Q: It is possible to change the time settings on a computer, right?

Q: Do you have any way of knowing if that was done on this computer before the files were accessed?

Q: Do you know if there were any changes to the time settings after the files were accessed?

Q: Do you have any way of determining who accessed the files?

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§14.62 2. Challenging Admission of Bank Record

Challenging a proffered business record of credit card transactions may involve questions such as the following:

Q: Is there anyone besides you who has access to the bank's computer systems for tracking credit card transactions?

Q: How is access to the systems controlled?

Q: Is there any way to show who accessed the systems and when?

Q: Is it possible to delete or change the information after it has been entered?

Q: Is it possible to add transactions in other ways?

Q: Has the bank changed the hardware or software it uses to track and store transaction information since the time of the transactions?

Q: How much time elapses between when a transaction takes place and when information about that transaction is entered?

Q: How is information entered into the system?

Q: Are there any procedures to double-check the accuracy of the information?

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15

Global Positioning Systems (GPS), Cell Phones, and Other Tracking Devices

Elena Condes

I. GLOBAL POSITIONING SYSTEMS (GPS) AND TRACKING DEVICES

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I. GLOBAL POSITIONING SYSTEMS (GPS) AND TRACKING DEVICES

A. Global Positioning Systems (GPS)

§15.1 1. Growth of Industry

The use and inclusion of Global Positioning Systems (GPS) in everyday electronics has been increasing over recent years and will likely continue to rise. "Global GPS sales have surpassed $20 billion a year," said the Commerce Department's David Sampson, "and will keep on growing at a healthy rate, according to industry estimates." See Pellerin, *United States Updates Global Positioning System Technology,* America.gov (Feb. 3, 2006), available online at http://www.america.gov (for direct link, enter article title into Search field). Nearly 35 million of these handheld or dashboard-mounted units were sold around the world in 2007, twice as many as in 2006. The Netherlands-based TomTom and its main rival, American Garmin, make nearly half of all personal navigation devices. See *Location Location Location: Where Is the Navigation Industry Heading?,* The Economist (Oct. 4, 2007), available to subscribers online at www.economist.com/business/displaystory.cfm?story_id=9916519.

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§15.2 2. GPS Use by Law Enforcement

As use of GPS devices for consumers and private citizens increases, so does their use by law enforcement in crime investigation and prevention. GPS technology is used to monitor both suspects and convicted criminals. Szep, *GPS Grows as a Crime-Fighting Tool in U.S.,* Reuters (May 14, 2008), available at http://www.reuters.com (for direct link, enter article title in the Search field).

Both Massachusetts and North Carolina have successfully used the system to monitor domestic violence offenders, as the devices alert law enforcement when an offender enters a prohibited geographic area. Another use for GPS devices is to enforce house-arrest sentences or conditions of probation for nonviolent and juvenile (in California) offenders. Pen C §§1203.016, 1210.7; *In re R.V.* (2009) 171 CA4th 239, 89 CR3d 702. See Szep, supra. In 2006, California passed the Sexual Predator Punishment, Control, and Containment Act (Stats 2006, ch 337), which requires sex offenders who are committed to prison and released on parole for an offense (or any attempt) listed in Pen C §290(c) to be monitored and placed on a GPS for the term of his or her parole. Pen C §§3000.07, 3004(b).

GPS tracking devices have also been used by law enforcement for the following purposes:

- To track a vehicle purchased or used for the purpose of transporting drugs into one state from another (*People v Tolliver* (2008) 160 CA4th 1231, 1237, 73 CR3d 375; *U.S. v Covarrubias* (D Or 2007, No. 06-CR-116-BR) 2007 US Dist Lexis 199);

- To perform surveillance of suspected marijuana cultivators (*U.S. v Pineda-Moreno* (9th Cir 2010) 591 F3d 1212; *U.S. v McIver* (9th Cir 1999) 186 F3d 1119;

- To place a suspect's vehicle at the location of incidents of arson in a national forest (*U.S. v Eff* (5th Cir 2008) 524 F3d 712, 714);

- To prove importation charges by showing that a boat has traveled from outside U.S. territory waters (*U.S. v Bennett* (9th Cir 2004) 363 F3d 947); and

- To show modus operandi in marine drug importation schemes (*U.S. v Lopez* (1st Cir 2002) 282 F3d 1).

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B. Cell Phones

§15.3 1. Convergence of Cell Phone and Navigation Gear Technology

While cellular telephone usage is also increasing, it is clear that mobile phones and navigation gear are converging. In late 2007, Navteq, based in Chicago, "formally accepted an $8.1 billion offer from Nokia, the world's largest mobile-phone maker, and a month prior to that Garmin, a Kansas City-based GPS-maker, withdrew its $3.3 billion hostile bid for Tele Atlas, leaving the map-maker to rival TomTom." See *GPS Changes Direction,* The Economist (Dec. 14, 2007), available to subscribers at www.economist.com/business/displaystory.cfm?story_id=9916519. According to information in Wikipedia, over 150 million smartphones with GPS capabilities were sold in 2009. See http://en.wikipedia.org/wiki/Global Positioning System navigation device.

The Federal Communications Commission (FCC) is requiring that all wireless licensees be E911 (extended 911) compliant. The second phase of the E911 program will require all wireless carriers to provide latitude and longitude information of a caller with an accuracy range within 50-300 meters. See the FCC's *Enhanced 9-1-1—Wireless Services* (visited June 2, 2010), available at http://www.fcc.gov/pshs/services/911-services/enhanced911/Welcome.html. While grounded in concerns over public safety, the implementation of the E911 program gives rise to yet more concerns over privacy. See Wrolstad, *Where's the Fire? E911 Strategies Slow to Ignite,* Mobile Tech Today (June 7, 2001).

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§15.4 2. Law Enforcement Uses

Modern cellular phones also offer tracking capabilities that may be used by law enforcement. It seems that cell phones (perhaps more than GPS devices) are implicated in a couple of different ways. If they have tracking devices in them, then they could be used to monitor movement. But they also capture content of communications through text messages and phone conversations. It appears that different legal issues arise with respect to the right to privacy and right against self-incrimination, depending on how or which type of cell phone evidence is going to be used. The ease with which law enforcement can obtain information from such systems raises interesting and new issues in privacy and the constitutional protections of the users of such devices and limitations of those seeking the information obtained by those devices.

- **Text message and call data.** Cell phone text messages that had been carefully deleted were recovered and used as evidence in a murder trial. A pastor of the Pentecostal congregation in the small community of Knutby was sentenced to life in prison for persuading one of his lovers (the au pair) to shoot and kill his wife and for trying to kill the husband of another mistress. Two days after the murder, the pastor's au pair, Sarah S., claimed that she did it. Despite her claims, the police believed she had an accomplice. The strongest evidence against the pastor was the extensive communication through text messages and voice calls between him and the au pair on the day of the murder and just before that. What they did not know was that their (anonymously sent and) carefully deleted text messages were possible to recover. Burnett & Hård af Segerstad, *The SMS Murder Mystery: The Dark Side of Technology,* Safety & Security in a Networked World: Balancing Cyber-Rights & Responsibilities (Sept. 2005) (for the online version of this article, go to http://www.oii.ox.ac.uk/microsites/cybersafety/extensions/pdfs/papers/robert_burnett.pdf), cited in Jansen, Delaitre & Moenner, *Overcoming Impediments to Cell Phone Forensics,* 41st Haw Int'l Conf on Sys Sciences (HICSS) (Jan. 2008), at http://csdl2.computer.org/comp/proceedings/hicss/2008/3075/00/30750483.pdf.

NOTE: However, the Ninth Circuit has decided that users of text messaging services such as those provided by Arch Wireless have a reasonable expectation of privacy in their text messages stored on the service provider's network. *Quon v Arch Wireless Operating Co, Inc.*. (9th Cir 2008) 529 F3d 892, rev'd on other grounds in *City of Ontario v Quon* (June 17, 2010, No. 08-1332) 2010 US Lexis 4972.

- **Location data.** Mobile phone evidence led the police to look more closely at a suspect. In one case, the authorities checked a victim's phone and discovered when and where it had been switched off. The only place on that route where the phone could have logged on to the specific location from which it disengaged itself was inside or just outside the suspect's house. This evidence was believed to have forced the suspect to change his story to admit that the victims died in his bathroom. Summers, *Mobile Phones—The New Fingerprints,* BBC News Online (Dec. 18, 2003), available at http://newsvote.bbc.co.uk/mpapps/pagetools/print/news.bbc.co.uk/1/hi/uk/3303637.stm, cited in Jansen, Delaitre & Moenner, *Overcoming Impediments to Cell Phone Forensics,* 41st Haw Int'l Conf on Sys Sciences (HICSS) (Jan. 2008), available at http://csdl2.computer.org/comp/proceedings/hicss/2008/3075/00/30750483.pdf. In another case, cell tower records placed the defendant along the route the victim had taken on the day of his kidnapping and placed the defendant at or near the motel room where the victim had been kept and at the victim's bank the next day. *People v Reyes* (2009) 178 CA4th 1183, 1188, 101 CR3d 109 (motion to suppress denied).

- **Impeachment of alibi testimony.** Prosecution introduced records for defendant's cellular telephone at trial, showing that his location during the critical period was inconsistent with his testimony. *People v Walker* (2006) 139 CA4th 782, 791, 43 CR3d 257.

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§15.5 C. GPS Explained

Global Positioning System (GPS) is a United States space-based navigational system initially developed by the U.S. Department of Defense and later opened for civilian and commercial use in 1996. The GPS system currently utilizes a constellation of up to 31 satellites that orbit the earth every 12 hours and their ground stations, located in Hawaii, Ascension Island, Diego Garcia, Kwajalein, and Colorado Springs, which together provide the user with longitude, latitude, and altitude information as well as the precise time.

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§15.6 1. How GPS Works

Each GPS satellite contains a high-frequency radio transmitter that sends information back to earth, where a GPS receiver locks onto the signals. The process by which the GPS receiver can accurately determine the satellite's location is known as triangulation.

The term triangulation refers to the way a GPS receiver determines position by calculating the distance to three or more GPS satellites. The following is an example of how this process works:

Let's assume that we find ourselves at a point in space 11,000 miles from a particular GPS satellite. This would mean that we could be located at any point on the surface of a sphere with a radius of 11,000 miles that is centered on the particular GPS satellite. Next, suppose that we determine the distance from our (as-yet-unknown) location to a second GPS satellite and find that this distance is 12,000 miles. This implies that we are also located on the surface of a second sphere with a radius of 12,000 miles centered on the second satellite. Now we can see that we must be located somewhere on the circle that is defined by where the two spheres intersect. If we calculate the distance between our location and a *third* satellite and find that this distance is, say, 13,000 miles, then using the same logic as before we find that we must be located on either one of the two points defined by the intersection of the three spheres. Usually one of these two points can be eliminated as a possible location because it is unrealistically far from the earth … [h]owever, we can determine our true location without any guesswork by measuring the distance to a *fourth* GPS satellite. [Emphasis original.] Egbert & King, The GPS Handbook: A Guide for the Outdoors (2003).

The satellites orbit the earth in such a way that there are always at least six satellites within the line of sight of almost every location on the earth's surface. The GPS receiver determines the distance a particular satellite is from the earth by calculating the time it takes for a radio signal to reach it. The receiver takes a weighted average of the satellite positions and translates that information into specific coordinates such as longitude and latitude. The satellites are equipped with atomic clocks, and the receivers decode the signals in order to synchronize the receiver with the satellite time. See, *e.g., City of Oxford, Georgia v F.A.A.* (2005) 428 F3d 1346, 1354, n18, citing Langley, *In Simple Terms, How Does GPS Work?* Dept. of Geodesy & Geomatics Eng'g, Univ. of New Brunswick (Mar. 24, 2003), available at http://gge.unb.ca/Resources/HowDoesGPSWork.html; *Brown v State* (Tex App 2005) 163 SW3d 818, 824; Egbert & King, The GPS Handbook: A Guide for the Outdoors. See also the Garmin website at http://www8.garmin.com/aboutGPS.

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§15.7 2. How Cell Phones With GPS Work

While more and more cellular phones are equipped with GPS devices, those without the GPS receivers can still provide law enforcement with the location of a cell phone and its user. When the cellular phone is on, it automatically communicates with one or more cell sites or "cell towers." A process known as "registration" begins when the cellular phone is powered on. The cellular phone constantly seeks out the site with the best reception, re-scanning for cell sites every 7 seconds or when the signal strength weakens, regardless of whether a call is made. The towers and phone communicate with each other identifying the phone, the phone's owner, and the service provider, and the tower relays that information to a switching office. As the phone changes location, it automatically switches to the cell site that provides the best reception and continually re-registers as it moves along. Wireless service providers typically keep track of the identity of the cell towers serving a phone at any point in time and of each tower transmitting to the phone. When a phone is in touch with more than one tower, the service provider (or law enforcement, if given permission) can compare the signals and locate the phone through a process of triangulation. See generally *In re Application for Pen Register & Trap/Trace Device With Cell Site Location Auth.* (SD Tex 2005) 396 F Supp 2d 747, 751 n5; Note, *Who Knows Where You've Been? Privacy Concerns Regarding the Use of Cellular Phones as Personal Locators,* 18 Harv J L & Tech 307 (2004).

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§15.8 3. GPS With Embedded Devices That Also Serve as Wiretapping Devices

Cars equipped with telecommunication devices that provide the user with navigational assistance, location of commercial businesses, or recovery of a stolen car as well as request emergency or roadside assistance often combine GPS technology with cellular technology. Some systems are installed in the vehicles, allowing the driver to communicate with a designated call center. In some situations, for example, when the car is in stolen vehicle recovery mode, the call center has the ability to turn on the communication line, and, unbeknownst to the occupants of the vehicle, the conversations of the occupants of the vehicle can be heard and recorded. For example, GPS navigation systems such as General Motors' OnStar offer car owners services including mapping capabilities, stolen vehicle tracking, remote door unlocking, directory information, and emergency roadside assistance. These systems determine location with GPS and communicate with an assistance and services center through the cellular network, offering two-way transmission of both voice and data (including location data). Depending on how the system is managed, law enforcement officials may be able to obtain location information from the service provider, either in real-time or after-the-fact. An explanation of how this system functions can be found in *In re U.S. for an Order Authorizing Roving Interception of Oral Communications* (CA 9th 2003) 349 F3d 1132, 1134.

In analyzing cases where evidence is obtained through listening or recording communications with these types of systems, the federal and state wiretap laws control. For federal wiretapping law, see Title III (Wiretapping and Electronic Surveillance) of the Omnibus Crime Control and Safe Streets Act of 1968 (18 USC §§2510-2522). Section 2518 requires that the company be a "provider of wire or electronic communication service," and the interception must be accomplished "unobtrusively and with a minimum of interference with the services." The court in *In the Matter of the Application of the U.S. for an Order Authorizing the Roving Interception of Oral Communications* (9th Cir 2003) 349 F3d 1132 reversed an order allowing interception of communications on the ground that the company involved could not "assist the FBI without disabling the System in the monitored car." Therefore, the "minimum interference" requirement could not be met. 349 F3d at 1146. See also *U.S. v New York Tel. Co.* (1977) 434 US 159, 172, 54 L Ed 2d 376, 98 S Ct 364.

For state law related to wiretapping, see Pen C §§629.50-629.98 (sunset January 1, 2012), which offers broader protections of wire or electronic communications.

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§15.9 II. USE OF GPS OR TRACKING DEVICES IN COURT

Though case law regarding modern electronic tracking devices is still somewhat sparse, and decisions regarding admissibility of evidence thus obtained appear to be based on analogies to older technology (such as wiretapping, radio tracking devices, and pen registers), various state and federal cases discuss use of GPS and cell phone records for suspect tracking and surveillance, determining the whereabouts of a suspect relative to the scene of a crime, determining the origin of a shipment of illegal goods, and to show modus operandi in drug importation schemes (perpetrators use GPS to facilitate air drops and boat-to-boat transfers and cellular phones to enable boat-to-ground communication). At the time of this printing, while no cases could be found of the defense introducing GPS or cell phone evidence for purposes of exoneration, logically such evidence could be used to establish an alibi or other facts tending to show that the accused was unable to participate in the alleged criminal activity. The defense may also be in a position to object to the introduction of such evidence on various due process and constitutional grounds. See §§15.19-15.24.

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A. Discovery

§15.10 1. Discovery of GPS Data

To the extent the results of GPS or cell phone tracking are to be used to provide evidence independent of first-hand witness knowledge of an accused's former location or route, discovery should include raw data generated by the device as well as any summary reports. See *People v Martin* (2002) 98 CA4th 408, 119 CR2d 679 (prosecution relied on defendant's cell phone records to establish his location in Monterey Park, Chino, and Calabasas during the crucial time period). But see *U.S. v Bennett* (9th Cir 2004) 363 F3d 947, 953 (testimony of officer that GPS device had demonstrated ship's entering U.S. waters from Mexico ruled inadmissible because he had failed to seize the GPS device or to obtain printout of the captured information). Oftentimes, the person using the GPS device or cell phone has access to some sort of summarized data report that does not include all relevant information or the required level of precision or accuracy required. For the complete information, the device itself should be seized, and further discovery should be sought from the provider and manufacturer of such devices. In most cases, this will involve use of a write blocker that will prevent new information from being input into the device during the investigation to ensure the integrity of the existing data while the device is further examined.

The TomTom 910, for example, is essentially a 20 GB external hard drive that can be docked to a PC via USB cable or Bluetooth. The TomTom 910 should be able to transfer information from a cell phone to a computer printer. Third party products for capturing Garmin and other GPS data are available. See, *e.g.,* Paraben's *Mobile Forensics* (visited June 2, 2010), available at http://www.paraben-forensics.com/device-seizure.html, and Berla Corporation's *Blackthorn—GPS Forensics* (visited June 2, 2010), available at http://www.berlacorp.com/blackthorn.html. Individuals have compiled protocols for various GPS devices, several of which can be found at http://vancouver-webpages.com/peter/idx_garmin.html (visited June 2, 2010). See also Garmin's *What Is GPS?* (visited June 2, 2010), available at http://www.garmin.com/aboutGPS.

NOTE: It should be kept in mind that these devices are constantly undergoing upgrades and improvements that may require periodic reassessment of the methods used to capture data.

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§15.11 2. Discovery of Cell Phone Data

Most cellular phones are equipped with means to load applications, store and process personal information independently of a desktop or notebook computer, and synchronize the results. The capabilities of such devices are expanding as digital technology evolves. When cell phones or other cellular devices are involved in a crime, forensic examiners must use tools that allow retrieval and efficient examination of the device's stored information. Recent treatises on current methodologies, along with an assessment of their reliability, can be found on the National Institute of Standards and Technology (NIST) website for the Computer Security Resource Center (Computer Security Division) at http://csrc.nist.gov/groups/SNS/mobile_security/publications.html#forensics (visited June 2, 2010). It is important to note that, with each advance in technological capability of these devices, equipment and software for capturing data must be assessed and potentially upgraded.

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§15.12 B. Expert Testimony

In general, the introduction of cell phone evidence has not necessitated the testimony of an expert witness. See *People v Martin* (2002) 98 CA4th 408, 412, 119 CR2d 679. The prosecution relied on the defendant's cell phone records to establish his location during the crucial time period. Those records showed he made a call that was handled by a cell tower in Monterey Park at 3:34 a.m. The tower is located next to Highway 60 in Paramount. The next call was made in Chino at 4:22 a.m. The Chino cell tower is located about 4 miles from where the body was found. Subsequent calls were handled progressively by cell towers to the west of Chino, ending with a call near his girlfriend's apartment in Calabasas at 5:15 a.m. The girlfriend, Ms. Camolinga, testified that the defendant arrived at her apartment after 5:00 a.m. and left at 7:00 a.m. *People v Martin, supra*. No objection appears to have been made to the prosecution's failure to utilize an expert to comment on the meaning of the cell phone records or the cell tower's placement.

A Florida court also found expert testimony to be unnecessary after the defense argued that cellular phone records custodians should not have been permitted to testify that persons who placed cell phone calls would be within a certain distance (1-3 miles) from the cell towers identified with those calls. *Perez v State* (Fla App 2008) 980 So2d 1126. A Missouri court upheld the testimony of a cellular phone company provider's engineer (testifying for the prosecution) while finding that the defendant's claimed expertise "based on his life experiences and ten years as a customer of Cingular" fell short of the expertise necessary to rebut the prosecution witness's testimony. *State v Manzella* (Mo App 2004) 128 SW3d 602.

Again, depending on the purpose for which the evidence is introduced, several cases have discussed the qualification of an expert who may testify regarding GPS devices. In one example, the defendant objected to the testimony of two witnesses: one (Fenster), who testified how GPS worked and about its reliability; and one (Easterwood), who was employed by the trucking company that maintained the GPS records as a business record. *Brown v State* (Tex App 2005) 163 SW3d 818.

Fenster testified (outside the presence of the jury) (*Brown,* 163 SW3d at 824):

that he worked for Collin County in "GIS" and used GPS daily in his work, such as to prepare maps and to pinpoint the location of residences for purposes including the 911 system. He explained that GPS involves a series of orbiting satellites which transmit signals to Earth. The GPS receiver picks up the signals from several satellites, compares the different lengths of time it took the signal from each satellite to reach the receiver, and uses that information to triangulate the receiver's position on Earth and provide latitude and longitude coordinates. He testified that GPS is accepted as valid in many civilian as well as military applications requiring positioning data, and that the acceptance of its reliability is analogous to that of an electronic calculator. Fenster stated that at the time he was testifying, March 2004, GPS was accurate to within a meter, and in 1993 it was accurate to within a kilometer.

Kori Easterwood testified that (*Brown,* 163 SW3d at 824):

[s]he was the safety administrative coordinator for the trucking company and dealt with "[a]nything that would happen with our drivers or equipment anywhere within the country." Easterwood testified that each of the trucks had a Qualcomm computer with a GPS receiver that would transmit the truck's position to the company, usually about once every hour. State's exhibit 63 was the company's record of that information for appellant's truck for the two weeks he worked for the company, October 29 to November 12, 1993. She testified that she was also able to verify the trucks' positions through fuel purchases, ATM card use, the drivers' check-in calls, and reports from the drivers and the customers about the arrival and departure times of the trucks. For example, the company's records about two of appellant's loads, States exhibits 59 and 60, included the arrival and departure times at the shipping and receiving points and correspond to the GPS locations and times shown for appellant's truck in State's exhibit 63. In Easterwood's experience using the system at the trucking company, the computer system either worked and was accurate or it did not work and "doesn't pull any data."

To the defendant's argument that Fenster was not qualified to testify about the reliability of GPS because his experience with GPS was in his job and because he lacked a "formal background" in GPS technology, the court responded that no authority required a witness testifying about the reliability of GPS to have a "formal background" in GPS. In any event, it found that the witness's bachelor's degree in geography and demonstrated knowledge of GPS's functioning and reliability made it reasonable for the trial court to conclude he was qualified to testify about the reliability of GPS technology. Easterwood, though not qualified as an expert on GPS, was able to explain how the GPS data became a business record of the trucking company. *Brown v State, supra.*

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C. Introducing and Challenging GPS Evidence

§15.13 1. Evidentiary Issues

Foundation, hearsay, and secondary evidence rule (formerly best evidence rule) objections are the most likely when the contents of the tracking device are sought to be introduced in an evidentiary hearing or trial without the device itself or the printout with the information from the device. *U.S. v Bennett* (9th Cir 2004) 363 F3d 947, 954.

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§15.14 a. Laying a Foundation

Case law is still sparse for these modern technologies; however, some guidance exists for the contexts in which a foundation must be laid for evidence to be introduced at trial.

In cases where cell phone billing records are to be introduced, the usual criteria relating to business records apply: it must be established that an exception to the hearsay rule applies (Evid C §1271), and the records must be demonstrated to be authentic (Evid C §§1271, 1561-1562). This is best done by eliciting testimony that the records were made in the regular course of business (Evid C §1271(a)) and at or near the time of the act, condition, or event (Evid C §1271(b)). The custodian or other qualified witness should identify the document and how it was prepared (Evid C §1271(c)); the record must appear trustworthy, based on the source of information and method and time of preparation (Evid C §1271(d)); and the copy produced in court must be a true copy of the records as kept at the place of business. Evid C §1561(a)(2). For further discussion of admitting business records, see Effective Introduction of Evidence in California, chap 13 (2d ed Cal CEB 2000).

In the event expert testimony is required, such as when data must be extracted from a cell phone or GPS device and that data is then required to be interpreted, the proponent of the evidence must develop through that expert's testimony that the expert has special knowledge, skill, experience, training, or education and should be able to explain the process (*e.g.*, extracting and interpreting the data), possibly with the aid of visual representations, so that the trier of fact can understand the process. For discussion of qualifying experts, see chap 3.

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§15.15 b. Hearsay

The hearsay objection in published cases has most often been made when cell phone records were introduced as evidence. It is important, therefore, for the proponent of the evidence to lay a foundation establishing that the documents introduced qualify under the business records exception to the hearsay rule. In California, this means the writing must have been made in the regular course of business and at or near the time of the act, condition, or event and that the custodian or other qualified witness testifies to its identity and the mode of its preparation. In addition, the sources of information and method and time of preparation must have been such as to indicate its trustworthiness. Evid C §1271. For further discussion of admitting business records, see Effective Introduction of Evidence in California, chap 13 (2d ed Cal CEB 2000).

In a federal case, text messages instructing the defendant to quickly "clean" and "flush" because the "cops [are] outside" established by a preponderance of the evidence that the sender was a co-conspirator, thus triggering the co-conspirator exception to the hearsay rule. *U.S. v Engler* (8th Cir 2008) 521 F3d 965, 973. The equivalent California rule may be found at Evid C §1223. For discussion of admissions of co-conspirators, see California Trial Objections §19.16 (Cal CEB Annual). A Hawaiian court has also found that threatening text messages that constituted hearsay were admissions of a party opponent and thus an exception to the hearsay rule. *State v Espiritu* (Haw 2008) 176 P3d 885. The California rule may be found in Evid C §1220; see discussion in Trial Objections §19.13.

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§15.16 c. Secondary Evidence Rule (Formerly Best Evidence Rule)

The so-called "best evidence rule" (former Evid C §§1500-1511) was replaced in California in 1998 by the "secondary evidence rule." Evid C §1521. Under the secondary evidence rule, a party may prove the content of a writing "by otherwise admissible secondary evidence" unless the court determines that "[a] genuine dispute exists concerning material terms of the writing and justice requires the exclusion" or "[a]dmission of the secondary evidence would be unfair." Evid C §1521(a). Under Evid C §1522(a), secondary evidence other than duplicates and certain specified copies may be excluded in criminal cases when the proponent of the evidence has custody or control of the original and has not made the original reasonably available for inspection. For further discussion, see California Trial Objections, chap 24 (Cal CEB Annual).

Since thus far no California case has discussed GPS or cell phone triangulation or tracking evidence in relation to the secondary evidence rule, the following Ninth Circuit federal case is used to illustrate how that concept might be applied in a state court. The federal court continues to use the term "best evidence rule." In *U.S. v Bennett* (9th Cir 2004) 363 F3d 947, 954, a GPS device was used on a boat that was seized by members of a joint task force targeting smuggling activity from Mexico into Southern California who, after an extensive search, discovered over 1500 pounds of marijuana. The defendant challenged the charge of illegal importation, which requires that the contraband come from a place outside the United States. The GPS device had a "backtrack" feature that graphed the boat's journey the day it was seized as well as "way points"—navigational points programmed into the GPS to assist the boat captain in navigation. A U.S. Customs officer seized the device during the search of the boat and later testified in trial about the information he retrieved from the device. However, the officer failed to take possession of the device, nor did he obtain any records of the data contained therein. At trial, the officer testified about the "way points" and the "backtrack" information he retrieved from the GPS device that mapped a journey from Mexico into U.S. waters. None of the officers testified as to independent observations of the boat traveling from Mexican waters to U.S. waters. The defense objected to the introduction of the officer's testimony citing, among other things, the best evidence rule.

The federal best evidence rule provides that the "'writing, recording, or photograph' is required to prove the contents thereof. Fed R Evid 1002. A writing or recording includes a 'mechanical or electronic recording' or 'other form of data compilation.' Fed R Evid 1001(2). An original is the writing or recording itself, a negative or print of a photograph or, '[i]f data are stored in a computer or similar device, any printout or other output readable by sight, shown to reflect the data accurately.' Fed R Evid 1001(3)." *U.S. v Bennett,* 363 F3d at 954.

"When the rule applies, the proponent must produce the original (or a duplicate, *see* Fed R Evid 1003) or explain its absence.… [T]he rule does apply when a witness seeks to testify about the contents of a writing, recording or photograph without producing the physical item itself—particularly when the witness was not privy to the events those contents describe." *U.S. v Bennett,* 363 F3d at 954. In *Bennett,* the court made findings that led to ruling that the officer violated the best evidence rule. First, the GPS display was a writing or recording because the officer testified that he saw a graphical representation of data compiled by the GPS device. Second, the officer did not observe the boat traveling the path represented on the device. 363 F3d at 953. Thus, the officer's testimony concerned the "content" of the GPS, and he did not produce the GPS itself nor a printout of the data. Accordingly, the court reversed the conviction on the importation charge. 363 F3d at 954. But see *State v Espiritu* (Haw 2008) 176 P3d 885 (distinguishing *Bennett* when, in contrast, the cell phone containing text messages is unavailable).

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§15.17 2. *Kelly/Leahy* Issues

If trial counsel wishes to introduce evidence that is based on a new or novel scientific technique, he or she must first establish the reliability of the new or novel technique under the *Kelly* rule. See *People v Kelly* (1976) 17 C3d 24, 30, 130 CR 144; *People v Leahy* (1994) 8 C4th 587, 598, 34 CR2d 663. For detailed discussion of the *Kelly* rule, see chap 2.

At the time of this printing, there is no ruling on GPS or cell phone technology in California. However, a Florida appellate court has held that a so-called *Frye* hearing (equivalent to what is now referred to in California as a *Kelly* hearing) was not necessary to determine the reliability of evidence from an in-vehicle telecommunication system. *Still v State* (Fla App 2005) 917 So2d 250, 251. The court stated that the evidence in the case was nothing more than "commonplace global positioning satellite (GPS) technology, a technology which has been generally accepted and used for years." The court added that "[t]he OnStar system is not new or novel scientific evidence; it is basically a tracking system that uses GPS technology." 917 So2d at 251.

NOTE: *Still* cites the following cases from other jurisdictions as holding that tracking technology is admissible without conducting a *Frye* hearing, see, *e.g., State v Vermillion* (Wash App 2002) 51 P3d 188; *People v Cortorreal* (App Div 1999) 695 NYS2d 244, 181 Misc 2d 314. *Still*, 917 So2d at 251.

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§15.18 3. Accuracy

In specific circumstances, the accuracy of the GPS tracking output could potentially also be called into question. Sources for inaccurate results include (see Garmin's *What Is GPS?*, available at http://www8.garmin.com/aboutGPS):

- **Ionosphere and troposphere delays.** Ionosphere and troposphere delays are caused by the satellite signal slowing as it passes through the atmosphere. The Garmin GPS system uses a built-in model that calculates an average amount of delay to partially correct for this type of error.
- **Signal multipath errors.** Signal multipath occurs when the GPS signal is reflected off objects such as tall buildings or large rock surfaces before it reaches the receiver, increasing the travel time of the signal and causing errors.
- **Receiver clock errors.** A receiver's built-in clock is not as accurate as the atomic clocks onboard the GPS satellites. Therefore, it may have very slight timing errors.
- **Ephemeris or orbital errors.** Ephemeris or orbital errors are inaccuracies of the satellite's reported location.
- **Number of satellites visible.** The more satellites a GPS receiver can "see," the greater the accuracy. Buildings, terrain, electronic interference, or sometimes even dense foliage can block signal reception, causing position errors or possibly no position reading at all. GPS units typically will not work indoors, underwater (such as in a tunnel), or underground.
- **Poor satellite geometry.** Satellite geometry or shading refers to the relative position of the satellites at any given time. Ideal satellite geometry exists when the satellites are located at wide angles relative to each other. Poor geometry results when the satellites are located in a line or in a tight grouping.
- **Intentional degradation of the satellite signal.** Selective availability (SA) is an intentional degradation of the signal once imposed by the U.S. Department of Defense. SA was intended to prevent military adversaries from using the highly accurate GPS signals. The government turned off SA in May 2000, which significantly improved the accuracy of civilian GPS receivers.

For further discussion, see Seo, Walter, Chiou & Enge, *Characteristics of Deep GPS Signal Fading Due to Ionospheric Scintillation for Aviation Receiver Design,* Stanford Univ. (2008), available at http://waas.stanford.edu/~wwu/papers/gps/PDF/SeoIES08.pdf (visited June 2, 2010); Weiss, Petit & Jiang, *A Comparison of GPS Common-View Time Transfer to All-in-View* (2005), available at http://tycho.usno.navy.mil/ptti/ptti2005/paper40.pdf.

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§15.19 III. CONSTITUTIONAL CHALLENGES

The law concerning the constitutionality of the use of GPS or cell phone tracking by law enforcement is evolving and by no means uniform. It can be further broken down by addressing the defendant's right to be free of unreasonable search and seizure (*i.e.,* does the surveillance require probable cause or a search warrant?), with part of the analysis devoted to the defendant's reasonable expectation of privacy in conducting the activity for which a search, seizure, or surveillance is proposed and his or her right to be free of unreasonable search and seizure. Prior to the advent of these new technologies, the law concerning radio-tracking devices was well settled after *U.S. v Knotts* (1983) 460 US 276, 75 L Ed 2d 55, 103 S Ct 1081, and *U.S. v Karo* (1984) 468 US 705, 82 L Ed 2d 530, 104 S Ct 3296. These cases held that so long as the conveyance or "thing" to be monitored is out and about on "public thoroughfares," "open fields," or even on private property—all instances where the information revealed by the surveillance target could be observed by visual surveillance engaged in by third parties—no showing of any evidence or probable cause was required. *Knotts,* 460 US at 281, 285. See also *U.S. v Pineda-Moreno* (9th Cir 2010) 591 F3d 1212, 1216. However, these cases address location evidence but do not address communication evidence, *e.g.,* the ability of these devices to capture conversation or eavesdrop.

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§15.20 A. Search and Seizure

The Ninth Circuit has held that placement of a tracking device on the undercarriage of a car does not constitute an illegal search and seizure. In *U.S. v McIver* (9th Cir 1999) 186 F3d 1119, 1127, the court held that since the placement of the tracking device did not pry into a hidden or enclosed area and the defendant did not demonstrate that he intended to preserve the undercarriage of his car as private, as a result, the defendant was not afforded a reasonable expectation of privacy in the area of the undercarriage of his car. Moreover, the placement of the tracking device on the undercarriage of the car was not a "seizure" of the vehicle as there was no meaningful interference with the defendant's possessory interests in the property. 186 F3d at 1127. See also *U.S. v Pineda-Moreno* (9th Cir 2010) 591 F3d 1212 (applying *McIver*).

Washington's state constitution provides broader protections than the federal constitution. In 2003, the Washington Supreme Court held that a warrant is required before a tracking device can be placed on a vehicle. The court reasoned, "use of GPS tracking devices is a particularly intrusive method of surveillance, making it possible to acquire an enormous amount of personal information about the citizen under circumstances where the individual is unaware that every single vehicle trip taken and the duration of every single stop may be recorded by the government." *State v Jackson* (Wash 2003) 76 P3d 217, 224. See also *People v Weaver* (2009) 882 NYS2d 357, 909 NE2d 1195 (New York state constitution requires a warrant to place tracking devise); *State v Campbell* (Or 1988) 759 P2d 1040 (Oregon constitution requires warrant or exigency to attach radio transmitter tracking device).

Such tracking has required a warrant under Fed R Crim P 41. A Maryland district court ruled that a warrant pursuant to Rule 41 is required for cell phone tracking because such tracking has the potential to venture into private and nonpublic areas. That court cited *U.S. v Karo* (1984) 468 US 705, 715, 82 L Ed 2d 530, 104 S Ct 3296, which required a warrant when a monitoring device entered a private residence. *In re Application of the U.S.A. for an Order Authorizing the Installation and Use of a Pen Register* (D Md 2005) 402 F Supp 2d 597, 601 n8. For current status on cellular telephone tracking cases and articles, see the Electronic Frontier Foundation website at http://w2.eff.org/legal/cases/USA_v_PenRegister (cases) and http://www.eff.org/issues/cell-tracking (articles) (visited June 2, 2010).

In its discussion of the constitutionality of attaching a GPS device to a vehicle in order to track the movements of its occupants, the Seventh Circuit in *U.S. v Garcia* (7th Cir 2007) 474 F3d 994, 997, noted that there was a split of authority on the issue. The Supreme Court held in 1983 "that the mere tracking of a vehicle on public streets by means of a similar though less sophisticated device (a beeper) is not a search." 474 F3d at 996. The Ninth and Fifth Circuits have held or implied that attaching a beeper to a vehicle that is using public thoroughfares or airspace does not constitute a search. On the other hand, the First, Sixth, and Seventh Circuits have held that at least reasonable suspicion or even probable cause is required, though a warrant may not be necessary. The *Garcia* court ultimately came down on the side of no search (474 F3d at 997):

If a listening device is attached to a person's phone, or to the phone line outside the premises on which the phone is located, and phone conversations are recorded, there is a search (and it is irrelevant that there is a trespass in the first case but not the second), and a warrant is required. But if police follow a car around, or observe its route by means of cameras mounted on lampposts or of satellite imaging as in Google Earth, there is no search. Well, but the tracking in this case was by satellite. Instead of transmitting images, the satellite transmitted geophysical coordinates. The only difference is that in the imaging case nothing touches the vehicle, while in the case at hand the tracking device does. But it is a distinction without any practical difference.

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B. Expectation of Privacy

§15.21 1. Attachment of GPS Device to Automobile

The issue of a defendant's reasonable expectation of privacy was addressed in *People v Tolliver* (2008) 160 CA4th 1231, 1239, 73 CR3d 375. A defendant wishing to suppress evidence discovered in an unlawful search has the burden of proving that he or she had a legitimate expectation of privacy. *Rawlings v Kentucky* (1980) 448 US 98, 104, 65 L Ed 2d 633, 100 S Ct 2556. Whether the defendant had a legitimate expectation of privacy is subject to a two-part test: (1) did the defendant manifest a subjective expectation of privacy in the object of the search? and (2) is society willing to recognize the expectation of privacy as legitimate? *California v Ciraolo* (1986) 476 US 207, 211, 90 L Ed 2d 210, 106 S Ct 1809.

The *Tolliver* court found that the codefendant, Villasenor, who provided money for another person to purchase the car, put the car in the purchaser's name, and did not insure the car in his name, had sufficiently disassociated himself from the car and could not then assert that he had a constitutionally protected privacy interest in it. Having obtained a warrant, the authorities attached a GPS device to the car while it was in an automobile body shop; the authorities suspected that the car would be used to transport controlled substances. The court found that Villasenor abandoned his privacy interest in the car and the privacy interest he asserted in his motion to suppress was illegitimate. Because the Fourth Amendment was not intended to protect this type of "illegitimate" privacy interest, Villasenor's attempt to assert such an interest failed. *People v Tolliver,* 160 CA4th at 1240.

Earlier, a New York court had addressed the expectation of privacy issue in *U.S. v Moran* (ND NY 2005) 349 F Supp 2d 425, 467, when a GPS device was attached to defendant's vehicle by law enforcement personnel without a warrant. The court found that law enforcement personnel could have conducted a visual surveillance of the vehicle as it traveled on the public highways and thus the defendant had no expectation of privacy in the whereabouts of his vehicle on a public roadway. The court concluded that no search or seizure took place and thus no Fourth Amendment concern was implicated in the use of the GPS device. 349 F Supp at 467. However, in May 2009, New York's highest court decided a case in which law enforcement had monitored the position of the defendant's vehicle for 65 days after placing a GPS device in the bumper. The court held that under New York's State Constitution, "in the absence of exigent circumstances, the installation and use of a GPS device to monitor an individual's whereabouts requires a warrant supported by probable cause." *People v Weaver* (2009) 12 NY3d 433, 447, 909 NE2d 1195. The court acknowledged that GPS "technology yields and records with breathtaking quality and quantity, is a highly detailed profile, not simply of where we go, but by easy inference, of our associations—political, religious, amicable and amorous, to name only a few—and of the pattern of our professional and avocational pursuits." 12 NY3d at 442.

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§15.22 2. Cell Phone Tracking

Courts have generally applied a more stringent standard to cases where the actual content of communication (as opposed to its mere existence or location) is concerned. In a 2004 cell phone tracking case, *U.S. v Forest* (6th Cir 2004) 355 F3d 942, cert granted and judgment vacated by *Garner v U.S.* (2005) 543 US 1100, 160 L Ed 2d 1001, 125 S Ct 1050, in which the Drug Enforcement Administration (DEA) already had authority to intercept wire communications pursuant to 18 USC §§2510-2522 as well as for the provider "to disclose to the government all subscriber information, toll records, and other information relevant to the government's investigation," the DEA dialed the target's cell phone (without letting it ring) several times to obtain the cell phone location information from the service provider. 355 F3d at 947. The Sixth Circuit followed *U.S. v Knotts* (1983) 460 US 276, 75 L Ed 2d 55, 103 S Ct 1081, in holding there was "no legitimate expectation of privacy in the cell-site data because the DEA agents could have obtained the same information by following [the target's] car." *Forest,* 355 F3d at 951.

Absent such a Title III order, though, the U.S. Department of Justice has had mixed results in attempting to use "selected provisions from Title II of the Electronic Communications Privacy Act (ECPA), primarily 18 USC §2703(d), either alone or in combination with the pen register/trap and trace statute ('Pen/Trap Statute'), 18 USC §§3121-3127." Clark, *Cell Phones as Tracking Devices,* 41(4) Valparaiso Univ L Rev 1413 (Summer 2007). See, *e.g., In re Application for an Order Authorizing the Extension & Use of a PEN Device, etc.* (ED Cal 2007) 2007 US Dist Lexis 11692. See also *U.S. v Ferguson* (D DC 2007) 508 F Supp 2d 7, 8, in which the defendant questioned the constitutionality of §2703 but the court did not reach the issue.

Most federal courts have found that an order based on probable cause and grounded on Fed R Crim P 41 (Rule 41) is required to compel cell phone providers to divulge real-time and prospective cell site location information. Moreover, a Rule 41 probable cause warrant is the standard procedure for obtaining authorization for the installation and use of mobile tracking devices. When the information sought is the contents of a wire communication, either stored in a device or remote computing service, a warrant is required; however, with information concerning electronic communications (such as, subscriber records, identity of sender and receiver, size of the communication, or other "envelope" type information), all that is necessary is a court order upon proof of "specific and articulable facts showing … reasonable grounds to believe that … the records or other information sought [is] relevant and material to an ongoing criminal investigation." See 18 USC §2703(d); *In re Application for Pen Register & Trap/Trace Device With Cell Site Location Auth.* (SD Tex 2005) 396 F Supp 2d 747.

NOTE: The Third Circuit Court of Appeals in Philadelphia is expected to issue an opinion deciding whether the Government is required to make a showing of probable cause rather than reasonable suspicion when seeking information about a cellular telephone subscriber's past or present cell cite location information. See *In the Matter of the Application of the United States of America for an Order Directing a Provider of Electronic Communication Service to Disclose Records to the Government*, Case No. 08-4227.

When the information obtained by law enforcement was obtained in violation of the governing statute and that information was used as the basis for a search warrant, a challenge can be made under *Franks v Delaware* (1978) 438 US 154, 57 L Ed 2d 667, 98 S Ct 2674.

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§15.23 3. Contents of Cell Phone

In many situations, the police arrest a suspect and go through the suspect's cellular phone for recent calls made. In a recent ruling of a Northern District of California case (*U.S. v Park* (ND Cal, May 23, 2007, No. CR 05-375) 2007 US Dist Lexis 40596), the court granted the defendant's motion to suppress evidence when the contents of the defendant's cell phone was searched well after the defendant's arrest and during the booking process. The court found that for purposes of Fourth Amendment analysis, cell phones should be considered "possessions within an arrestee's immediate control" and not part of "the person." This is so because modern cellular phones have the capacity for storing immense amounts of private information. Unlike pagers or address books, modern cell phones record incoming and outgoing calls, and can also contain address books, calendars, voice and text messages, e-mail, video, and pictures. 2007 US Dist Lexis at 21. The court concluded that a search of the contents of a cellular phone is investigatory and goes beyond the rationales for searches incident to arrest, which are to "remove weapons to ensure the safety of officers and bystanders, and the need to prevent concealment or destruction of evidence." 2007 US Dist Lexis at 24.

Other courts have held that when the search of the contents of a cell phone is contemporaneous to the arrest, an exception to the warrant requirement exists, such as preserving evidence of a crime. *U.S. v Finley* (5th Cir 2007) 477 F3d 250, 259. One court analogized the cell phone to an address book. See *U.S. v Valdez* (ED Wis 2008) 2008 US Dist Lexis 9995. A recent case, *U.S. v James* (ED Mo 2008) 2008 US Dist Lexis 34864, held that while there is a reasonable expectation of privacy in the data contained in the cell phone, a search and seizure of the contents of a cell phone can be proper under the automobile exception to the warrant requirement. The reasoning was that probable cause existed to believe that evidence of a crime would be found in the cell phone's call records and address book. The court likened the cell phone to any other closed containers that can be found in a vehicle that is subject to search under the automobile exception. See also *U.S. v Fierros-Alavarez* (D Kan 2008) 547 F Supp 2d 1206. Note, however, that the Supreme Court in *Arizona v Gant* (2009) ___ US ___, 173 L Ed 2d 485, 129 S Ct 1710, has rejected a broad reading of *New York v Belton* (1981) 453 US 454, 69 L Ed 2d 768, 101 S Ct 2860, the case from which the so-called automobile exception was derived. In *Gant,* the Court reiterated that warrantless searches are per se unreasonable unless the search falls into a narrow class of exceptions concerned primarily with officer safety and the preservation of evidence. The Court held that police are authorized to search a vehicle incident to a recent arrest only when the arrestee is unsecured and within reaching distance of the passenger compartment at the time of the search or when it is reasonable to believe that evidence relevant to the *crime of arrest* may be found.

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§15.24 4. Text Messages

In *Quon v Arch Wireless Operating Co.* (9th Cir 2008) 529 F3d 892, rev'd on other grounds in *City of Ontario v Quon* (June 17, 2010, No. 08-1332) 2010 US Lexis 4972, the court held that users of text messaging services have a reasonable expectation of privacy in their text messages stored on the provider's network. The court likened the text message to a letter. The envelope information (name, address and size of the package) is not protected while the content of the letter is protected. The identity of the sender and receiver's cell phone numbers and size of the transmission is not protected while the content of the message is protected. Note there is no reasonable expectation that the sender and receivers of the messages will hold the messages private. Consent from either the sender or the recipients to reveal the content of their messages extinguishes the Fourth Amendment claim.

However, in the related case, *City of Ontario v Quon* (June 17, 2010, No. 08-1332) 2010 US Lexis 4972, the court held that even assuming a public employee had a reasonable expectation of privacy in text messages sent from an employer issued pager, the principles applicable to a government employer's search of an employee's physical office apply as well to the electronic sphere and the employer's audit of such messages constituted a reasonable search within the meaning of the Fourth Amendment. The search was justified because it was for a "noninvestigatory work-related purpose."

The Court did not resolve the broader issue regarding the parameters of a public employee's expectation of privacy in government-issued communication devices; an expectation of privacy was assumed. The Ninth Circuit Arch Wireless case still holds for the proposition that there is an expectation of privacy in the content of the text messages.

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16

Assessment of Mental Health and Functioning

John T. Philipsborn

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I. USE OF MENTAL HEALTH EXPERT TO ASSESS MENTAL HEALTH AND FUNCTIONING

§16.1 A. Mental Health Expert Often Involved in Criminal Adjudication

The law of the State of California allows, and sometimes requires, mental health experts at some juncture during a court's adjudication of a criminal case. While it is certainly possible to prosecute, or to defend, a criminal case without the attorneys calling on mental health experts, because of the issues addressed by the fields of science focused on mental health and mental processes under specific circumstances, courts can choose to inject mental health issues into a criminal case regardless of the desires, or strategies, of the parties. For example, if the judge suspects the defendant is incompetent, the judge must solicit the opinion of the defendant's attorney as to whether the defendant is competent to stand trial. Pen C §1368; *People v Ary* (2004) 118 CA4th 1016, 1020, 13 CR3d 482.

The purpose of this chapter is to assist in the understanding of the legal and professional standards applicable to mental health experts, whether as consultants, report writers, or testifying witnesses in criminal court proceedings. As covered in this chapter, the mental health sciences at issue are those involved in the retrospective or current assessment of mental health and functioning, thought processes, legally defined mental conditions or mental states, and current and future behavior. Predictions of behavior are often the focus of capital and noncapital sentencing as well as in proceedings involving status offenders, such as those labeled sexually violent or mentally disordered offenders.

Mental health experts can be involved in many aspects of the adjudication of criminal cases. For example, some experts on eyewitness testimony may be psychologists or psychiatrists. Psychiatrists and psychologists, and experts with still other qualifications, may be called to testify about the known effects of given substances, whether illegal or not, on the accused and even on a witness. Such use of experts is not the focus here. The aim in this chapter is to address events that involve an assessment protocol based on a scientific process and the exercise of professional judgments. The hope is to underscore that the law tolerates unstandardized and unsupported diagnoses and opinions, the effects of which could be minimized by well-informed courts and litigants.

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§16.2 1. Mental Health Subject Matter in Criminal Court

It may be useful to briefly review the legally defined situations in which an individual's mental health and functioning, or both, may need to be assessed. Such assessments will likely arise when the court must adjudicate an individual's current overall mental health, the individual's competency to stand trial or otherwise participate in proceedings, whether at the trial or in postconviction litigation, or the individual's competency to be executed. As part of pretrial or trial sessions, courts may be required to hear expert testimony about the presence or absence of a criminal mental state, insanity, and cognitive development disorders, such as legally defined "idiocy" or mental retardation as a basis either for diversion out of the criminal courts or as a constitutionally provided bar to the death penalty. The court may use mental health diagnoses and assessments to assist in determining outpatient status for those found insane or incompetent. In addition, courts involved in the capital and noncapital sentencing process may receive either testimony or reports (bearing on past, current, or future mental states), explanations of behavior, or predictions of risk and dangerousness. See, *e.g.*, *Hamilton v Ayers* (9th Cir 2009) 583 F3d 1100, 1112 (effective assistance denied at penalty phase of capital trial by counsel's failure to investigate mitigating evidence concerning defendant's childhood and mental illness (federal habeas corpus proceeding)). Diagnoses and risk assessments may also be legally required in Sexually Violent Predator Act (SVPA) (Welf & I C §§6600-6609.3) and Mentally Disordered Offender (MDO) Law (Pen C §§2960-2981) proceedings.

NOTE: In response to *Verdin v Superior Court* (2008) 43 C4th 1096, 77 CR3d 287, the legislature amended Pen C §1054.3 to authorize the court to order a defendant or juvenile in a Welf & I C §602 proceeding to submit to testing by a prosecution-retained mental health expert whenever the defendant has placed his or her mental state at issue. Under the statute, (1) the prosecution must make a timely request and; (2) submit a list of "tests," including any and all assessment techniques, such as a clinical interview, that its expert proposes to administer; (3) a hearing must be held at the request of the defense to consider objections to the proposed tests; and (4) before issuing an order, the trial court must make a threshold determination that the proposed tests bear some reasonable relation to the mental state placed in issue. Pen C §1054.3(b)(1). The constitutionality of the newly enacted statute has yet to be resolved. Counsel addressing these issues should review pertinent pending cases, including *Maldonado v Superior Court* (2010) 184 CA4th 739, ___ CR3d ___, interpreting the statute and providing judicially created structural protections during the court ordered examination.

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§16.3 2. Other Sciences Used in Mental Health Assessment

Most mental health assessments require the use of professionals with expertise in psychology or psychiatry. However, many different scientific disciplines potentially may be involved in the assessment of a person's mental health and functioning, and courts have looked to well-established scientific texts for guidance on such matters as the definition of various mental states. Other scientific disciplines relevant to assessments of mental health and functioning may include epidemiology, sociobiology, electrophysiology, cognition and perception science, genetics, learning theory, the science of memory, neurobiology, psychoendocrinology, and traumatic brain injury medicine. See Sadock, Sadock & Ruiz Comprehensive Textbook of Psychiatry (9th ed 2009). For example, the U.S. Supreme Court cited the following sources for a definition of and statistics on mental retardation (*Atkins v Virginia* (2002) 536 US 304, 309 n3, 153 L Ed 2d 335, 342 n3, 122 S Ct 2242):

- American Psychiatric Association, Diagnostic and Statistical Manual of Mental Disorders, p 41 (4th ed 2000); and
- American Association on Intellectual and Developmental Disabilities, Intellectual Disability, Definition, Classification, and Systems of Support (11th ed 2010).

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§16.4 3. Wide Acceptance of Assessment Device

Practitioners should research whether an opinion they are seeking to admit or attack is based on assessment devices that are not yet widely accepted. A number of the diagnostic and treatment tools employed today (*e.g.,* new forms of brain scans, new generations of psychotropic drugs, new editions of otherwise "standard" cognitive functioning tests, translations of cognitive assessment tests (including IQ tests) developed and normed for English speakers, abbreviated versions of tests or newly devised competence assessment tools) have only relatively recently been developed. Whether seeking to admit an opinion or attack its admission, practitioners are well advised to ensure that they have researched and understood the extent to which a given opinion may, in fact, be based on a novel theory, or on assessment devices and methodologies that are developing (and likely not generally accepted). On distinguishing between the general standard for the admission of expert testimony (Evid C §801) and the *Kelly* standard for admission of testimony based on a new or novel scientific technique, see §16.7.

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§16.5 4. Case Law Lacks Comprehensive Discussion of Methodology

Despite the wide availability of mental health literature that provides a detailed description of assessing mental health and functioning in criminal cases, published California cases rarely incorporate a detailed discussion of the methodology that led to an opinion, diagnosis, or report that became part of a court record. The California Supreme Court has stated that "[n]o precise legal rules dictate the proper basis for an expert's journey into a patient's mind to make judgments about his behavior." *People v Stoll* (1989) 49 C3d 1136, 1154, 265 CR 111. There is little overlap between legal standards and professional scientific standards for mental health assessments and conclusions. Indeed, California benchbooks and mental health training materials for judges contain few references to the generally accepted literature on mental health-related assessments and function. One notable exception found in a nationally focused work is Parry, Criminal Mental Health and Disability Law, Evidence and Testimony (2009).

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B. Legal Standards for Admission of Mental Health Expert Testimony

§16.6 1. Federal Standards

Federal courts use the standards outlined in *Daubert* and *Kumho Tire Co*. to determine the admissibility of mental health expert testimony. Under these cases and Fed R Evid 702, qualified experts may give opinion testimony as long as that testimony is reliable and based on sufficient data. See Fed R Evid 701-703; *Kumho Tire Co., Ltd. v Carmichael* (1999) 526 US 137, 143 L Ed 2d 238, 119 S Ct 1167; *Daubert v Merrell Dow Pharms., Inc.* (1993) 509 US 579, 125 L Ed 2d 469, 113 S Ct 2786. See also *Boyd v City & County of San Francisco* (9th Cir 2009) 576 F3d 938, 945 (forensic psychiatrist's testimony regarding suicide-by-cop properly admitted). When deciding whether a particular scientific technique is admissible, federal courts often consider whether that technique (1) has been well tested, (2) has been subject to peer review, (3) has a relatively low rate of error, and (4) is generally accepted by the scientific community. See *Daubert,* 509 US at 593. See generally Imwinkelried, *Rules of Evidence,* Nat'l LJ 13 (Mar. 27, 2006); Sales & Shuman, Experts in Court: Reconciling Law, Science, and Professional Knowledge (2005); Sales & Shuman, eds., *Daubert's Meaning for the Admissibility of Behavioral and Social Science Evidence,* 5 Psychol, Pub. Pol'y & L 3 (1999).

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§16.7 2. California Standards

California has its own law, independent of the federal standard, on the admission of mental health and functioning testimony from mental health professionals. The seminal California cases do *not* require most psychological and psychiatric testimony to meet a standard that would apply to a "new scientific method of proof" under a *Kelly* analysis. *People v Kelly* (1976) 17 C3d 24, 130 CR 144. California courts continue to find that medical expert testimony is generally not subject to the *Kelly* test for the admission of a new scientific method of proof. See, *e.g., People v Rowland* (1992) 4 C4th 238, 265, 14 CR2d 377. Some courts have admitted psychiatric or psychological testimony, including testimony concerning predictions of future behavior and dangerousness, without requiring that accepted or specified methodologies have been employed to support that testimony. See *People v Ward* (1999) 71 CA4th 368, 372, 83 CR2d 828. On the application of the *Kelly* test, see chap 2.

At the same time, the California Supreme Court has acknowledged that "[n]ot all psychologists, of course, have the special knowledge, experience, or training to qualify as experts" on a given psychological subject matter. *People v McDonald* (1984) 37 C3d 351, 375 n22, 208 CR 236, overruled on other grounds in *People v Mendoza* (2000) 23 C4th 896, 914, 98 CR2d 431.

An appellate court addressed testimony from a psychiatrist that had been offered by the prosecution to establish that the defendant's killings of her own children were typical of Munchausen Syndrome by Proxy. The psychiatrist had not examined the defendant, but rather based his testimony on his professional experience and familiarity with literature pertinent to the syndrome. The appellate court acknowledged that the psychiatric testimony offered was "somewhat speculative and … posed some risk of both confusion and prejudice," but determined that it had been within the trial court's discretion to admit it, in part because the testimony was not founded on a "new scientific technique," and there was no "conflict within the scientific community" concerning the existence of the syndrome. *People v Phillips* (1981) 122 CA3d 69, 87, 175 CR 703.

The California Supreme Court wrote that although "[n]o precise legal rules dictate the proper basis for an expert's journey into a patient's mind to make judgments about his behavior," it was wrong for the trial court to exclude expert opinion testimony regarding mental health assessments because "California courts have deferred to a qualified expert's decision to rely on 'standardized' psychological tests such as the MMPI [Minnesota Multiphasic Personality Inventory] to reach an opinion on mental state at the time acts were committed." *People v Stoll* (1989) 49 C3d 1136, 1154, 265 CR 111. In addition, the court reasoned that in the absence of some showing that the mental health and functioning expert was relying on new or revolutionary developments, subject to the trial court's discretion, "issues of test reliability and validity may be thoroughly explored on cross-examination at trial. … The prosecution also may call, in rebuttal, another expert of comparable background to challenge defense expert methods." 49 C3d at 1159. The court further wrote that the "normative and subjective diagnostic process … is a learned professional art, rather than the purported exact 'science'" with which the legal standards pertinent to new scientific methods of proof are concerned. 49 C3d at 1159.

NOTE: The California Supreme Court's reference in *Stoll* to mental health assessment as an "art" reflects the view that the mental health assessment process is not truly scientific. Some California courts have not yet adopted the view that mental health and functioning assessment practices are sufficiently reliable and valid to establish a definitive forensic mental health "science." Professional literature contains evidence of scientific approaches to mental health and functioning assessment processes and methods. With suitable research, attorneys should be able to undermine attempts to introduce unfounded mental health "expertise." Irrelevant and unreliable evidence from mental health and functioning experts is subject to exclusion, as is evidence from unqualified witnesses. See generally Evid C §§350, 720, 801, 803. See also Evid C §352.

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C. Qualification of Mental Health Professional as Expert

§16.8 1. Courts Have Considerable Discretion

Legal standards for the admission of mental health expert opinion testimony do not require specific academic degrees, state or federal licenses, specialty certificates, or proof of specific and ongoing professional education. The Evidence Code and interpreting case law leave courts considerable discretion in determining whether an individual is qualified to testify as an expert in a given proceeding. See generally Evid C §§720, 801; *McCleery v City of Bakersfield* (1985) 170 CA3d 1059, 1066, 216 CR 852 (quoting *People v Kelly* (1976) 17 C3d 24, 39, 130 CR 144).

Increasingly, however, a combination of governmental regulation and professional standards is being used to evaluate whether individuals qualify as mental health and functioning experts, especially since the American Medical Association (AMA) has held that offering testimony amounts to a professional practice that is subject to peer review and discipline. See the 1998 AMA Report of the Board of Trustees (Report 5-A-98) (visited June 2, 2010), available online at http://www.truthinjustice.org/amareport.htm. Thus, psychologists and psychiatrists—the practitioners who most commonly testify as mental health experts in criminal cases—can be exposed to claims of malpractice, as well as claims of practicing without the required licensure or approval, as a result of courtroom testimony. There are significant differences in the training and professional development of these two occupations, as discussed in §§16.9-16.11.

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2. Psychologists

§16.9 a. Training and Credentials

Psychologists who testify in court as experts are generally individuals who have earned a Doctor of Philosophy degree (Ph.D.) from an accredited institution in a specific field of psychology, though some qualified experts have not achieved such a credential. Fields of study in psychology include, for example, clinical, counseling, educational, experimental, industrial-organizational, developmental, social, and research psychology.

Another type of credential for psychologists is a Psy.D., or Doctor of Psychology degree. This terminal degree is often associated with clinical practice. A further terminal degree sometimes possessed by persons who qualify in courts as "psychologists" is an Ed.D., or Doctorate in Education, which is offered by some academic institutions for those training in "educational psychology," including developmental and school psychology.

Unlike therapeutic psychologists, who treat patients directly, forensic psychologists act as experts on psycho-legal issues. They work with courts, parties to legal proceedings, and correctional and forensic mental health facilities. Forensic mental health assessments are conducted according to a court schedule, at times in custodial settings, and often focus on issues such as physical brain structure, the effects of legal and illegal drug use, possible malingering, and diagnoses based on medical and laboratory tests.

The American Psychological Association (APA) currently accredits doctoral training programs in clinical, counseling, and school psychology. It also accredits institutions that provide internships for doctoral students in these fields. The National Association of School Psychologists and the National Council for Accreditation of Teacher Education are involved in the accreditation of terminal degree programs in school psychology. The APA is the principal, though not the only, nationwide organization primarily for psychologists. The APA publishes a number of practice guides and guidelines useful for preparation of direct and cross-examinations of psychologists. See, *e.g.,* Turner, DeMers, Fox & Reed, *APA's Guidelines for Test User Qualifications: An Executive Summary,* 56(12) Am Psychol. 1099 (Dec. 2001).

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§16.10 b. Recognized Specialty Certificates

The American Board of Professional Psychology (ABPP) is a nationwide professional organization that awards specialty certificates in several fields of psychology, including clinical psychology, forensic psychology, clinical neuropsychology, counseling, and school psychology. Individuals possessing ABPP certificates must demonstrate a certain level of credentials, including an appropriate doctorate degree, postdoctoral training in their area of specialty, at least 5 years of experience, recommendations and endorsements from persons in the field, and a suitable performance on a field-specific examination. The National Association of School Psychology together with the National Council for Accreditation of Teacher Education give accreditation to advanced degree programs in school psychology.

Several academic institutions now offer lengthy postgraduate programs in forensic psychology, which provide postgraduate hours of specialized training and supervised clinical experience to persons who intend to specialize in a forensic practice. Often, these individuals will have spent time in academic settings and, under specified supervision, conduct assessments, write reports, and provide opinion testimony on matters that often arise in criminal cases. There has been a concurrent emergence of professional certification boards, such as the American Board of Forensic Psychology (ABFP).

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§16.11 3. Psychiatrists

Psychiatrists who testify in court as experts generally are first trained and licensed as medical doctors before they meet various training, licensure, and specialty requirements for certification in a particular field of psychiatry. Psychiatry is actually one of several specialties in which physicians can be certified. Thus, a primary means of distinguishing psychologists and psychiatrists is that today most, though not all, psychiatrists have been trained and licensed as physicians. They can administer medical care and legally prescribe medications and medical treatment. Some other courses of psychiatric training, such as becoming a Doctor of Osteopathy, allow an individual to enter training as a psychiatrist after certain requirements have been met.

The American Psychiatric Association and the American Medical Association (AMA) are two of the most important organizations that have played a part in the development of psychiatry as a formal area of specialty. The AMA began voluntary accreditation of medical schools and internship programs around 1914, and the American Psychiatric Association initiated a number of efforts to establish formal requirements for the practice of psychiatry, beginning in the late 1920s. In addition, the American Board of Psychiatry and Neurology (ABPN) certifies physicians in several specialty areas, including psychiatry, neurology, and child neurology. It also certifies diplomates in a number of subspecialties.

In the process of formalizing the training for those generally identified as "psychiatrists," the Accreditation Council for Graduate Medical Education (ACGME) and the Residency Review Committees (RRCs) in psychiatry and neurology (two separate bodies) established training requirements that were approved by the ACGME. For example, the training requirements applicable to forensic psychiatry were established in 1996. Sadock, Sadock & Ruiz, Comprehensive Textbook of Psychiatry, vol 2 (9th ed 2009).

Other organizations affiliated either with the AMA or the American Psychiatric Association have played a role in the development of standards for initial and continuing education and of subspecialty expertise. These include the American Academy of Psychiatry and the Law (AAPL) and the American Academy of Addiction Psychiatry (AAAP), both of which provide training in specialties sought out in criminal cases. There are many other groups that have emerged, some on a national, and others on a more local, level.

Attorneys may obtain publications helpful to understanding the requirements imposed by the various certifying bodies through the American Board of Medical Specialties and the ABPN. See, *e.g.,* Scheiber, Kramer & Adamowski, eds., Core Competencies for Psychiatric Practice: What Clinicians Need to Know (A Report of the American Board of Psychiatry and Neurology) (2003).

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D. Areas of Concern in Evaluating Expert Qualifications and Testimony

§16.12 1. Professional Certification No Guaranty of Reliability

Even though private regulatory bodies have established certification and practice criteria for professionals who are involved in mental health assessment, there is no guaranty that expert assessments or testimony will meet those standards or the standards for admission of expert opinion under California law. This is particularly true of opinions that might be based on dubious methodologies or faulty science. In addition, there is no guaranty that mental health assessments that do meet professional standards will also meet legal standards for admissibility.

Courts' and attorneys' knowledge of training requirements for psychiatrists and psychologists is highly variable, and individuals holding themselves out as having sufficient academic training, licensure, and continuing education to provide relevant forensic mental health opinions may really have no relevant experience to the issue at hand. Counsel must look into experts' backgrounds to be sure that they have the experience and the education needed to assist in a particular case. With the growth of information on the Internet, the parties to a criminal case may have ample opportunity to review the experts' credentials, training, and professional memberships.

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§16.13 2. Testimony Must Not Exceed Scope of Professional Expertise

Although many psychologists and psychiatrists are able to qualify as expert witnesses, attorneys should pay particular attention to whether expert testimony offered exceeds the scope of the witness's professional expertise. The author has observed, for example, that individuals with doctoral degrees of various kinds in psychology often are allowed to testify on a wide variety of subjects that may exceed their expertise. The holder of a Ph.D. in educational psychology may be asked, and permitted to testify, about the side effects of psychotropic medications without demonstrating the related qualifications. This is, perhaps, due in part to the cynical view held by some attorneys and judges that mental health experts are fungible, and also, perhaps, because of the lack of any statutory or case law-provided requirement of specific qualifications for the statement of many opinions at issue in criminal cases. Sometimes, close scrutiny may reveal that these subjects are well beyond the areas that were covered by the psychologist's formal academic education, supervised clinical experience, or subsequent professional experience and training.

The same is true of psychiatrists, who also have both varying courses of study and professional experience and may be asked to opine about nuances of psychological test results without having been trained to administer or interpret them. While some states have specific requirements concerning their respective statutory schemes for criminal procedure, the California Penal Code only contains the requirement of a "qualified expert" in certain areas. See, *e.g.*, Pen C §1376(b)(1) (pertaining to expert whose declaration is submitted to initiate hearing on whether capital case defendant is mentally retarded). The legislature did not include a specific definition in Pen C §1376 of who the "qualified expert" might be for those purposes.

PRACTICE TIP: Counsel should research the background of each of the opposing party's mental health experts and object if any of their testimony ventures beyond the scope of their professional backgrounds.

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§16.14 3. Testimony Must Be Based on Adequate Assessment

Despite professional literature cautioning mental health experts against relying on any single test result or assessment as the basis for a diagnosis, expert testimony on mental health issues is, in practice, frequently based on a short, one-time "drive-by" evaluation. When financial realities such as a defendant's indigence limit resources, the quality, reliability, and validity of a mental health assessment may suffer.

Attorneys should be prepared to challenge an opinion or diagnosis that appears to be based on inadequate assessment practices. Without a convincing challenge, courts might admit diagnoses, opinions, or assessment results without knowing that the "science" involved is unacceptable under professional standards.

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§16.15 4. Academic Criticism of Mental Health Testimony Based on Assessment

Some professionals have criticized the introduction of testimony regarding forensic mental health assessments, finding "the entire enterprise almost completely lacking in sound science." Rogers & Shuman, Fundamentals of Forensic Practice: Mental Health and Criminal Law, chap 10 (2005). The opponents of mental health testimony are concerned about the intrusion of psychiatric or psychological vocabulary and concepts into legal matters, the insufficiency and lack of credibility of the information being provided to courts by experts, and the irrelevance of mental health testimony to the issues presented. Grisso, Evaluating Competencies: Forensic Assessments and Instruments, chap 11 (2d ed 2003).

Jay Ziskin, who was both an attorney and a psychologist, argued that the mental health sciences were a conglomeration of invalid theories of behavior, that there is no defensible diagnostic system for mental illness, and that many measurement and assessment devices are unreliable. See Ziskin, Coping with Psychiatric and Psychological Testimony (5th ed 1995, updated 2000); a 6th edition of this work is expected in 2010, updated by David Faust. Although considered overly critical to some, Ziskin's works are often used as a basis to cross-examine mental health experts.

Advances in mental health assessment procedures since Ziskin's time have resulted in more reliable diagnoses. For instance, instead of forming opinions based on a single meeting with a single examiner, experts now typically require several structured patient interviews before making a preliminary diagnosis. Because it accounts for differences across various test givers, tests, and times, this method has been called a major advance in forensic practice that addresses "a key criticism of forensic psychology and psychiatry, namely diagnostic subjectivity." Rogers & Shuman, Fundamentals of Forensic Practice: Mental Health and Criminal Law, chap 11 (2005).

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§16.16 E. Importance of Published Ethical and Professional Standards

The American Psychiatric Association and the American Psychological Association (APA) have each published ethical and professional standards that can help attorneys evaluate experts' mental health and functioning assessments. For websites listing the standards, see the American Psychiatric Association, *The Principles of Medical Ethics With Annotations Especially Applicable to Psychiatry* (2009), available online at http://www.psych.org/MainMenu/PsychiatricPractice/Ethics/ResourcesStandards/PrinciplesofMedicalEthics.aspx, and the APA, *Ethical Principles of Psychologists and Code of Conduct With the 2010 Amendments* (2010), available online at http://www.apa.org/ethics/code/index.aspx.

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§16.17 1. Ethical Standards for Psychiatrists

The American Psychiatric Association publishes ethical standards and obligations for psychiatrists in *The Principles of Medical Ethics With Annotations Especially Applicable to Psychiatry* (rev ed 2009), available at http://www.psych.org/MainMenu/PsychiatricPractice/Ethics/ResourcesStandards/PrinciplesofMedicalEthics.aspx. The American Academy of Psychiatry and the Law (AAPL) publishes ethical guidelines specifically for forensic psychiatrists in *Ethical Guidelines for the Practice of Forensic Psychiatry* (rev ed 1995), at http://www.aapl.org/ethics.htm. These guidelines are intended to supplement the American Psychiatric Association's *Principles of Medical Ethics* and deal with such issues as confidentiality, consent, honesty, objectivity, and procedures for handling complaints.

Attorneys can use the AAPL's *Ethical Guidelines* to help them evaluate whether a psychiatrist adhered to ethical standards in performing a mental health assessment, as reflected in his or her court testimony or report. For example, the AAPL's *Ethical Guidelines* address whether it is proper for a psychiatrist to give an opinion about an individual he or she has never examined (AAPL, *Ethical Guidelines,* IV (rev ed 1995)):

Honesty, objectivity and the adequacy of the clinical evaluation may be called into question when an expert opinion is offered without a personal examination. For certain evaluations (such as record reviews for malpractice cases), a personal examination is not required. In all other forensic evaluations, if, after appropriate effort, it is not feasible to conduct a personal examination, an opinion may nonetheless be rendered on the basis of other information. Under these circumstances, it is the responsibility of psychiatrists to make earnest efforts to ensure that their statements, opinions and any reports or testimony based on those opinions, clearly state that there was no personal examination and note any resulting limitations to their opinions.

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§16.18 2. Ethical Standards for Psychologists

The *Specialty Guidelines for Forensic Psychologists,* 15(6) Law & Human Behavior 655 (1991) are aimed at psychologists who work as experts within the judicial system, such as clinical forensic examiners, psychologists who testify as forensic experts or consult with attorneys and the courts, and researchers who testify about the relevance of scientific data to a psycho-legal issue. The guidelines are available at http://www.ap-ls.org/links/currentforensicguidelines.pdf. The *Specialty Guidelines* document is a joint statement of the American Psychology-Law Society and Division 41 of the American Psychological Association and is endorsed by the American Academy of Forensic Psychology.

The American Psychological Association (APA) publishes *Ethical Principles of Psychologists and Code of Conduct with 2010 Amendments* (2010), also known as the Ethics Code, available online at http://www.apa.org/ethics/code/index.aspx. The Ethics Code is useful for counsel preparing to introduce or cross-examine a psychologist expert witness because it discusses the use of assessments, release of test data, construction of tests, interpretation of results, and use of obsolete tests. The Ethics Code also covers matters that may provoke inquiry in court proceedings, such as the question of how psychologists should define their own professional competence (APA, *Ethical Principles of Psychologists and Code of Conduct,* Standard 2.01(a) (2002)):

Psychologists provide services, teach, and conduct research with populations and in areas only within the boundaries of their competence, based on their education, training, supervised experience, consultation, study, or professional experience.

In addition to the American Psychiatric Association and APA, other professional groups of psychologists and psychiatrists publish their own ethical codes and statements of professional standards. For an online resource that links to many such codes, see http://www.kspope.com/ethcodes/index.php (visited June 2, 2010).

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II. THE ASSESSMENT PROCESS

§16.19 A. Areas of Investigation

Assessment of mental health and functioning frequently includes investigation of neurochemical, neurological, physiological, and anatomical operatives of the brain; cognitive functioning and development; thought processes; legally defined mental condition or mental state; and current and future behavior. An assessment of mental condition often begins by collecting historical information about a defendant, including any records demonstrating a past finding of a mental disorder or developmental disability. Sometimes a client's historical mental health issues are related to a current legal issue.

Through clinical training and reference to standardized materials, examiners of mental health and functioning are able to assess thought content, cognitive skills or disturbance, and judgment. Mental health experts are typically familiar with techniques for obtaining a patient history and understand the role of genetics, childhood development, and social history in a current mental health status. Mental health and functioning assessment may also involve the following:

- Acquisition and review of records;
- Investigation of anecdotal information;
- Use of diagnostic tests, including blood tests and scans;
- Review of what constitutes symptoms; and
- Development of corroborating information based on additional testing, such as neuropsychological assessment.

Professional textbooks describe accepted methods for using mental health and functioning assessments to uncover foundational information underlying diagnoses or opinions. See, *e.g.,* Sadock, Sadock & Ruiz, Comprehensive Textbook of Psychiatry (9th ed 2009) (contains discussions, based on multiple sources, about diagnostic processes, interview techniques, tests of mental status, and assessment of speech and thinking, affect, and mood; the 9th edition is due to be released in June 2009).

Both the American Psychological Association (APA) and the American Psychiatric Association produce bibliographies, textbooks, and other documents providing updated information on the assessment process. Sources for standardized diagnoses and approaches to assessment can also assist counsel in reviewing the assessments, opinions, and diagnoses of proposed expert witnesses.

Organizations such as the National Association of District Attorneys, the California District Attorneys Association, the California Public Defenders Association, California Attorneys for Criminal Justice, and the National Association of Criminal Defense Lawyers also prepare materials on mental health assessment that may be useful to California attorneys.

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§16.20 B. Classifications and Definitions for Mental Disorders (the "DSM-IV-TR")

In California courts, the primary source of "standardized" definitions of diagnostic criteria used by mental health experts is the American Psychiatric Association, Diagnostic and Statistical Manual of Mental Disorders: DSM-IV-TR (4th ed, text rev, 2000), often abbreviated as "DSM-IV-TR" or simply "DSM." Publication of the DSM, beginning in 1952, was part of an effort in the United States to provide a standardized diagnostic language, including (most recently) specified diagnostic criteria for mental disorders. A classification system for mental disorders and conditions has been under discussion and in the process of definition for many years. In 2000, the American Psychiatric Association revised the text, but not the substance, of the DSM-IV and published what is referred to as the DSM-IV-TR (text revision). The DSM-V is not anticipated until at least 2012.

NOTE: The development of the DSM paralleled the development by the World Health Organization and its affiliates of the International Statistical Classification of Diseases and Related Health Problems (ICD) (2d ed 2004), now in its tenth revision. The ICD includes an elaborate classification of mental disorders, but differs from the DSM in certain areas, which may be of significance in a given case.

CAUTION: The DSM cautions that clinical standards for diagnosis do not always match legal standards, noting that a diagnosis of a DSM-IV-TR mental disorder is generally insufficient to establish a mental disorder, disability, or disease for the purpose of meeting a legal standard associated with, for example, competence or criminal responsibility. The wide variation within each of the DSM diagnostic categories prevents pinpointing a level of impairment or disability specifically to align with such standards. American Psychiatric Association, Diagnostic and Statistical Manual of Mental Disorders: DSM-IV-TR, pp xxii-xxiii (4th ed, text rev, 2000).

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C. Tests, Assessment Instruments, Structured Interviews, and Psychometrics

§16.21 1. Commonly Used Tests

Experts often use one or more instruments to obtain information that can lead to opinions about and diagnoses of a defendant's mental health. Measurement devices can be divided into several commonly used testing "clusters," including the following:

- Multiscale inventories, which include standardized tests, such as the Minnesota Multiphasic Personality Inventory (MMPI, MMPI-2, and MMPI-A (for adolescents));
- Projective measures such as the Rorschach Inkblot Test and the Rosenzweig Picture-Frustration Study, some of the oldest psychiatric-psychological assessment devices in use;
- Structured interviews, such as the National Institute of Mental Health (NIMH) Diagnostic Interview Schedule (DIS);
- Specific forensic measures, such as the Rogers Criminal Responsibility Assessment Scales (R-CRAS); and
- Cognitive measurements (commonly called "IQ tests"), such as the Wechsler Adult Intelligence Scale (WAIS-III, WAIS-IV), the Kaufman Adolescent and Adult Intelligence Test (KAIT), and the Wechsler Abbreviated Scale of Intelligence (WASI).

These types of measurement tools are used to ensure that the assessment process includes empirically validated knowledge and methods. See Rogers & Shuman, Conducting Insanity Evaluations (2d ed 2000). See also Melton, Petrila, Poythress & Slobogin, Psychological Evaluations for the Courts: A Handbook for Mental Health Professionals and Lawyers (3d ed 2007); Buros Institute, The Seventeenth Mental Measurements Yearbook (18th ed Summer, 2010). Note that the Mental Measurements Yearbook is produced every 2 years. There are also a number of publications that describe, in some detail, testing and assessment devices used in certain areas of specialization, such as neuropsychology. See, for example, Strauss et al, A Compendium of Neuropsychological Tests (3d ed 2006).

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§16.22 2. Selection of Appropriate Assessment Tests

Multiple tests and assessment devices are available for each mental health and functioning issue. See generally Buros Institute, The Seventeenth Mental Measurements Yearbook (18th ed Summer 2010); Buros Institute, Tests in Print VII (7th ed 2006) — note that Buros has announced that Tests in Print will be available online, as well. For example, there are more than 2000 published tests or assessments of intelligence; though, on close scrutiny, many of these tests—particularly those created by individuals who are not mental health professionals but rather comprise commercial publishing houses—would not be accepted by professionals.

Information about test standards can be found in the Standards for Educational and Psychological Testing (1999), developed by the American Educational Research Association (AERA), the American Psychological Association (APA), and the National Council on Measurement in Education (NCME). For an overview of the organization and content of these standards, go to http://www.apa.org/science/programs/testing/standards.aspx (visited June 2, 2010). Outside California, such as in Arkansas and Maine, specific standards for forensic mental examinations may be published in statutes or as regulations.

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§16.23 3. Ethical Guidelines Require Reliability and Validity of Tests

The American Psychological Association's (APA's) ethical guidelines require that psychological assessment tests have demonstrated *reliability* and *validity* for the purpose or clinical application for which they are used. APA, *Ethical Principles of Psychologists and Code of Conduct With the 2010 Amendments,* APA Online §9.02(b) (2010), available online at http://www.apa.org/ethics/code/index.aspx.

An assessment test is reliable if it consistently measures as designed, regardless of possible anticipated variables. A reliable test will usually generate the same measurements when given by different assessors (inter-rater reliability) and generate similar scores for similarly situated test takers (test-retest reliability).

Validity is a test's ability to measure what it is supposed to measure. For example, a reliable test to measure risk of recidivism is not valid as a test to measure intelligence. The Standards for Educational and Psychological Testing (1999), developed by the American Educational Research Association (AERA), the American Psychological Association (APA), and the National Council on Measurement in Education (NCME), list three areas of test validity: construct, content, and criterion. For more information on this publication, go to http://www.apa.org/science/programs/testing/standards.aspx.

A test has construct validity if it accurately measures the particular "social construct" that it is designed to measure. Construct validity is often supported by statistical analysis showing that the test generates results that match what is already known about the social construct under examination. A test has content validity if its questions fit with the test's purpose. For example, a test measuring a defendant's competence to stand trial—a legal standard—should include questions designed to reveal how closely the test taker meets each element of the legal definition of competence. There are two kinds of criterion validity: predictive validity, which is a test's ability to predict something it is designed to predict, and concurrent validity, which is a test's ability to separate and measure variables it is designed to distinguish. A test with predictive validity might suitably assess an inmate's risk of recidivism, while a test with concurrent validity might suitably distinguish test takers with bipolar disorder from those with paranoid schizophrenia.

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§16.24 4. Psychometrics and Test "Norming"

Psychometrics is the theory of psychological measurement, including the measurement of personality traits and intelligence. Within psychometrics, classical test theory tries to predict outcomes of mental health testing, with the goal of making tests reliable. Item response theory, on the other hand, uses mathematical models to link test scores with certain traits, with the goal of assessing a test taker's inherent traits relative to those of a "norm group" of the general population.

"Norming," or development of normative data, refers to establishing characteristics of a given population as measured for specific phenomena. For example, researchers "normed" IQ tests by administering them to persons in different age groups as well as to persons with different educational levels; from this, researchers established that a person's level of education accounts for greater variation in performance on certain parts of standard IQ tests than do variations in age. Tests normed with only very small populations have limited meaning and usefulness. Counsel seeking an understanding of the application of these concepts to neuropsychological testing often used in the criminal-legal context may wish to review Mitrushama, Handbook of Normative Data for Neuropsychological Assessment (1999).

To determine whether tests are reliable and useful, attorneys may need information about the "base rates" that form the predictive value of a given test. For example, a valid and reliable test might establish a "base rate" of memory loss for persons over 50 by showing that 80 percent of test takers aged 51 and above recall fewer items than do their younger counterparts. A new test measuring memory deterioration of people over 50 would then be useful only if it revealed more information than was already established by the known base rate (*i.e.,* if it revealed something in addition to the fact that 80 percent of people over 50 experience memory loss). Knowing the base rates can expose whether or not a test is useful when given for a certain purpose.

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§16.25 D. Relevance of Assessment Methods and Diagnoses to Legal Question Presented

Attorneys and mental health and functioning experts often overlook the relevance of a particular assessment method to the legal question presented in a given case. If an assessment method and related diagnosis fail to address the issue for which expert opinion is needed, the opinion will lack credibility, and testimony based on that opinion could be subject to objection on relevancy grounds. See Evid C §350.

The relevance of assessment methods is particularly important when the accused's competence to stand trial is at issue. See, *e.g.*, *Drope v Missouri* (1975) 420 US 162, 43 L Ed 2d 103, 95 S Ct 896; *Dusky v U.S.* (1960) 362 US 402, 4 L Ed 2d 824, 80 S Ct 788; Pen C §1367. The relevance of the assessment method also may be a key issue when there are claims of malingering or when an expert's opinions or diagnosis is not easily subject to verification. On particular methods used to assess competence, see §§16.37-16.43. On assessment of malingering, see §16.36.

PRACTICE TIP: Tests and assessment devices are part of accepted practice, but counsel should consider whether the particular tests given to a client are both valid and relevant to the proceedings. One instructive publication that uses a particular test series as a basis for discussion of many aspects of the questions just discussed is, Pope et al, The MMPI, MMPI-2, and MMPI-A In Court: A Practical Guide for Expert Witnesses and Attorneys (APA, 2003). In addition, even valid and relevant tests do not eliminate the need to obtain historical information about the client, including records and anecdotal information available through third party interviews. See Melton, Petrila, Poythress & Slobogin, Psychological Evaluations for the Courts: A Handbook for Mental Health Professionals and Lawyers, chap 3 (3d ed 2007). For a more detailed review of the assessment process, including a discussion of the strengths and weaknesses of frequently used tests and forensic interview devices as well as an extensive bibliography, see Rogers & Shuman, Conducting Insanity Evaluations (2d ed 2000). See also Rogers & Shuman, Fundamentals of Forensic Practice: Mental Health and Criminal Law (2005).

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E. Use of Imaging Technology, Electrophysiological, and Neuroscientific Techniques

§16.26 1. History of Brain Injury or Damage

A mental health assessment may require experts from specialized fields such as neurobiology, neurochemistry, and neuropathology to assess the structure, electrophysiology, and chemical functioning of the brain. This is common when, for example, the person being assessed has a history of brain injury from oxygen deprivation or a skull fracture, brain swelling, changes in intracranial pressure, or disease such as meningitis. See generally Silver, McAllister & Yudofsky, eds., Textbook of Traumatic Brain Injury (2005).

PRACTICE TIP: Brain injuries, neurochemical changes, and changes in the cellular composition of the brain may not be immediately obvious and may be revealed only after specialized examination. Taking a thorough client history allows an attorney to begin searching for evidence to explain the extent of any head or brain injuries and the impact of any reported diseases and illnesses. A history of a traumatic injury that caused massive shock might have resulted in brain damage that has never been addressed. In such cases, counsel will need to retain highly specialized forensic experts.

Not all methods of evaluating brain structure have proven reliable or make acceptable foundations for expert opinion testimony. In fact, there are ongoing debates in professional journals for experts in neurology, neurotrauma, neuroradiology, neurosurgery, brain injury, and neuropsychiatry about which technologies are best at detecting pathology and injury. For mental health texts that may be helpful in understanding the vocabulary of these technologies and in locating specialized literature, see Sadock, Sadock & Ruiz Comprehensive Textbook of Psychiatry (9th ed 2009); and Silver, McAllister & Yudofsky, eds., Textbook of Traumatic Brain Injury (2005). The National Institutes of Health (NIH) often disseminate information about recent research involving neuroimaging.

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§16.27 2. Structural and Functional Imaging Technologies

Structural and functional brain imaging produce images that a jury or judge can see firsthand, enhancing expert testimony about the defendant's unusual brain physiology, particular conditions, or psychiatric diagnoses. Hurley & Taber, Windows to the Brain: Insights From Neuroimaging (2008).

Computed tomography (CT) and magnetic resonance (MR) scans are structural imaging technologies that reveal parts of the brain's physical structure. CT imaging is useful for detecting macroscopic abnormalities such as tumors or cysts, particularly those associated with trauma. MR imaging allows detailed investigations of anatomical changes in the brain, such as atrophy.

Functional imaging reveals processes within the brain such as metabolism and blood flow. The most common functional imaging technologies, single-photon emission computed tomography (SPECT) and positron emission tomography (PET), track a radioactive isotope through the brain. Some experts use functional magnetic resonance imaging (functional MRI or fMRI) and nuclear magnetic resonance (NMR) spectroscopy to produce brain images for analysis.

Researchers are working to link analyses and diagnoses based on modern imaging technologies, which are new and evolving, to those based on older methods of assessment, such as tests and interviews.

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§16.28 3. Electroencephalography

Electroencephalography reveals patterns of electrical activity generated by chemical reactions in the brain. Electroencephalograms (EEGs) are sometimes recorded simultaneously with functional images, whose ability to show changes in blood flow or metabolism might also suggest information about the brain's electrical rhythms. Experts can use brain electrical activity mapping (BEAM) and quantitative EEG (QEEG) to map an individual's brain activity and can compare an individual's EEG to baseline EEGs that show patterns of normal and abnormal electrophysiological brain events. Sadock, Sadock & Ruiz, Comprehensive Textbook of Psychiatry (9th ed 2009).

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§16.29 4. Use of Combined Technologies Provokes Questions

Some assessments of brain dysfunction or injury use more than one assessment technique, such as a combination of neuropsychological testing and structural and functional imaging. Counsel may not be able to tell whether a court will accept the use of combined techniques as a basis for expert opinion, and few published decisions discuss the admissibility of imaging and brain activity measurement techniques. For example, the California Supreme Court in *People v Gutierrez* (2002) 28 C4th 1083, 1114, 124 CR2d 373, noted in passing that a brain scan had been performed on a defendant; the use of a computed tomography (CT) scan as a diagnostic technique was commented on in *People v Eckley* (2004) 123 CA4th 1072, 1076, 20 CR3d 555. In *People v Kraft* (2000) 23 C4th 978, 1029, 99 CR2d 1, a highly complex capital case, the court mentioned that a positron emission tomography (PET) scan had been performed. None of these decisions elaborated on legal issues surrounding the technologies used. Although few published decisions discuss imaging technology in detail, anecdotal information suggests that imaging technology is an issue regularly raised at the trial court level.

Counsel may want to consult professional associations, trade journals, and professional literature devoted to the study of brain injuries when researching technologies used for brain assessment. See *e.g.,* American Association of Neurological Surgeons, Guidelines for the Management of Severe Traumatic Brain Injury (3d ed 2007) (ordering information available online at http://www.braintrauma.org/coma-guidelines/); Silver, McAllister & Yudofsky, eds., Textbook of Traumatic Brain Injury, chap 3 (2005).

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§16.30 5. Neuropsychiatry

Neuropsychiatrists study and address issues such as the following:

- Dementia;
- Seizure disorders, including epilepsy;
- Traumatic brain injury;
- Movement disorders;
- The effects of infectious and inflammatory diseases; and
- Developmental disabilities.

Neuropsychiatrists also study neuroanatomical brain abnormalities such as tumors, malformations, and structural defects. Diseases such as HIV and multiple sclerosis, medications affecting the central nervous system and brain function, and even the normal aging process can affect a person's neuropsychiatric condition. Yudofsky & Hales, The American Psychiatric Publishing Textbook of Neuropsychiatry and Behavioral Neurosciences (5th ed 2008).

Several universities train psychiatrists in the diagnostic techniques and specialized assessment technologies used to assess neuropsychiatric conditions. See Sadock, Sadock & Ruiz, Comprehensive Textbook of Psychiatry, chap 2 (9th ed 2009).

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§16.31 6. Neuropsychology

Clinical neuropsychology is a specialty recognized by the American Psychological Association that studies the relationship between behavior and brain functioning, assessing brain damage by measuring cognitive, motor, emotional, and sensory performance. Psychologists with the required training and experience and who have passed a specialty examination and obtained other necessary credentials can be certified as neuropsychologists through the American Board of Clinical Neuropsychology, an arm of the American Board of Professional Psychology.

Neuropsychologists can administer a "standard battery" of tests to assess performance in such areas as the following:

- Attention and concentration;
- Intellectual functioning;
- Memory and learning;
- Executive functioning;
- Concept formation;
- Motor function;
- Psychological factors;
- General intelligence; and
- Visuospatial language.

CAUTION: Not all psychologists are qualified to perform and interpret a neuropsychological assessment.

In complex cases in which a defendant may be evaluated by experts from several different specialty areas, it is not uncommon for an experienced neuropsychologist to perform only initial screening tests. These tests typically would not produce sufficient data to provide a foundation for any necessary expert testimony, but they might define areas that require further evaluation. In addition, sometimes neuropsychologists are brought into a case to perform a "limited assessment" in a given area after other experts have conducted assessments in other areas. The "limited assessment" becomes one piece of a full neuropsychological assessment.

Neuropsychologists might approach assessments in several ways, and the party retaining such a neuropsychological expert must work closely with him or her to design an appropriate approach and decide on an appropriate testing methodology for a given case. See generally Heilbronner, Forensic Neuropsychology Casebook (2005). See also, Lezak et al, Neuropsychological Assessment (Oxford 2004).

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§16.32 7. Role of Psychopharmacology in Assessing Mental Health and Functioning

Psychopharmacology is the study of the effects on the body—particularly the brain and nervous system—of ingesting various legal or illegal substances. Psychologists, psychiatrists, medical doctors, and other types of experts on neurobiology, neurochemistry, and physiology sometimes testify about these effects, particularly when the defendant presents evidence of impairment that could affect his or her mental state.

Psychopharmacology is gaining importance because of developments in neuroscientific training and as a result of the continuing development of psychoactive medications. Psychopharmacologists with experience in forensics increasingly have been involved in studying the effects of legal and illegal substances on brain function and the nervous system.

In addition, changes in the law have made it important for courts to understand the effects of psychoactive medications. For example, when a person is forcibly medicated into competence through administration of psychoactive drugs, courts must follow the procedure set out by the U.S. Supreme Court in *Sell v U.S.* (2003) 539 US 166, 179, 156 L Ed 2d 197, 211, 123 S Ct 2174, which involved consideration of the side-effects of medications. Often, the mental health and functioning experts whose testimony is sought out in such cases are psychopharmacologists who have participated in drug trials or research pertinent to a specific drug or class of medications.

Because of the increase in the number of diagnostic and research tools available to mental health and functioning experts, the amount of reliable evidence that can be presented to a judge or jury about the effects of a wide variety of legal or illegal substances is greater today than it was 15 years ago. The imaging study techniques discussed in §§16.26-16.28, particularly functional imaging, have been used to study the effects of various psychoactive substances, so the trier of fact can be presented with actual images of the brain control centers affected by substances.

With ongoing research on chemical and electrophysiological activity in the brain, psychopharmacologists and other persons trained in the neurosciences are increasingly able to explain both the effects of substances and the benefits of current and emerging classes of medications on behavior. This form of psychopharmacological expertise is likely to be used with risk assessment or sentencing hearings. See generally Schatzberg & Nemeroff, eds., The American Psychiatric Publishing Textbook of Psychopharmacology (3d ed 2004). On risk assessment, see §§16.48-16.51.

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§16.33 F. Consideration of Culture and Language

Forensic evaluations of mental health and functioning should take into account issues of culture, ethnicity, and language in describing symptoms. See Sadock, Sadock & Ruiz Comprehensive Textbook of Psychiatry (9th ed 2009). For example, parts of Asia and the Pacific Islands might describe a person as "running amok," which can be a cultural- and language-specific way of describing symptoms of a particular dissociative disorder. Sadock, Sadock & Ruiz, Comprehensive Textbook of Psychiatry, chap 27.

Attorneys should be aware of the effect of cultural diversity on psychological testing, and "the reliability, validity, and norms of the translated [version of any test] should be independently established for any population in which the test will be used." Anastasi & Urbina, Psychological Testing, p 344 (7th ed 1997). This view is echoed in the *Standards for Educational and Psychological Testing* (1999) by the American Educational Research Association (AERA), the American Psychological Association (APA), and the National Council on Measurement in Education (NCME). For an overview of the organization and content of these standards, go to http://www.apa.org/science/programs/testing/standards.aspx (visited June 2, 2010).

For more information on the cross-cultural aspects of psychological assessment, see the following publications:

- Llorente, Principles of Neuropsychological Assessment with Hispanics (2010);
- Ramirez, ed., Cultural Issues in Criminal Defense (2d ed 2007);
- Nell, Cross-Cultural Neuropsychological Assessment: Theory and Practice (2000);
- Pontón & León-Carrión, Neuropsychology and the Hispanic Patient: A Clinical Handbook (2001);
- Bobes, García-Calvo, Prieto, García-García & Rico-Villademoros, *Psychometric Properties of the Spanish Version of the Screening Scale for DSM-IV Generalized Anxiety Disorder of Carroll and Davidson,* 34(2) Actas Españolas de Psiquiatría 83 (Mar.-Apr. 2006); and
- The Journal of Cross-Cultural Psychology.

A useful bibliography on published research in the role of culture and language in mental health assessments is provided in Anastasi & Urbina, Psychological Testing, p 344.

On attempts to validate and determine norms for the use of assessment instruments on Spanish-speaking patients, see, *e.g.,* Llinàs, Lozano, López, Gudayol, López-Pousa, Vilalta & Saxton, *Validation of the Spanish Version of the Severe Impairment Battery,* 10(1) Neurologia 14 (Jan. 1995). For information on psychological assessments conducted outside of the United States, see the European Journal of Psychological Assessment.

NOTE: Adherence to standards for norming and validation of psychometric instruments may vary by country, as do threshold standards for the publication of materials in scientific journals in other countries. Counsel should be cautious when drawing inferences about the relevance, validity, and reliability of specific "translated" or foreign language testing instruments and assessment tools until they are sure that the scholarship and expertise involved would meet the standards applicable in the United States.

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III. ASSESSMENT OF PARTICULAR BEHAVIORS, MENTAL COMPETENCE, AND OTHER CONDITIONS

§16.34 A. Lack of Case Law Guidance on Assessment Methods

There are many different types of mental health and functioning assessments, and the question of which assessment methods should be used in a particular case is largely not prescribed by case law. See, *e.g.*, *Centeno v Superior Court* (2004) 117 CA4th 30, 46, 11 CR3d 533 (trial court need only make initial determination regarding whether proposed tests are reasonably related to mental retardation issue tendered).

For discussion of mental competence, mental defenses, and related issues, see California Criminal Law Procedure and Practice, chap 48 (Cal CEB Annual).

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§16.35 B. Mental State as of Time Crime Was Committed

Forensic evaluators of mental health and functioning may need to assess a criminal defendant's mental state as of the time the crime charged was committed—that is, to make a "retrospective" assessment. See, *e.g.,* Gutheil, *Assessment of Mental State at the Time of the Criminal Offense: The Forensic Examination,* in Simon & Shuman, eds., Retrospective Assessment of Mental States in Litigation: Predicting the Past (2002); see also Melton, Petrila, Poythress & Slobogin, Psychological Evaluations for the Courts: A Handbook for Mental Health Professionals and Lawyers, chap 8 (3d ed 2007). A forensic evaluator's assessment should include (*Gutheil, supra*):

- A forensic interview of the defendant, based on the evaluator's knowledge of the facts of the crime;
- Independent assessment of any disorder of the defendant that either is currently present or appeared present at the time of the criminal event, or at both times;
- Taking the defendant's life history;
- Standardized assessment tests;
- Interviews with third parties, including contemporary observers of the defendant; and
- Examination of the defendant's behavior near the time of the crime.

NOTE: In response to *Verdin v Superior Court* (2008) 43 C4th 1096, 77 CR3d 287, the legislature amended Pen C §1054.3 to authorize the court to order a defendant or juvenile in a Welf & I C §602 proceeding to submit to testing by a prosecution-retained mental health expert whenever the defendant has placed his or her mental state at issue. Under the statute, (1) the prosecution must make a timely request and (2) submit a list of "tests," including any and all assessment techniques, such as a clinical interview, its expert proposes to administer; (3) a hearing must be held at the request of the defense to consider objections to the proposed tests; and (4) before issuing an order, the trial court must make a threshold determination that the proposed tests bear some reasonable relation to the mental state placed in issue. Pen C §1054.3(b)(1). The constitutionality of the newly enacted statute has yet to be resolved. However, some recent rulings should be examined by counsel, as they may impact on the procedures used in the examinations at issue—see, for example, *Maldonado v Superior Court* (2010) 184 CA4th 739, ___ CR3d ___, a case decided as this chapter was being finalized. If the published decision survives review, it outlines some "protective measures" that may be used by courts when examinations of the defendant are ordered.

For further discussion on retrospective assessments of mental states, see Rogers & Shuman, Conducting Insanity Evaluations (2d ed 2000); Simon & Shuman, eds., Retrospective Assessment of Mental States in Litigation: Predicting the Past (2002). On analysis of mental health issues associated with waivers, such as a waiver of the right to counsel at the time of an interrogation, see Grisso, Evaluating Competencies: Forensic Assessments and Instruments (2d ed 2003). The bibliographies of these works also contain useful sources for background information on retrospective mental health assessments.

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§16.36 C. Malingering

Malingering is intentionally claiming false or grossly exaggerated physical or psychological symptoms for some secondary advantage such as avoiding conviction. See American Psychiatric Association, Diagnostic and Statistical Manual of Mental Disorders: DSM-IV-TR (4th ed, text rev, 2000); see also Sadock, Sadock & Ruiz, Comprehensive Textbook of Psychiatry, (9th ed 2009); Rogers, ed., Clinical Assessment of Malingering and Deception (3d ed 2008).

NOTE: In capital cases, a prosecutor might suggest that an accused's malingering during a defense-arranged or court-ordered evaluation not only affects the reliability of the end result, but reflects negatively on the accused's moral and behavioral makeup, a relevant consideration under Pen C §190.3.

Because the suggestion that an individual is malingering can be significant to a trier of fact, it is important to address what a mental health and functioning evaluator means if he or she suggests that a client is "malingering." An evaluator may suspect malingering, for example, if a client appears to be:

- Feigning a low degree of ability (such as claiming amnesia or downplaying actual intelligence) when cognitive impairment or mental retardation is at issue;
- Constructing a false history or faking symptoms to establish a condition such as post-traumatic stress disorder or psychosis; or
- Using a specific nonresponsive pattern in answering assessment test questions.

Note, however, that an individual who is disordered or has real cognitive impairment can still seem to be malingering. Moreover, certain types of malingering are attributed to persons who are trying to make themselves look "better" (that is, less mentally ill or more intelligent) than they actually are. Thus, malingering does not necessarily defeat a diagnosis of disease, disorder, or deficiency.

Experts draw inferences of malingering from particular patterns of response to standardized personality tests. Mental health literature, such as Rogers, ed., Clinical Assessment of Malingering and Deception (3d ed 2008), provides useful information on facts and myths about malingering. Tests aimed at uncovering malingering include the following:

- Validity Indicator Profile (VIP);
- Structured Interview of Reported Symptoms (SIRS); and
- Test of Memory Malingering (TOMM).

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Source: Criminal Law/Scientific Evidence in California Criminal Cases/16 Assessment of Mental Health and Functioning/ D. Competence to Stand Trial/§16.37 1. California Standard of Competence

D. Competence to Stand Trial

§16.37 1. California Standard of Competence

A criminal defendant is "mentally incompetent" when "as a result of mental disorder or developmental disability, the defendant is unable to understand the nature of the criminal proceedings or to assist counsel in the conduct of a defense in a rational manner." Pen C §1367(a); *People v Visciotti* (1992) 2 C4th 1, 35, 5 CR2d 495; *People v Garcia* (2008) 159 CA4th 163, 169, 70 CR3d 837. When a doubt arises in the mind of the judge concerning the mental competence of the defendant, he or she shall ask the attorney for the defendant whether, in the opinion of the attorney, the defendant is mentally competent. Pen C §1368(a). If, in response, "counsel informs the court that he or she believes the defendant is or may be mentally incompetent, the court shall order that the question of the defendant's mental competence be determined in a hearing." Pen C §1368(b). Discretion to order a hearing is vested with the trial court. "A doubt in the mind of counsel, or anyone else other than the trial court, is not sufficient to require a hearing." *People v Wade* (1959) 53 C2d 322, 336, 1 CR 683, overruled on other grounds in *People v Carpenter* (1997) 15 C4th 312, 381, 63 CR2d 1; *People v Garcia* (2008) 159 CA4th 163, 170, 70 CR3d 837 (quoting *Wade*). However, when substantial evidence appears that the defendant, because of mental illness, cannot understand the proceedings or assist in the defense, then the defendant is entitled to a Pen C §1368 hearing as a matter of right; "the court has no discretion to exercise." *People v Pennington* (1967) 66 C2d 508, 518, 58 CR 374. The defendant is entitled to the hearing no matter how persuasive other evidence to the contrary may be. 66 C2d at 519; *People v Sundberg* (1981) 124 CA3d 944, 954, 177 CR 734.

Under *Pennington,* when a psychiatrist or psychologist who has had sufficient opportunity to examine the accused states under oath that the accused is incompetent, the substantial evidence test has been met. A lawyer who has had his or her client examined by a qualified mental health professional, and who as a result has a good faith basis for stating that the client is not competent to stand trial, presents a trial court with a basis for further inquiry and may create a record that will warrant review on appeal if no action is taken by the trial court in response. As a practical matter, trial courts will often suspend proceedings based on such a record. Also, the trial court that has heard evidence from experts that indirectly relates to competence to stand trial may have to inquire further, even if trial counsel does not declare a doubt concerning trial competence. *People v Ary* (2004) 118 CA4th 1016, 1021, 13 CR3d 482 (retrospective competency inquiry should be held because evidence of defendant's "mental functioning" presented during motion to suppress suggested defendant was not competent to stand trial). For further discussion of competency, see California Criminal Law Procedure and Practice, chap 48 (Cal CEB Annual).

California law does not require a specific type of mental health and functioning assessment to make the determination that a defendant is not competent. Courts may mistakenly believe that a defendant is legally incompetent only if his or her disorder is listed in the American Psychiatric Association, Diagnostic and Statistical Manual of Mental Disorders: DSM-IV-TR (4th ed, text rev, 2000) or fits definitions of mental retardation or developmental disability listed in the Welfare and Institutions Code or Penal Code. In reality, neither statute nor case law requires that the defendant's particular disorder be listed in the DSM-IV-TR. When a defendant's competence is at issue, a key area of dispute is often whether this interpretation is appropriate given the U.S. Supreme Court's definition of competence, which is a legal condition rather than a DSM-IV-TR diagnosis. See *Drope v Missouri* (1975) 420 US 162, 171, 43 L Ed 2d 103, 112, 95 S Ct 896; *Dusky v U.S.* (1960) 362 US 402, 4 L Ed 2d 824, 80 S Ct 788. Competence is required by the federal Due Process Clause under the Fourteenth Amendment, so California's definition must be read against that background.

The U.S. Supreme Court has said that "while States are free to adopt competency standards that are more elaborate than [ours], the Due Process Clause does not impose these additional requirements." *Godinez v Moran* (1993) 509 US 389, 402, 125 L Ed 2d 321, 334, 113 S Ct 2680. And indeed, California's competence laws go beyond the U.S. Supreme Court's formulation of competence to stand trial. See Pen C §§1367-1376. For discussion of the federal standard, see §16.38. California courts cite both the state laws and U.S. Supreme Court definitions for competence to stand trial. See, *e.g., People v Leonard* (2007) 40 C4th 1370, 1391, 58 CR3d 368.

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Source: Criminal Law/Scientific Evidence in California Criminal Cases/16 Assessment of Mental Health and Functioning/§16.38 2. Federal Standard of Competence

§16.38 2. Federal Standard of Competence

Competence, as defined by the U.S. Supreme Court, requires that the defendant have (*Drope v Missouri* (1975) 420 US 162, 170 n7, 43 L Ed 2d 103, 112 n7, 95 S Ct 896; *Dusky v U.S.* (1960) 362 US 402, 4 L Ed 2d 824, 80 S Ct 788):

- A sufficient present ability to consult with counsel with a reasonable degree of rational understanding;
- Both a rational and factual understanding of proceedings; and
- The ability to assist counsel in preparing his or her defense.

In addition, competent defendants in criminal cases must have the capacity to make important decisions, such as whether to (*Godinez v Moran* (1993) 509 US 389, 398, 125 L Ed 2d 321, 332, 113 S Ct 2680):

- Waive rights and privileges;
- Take the stand; and
- Decide case procedures and strategies, such as whether to decline to cross-examine certain witnesses, put on a defense, or raise one or more affirmative defenses.

NOTE: In *Edwards v Indiana* (2008) 554 US 164, 171 L Ed 2d 345, 357, 128 S Ct 2379, the United States Supreme Court held that the Constitution permits states to limit defendants' right of self-representation by insisting that counsel represent a defendant found competent to stand trial under *Dusky*, *supra,* yet who is not competent to conduct trial proceedings alone. See also *U.S. v Ferguson* (9th Cir 2009) 560 F3d 1060, 1061 (after *Edwards*, a different standard of mental competency applies when considering defendant's request for self-representation than when considering whether defendant may be tried at all); *People v Taylor* (2009) 47 C4th 850, 866, 102 CR3d 852 (no error in failing to deny self-representation when, at time of trial, California had not set higher or different standard for self-representation than for trial with counsel; *Edwards* did not alter principle that constitution is **not** violated by permitting defendant to represent self when found competent to stand trial). *Edwards* also contains a useful recent discussion of the Supreme Court's interpretation of competence to stand trial.

In contrast to California's competency standards (see Pen C §1367(a)), the federal test does not appear to require a specific finding of mental disorder or disability. Other states have defined competency to stand trial in ways that differ from the U.S. Supreme Court's standards. For a useful description of the federal standard in the view of two leading scholars, including state law variations, see Rogers & Shuman, Fundamentals of Forensic Practice: Mental Health and Criminal Law, chap 6 (2005).

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3. Competence Assessment Methods

§16.39 a. Focus on Present Situation, but History a Factor

Even though competence is about a defendant's mental state at the time of trial, evidence of a prior diagnosis of disorder or disability can help an expert assess a defendant's current level of competence. Counsel who evaluates a competence assessment should investigate whether the examiner used established diagnostic criteria, obtained a social history, or reviewed any third party evidence regarding the defendant's mental abilities. For discussion of methods for assessing competence, see Melton et al., Psychological Evaluations for the Courts (3d ed 2007); Rogers & Shuman, Fundamentals of Forensic Practice (2005); Grisso, Assessing Competencies (2003).

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§16.40 b. Assessment Protocols

Competence assessment protocols typically include the following:

- Measures of cognitive functioning;
- Structured interviews and other assessment tools specific to competence to stand trial; and
- Communication between the mental health evaluators and counsel about the ability of the accused to assist in preparation of the defense and to confer with counsel with a reasonable degree of rational understanding.

NOTE: Counsel for a defendant should initiate contact with mental health evaluators if such contact is not part of the evaluator's standard protocol.

For a comprehensive discussion of competence assessment instruments, see *U.S. v Duhon* (WD La 2000) 104 F Supp 2d 663. Although *Duhon* was a federal court decision and is not binding in California, it discusses pertinent case law, literature, and evidence of incompetence in detail. See also *U.S. v Gigante* (ED NY 1997) 996 F Supp 194, which discusses methods used to assess the competence of a defendant who later admitted to having malingered during testing.

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§16.41 c. Methodologies

Competence assessment devices attempt to address some of the legal definitions of competence. Although their effectiveness in doing so is widely questioned in the scientific community, they are designed to test the accused's knowledge of:

- Courtroom vocabulary;
- Situational awareness of charges;
- Rational and factual understanding of the legal processes at issue;
- Areas of interaction with counsel;
- Primary players in the courtroom; and
- Possible outcomes of the case.

There are two generally accepted approaches to conducting competence assessments: standardized and extrapolated See, *e.g.,* Grisso, Evaluating Competencies: Forensic Assessments and Instruments (2d ed 2003); Melton, Petrila, Poythress & Slobogin, Psychological Evaluations for the Courts: A Handbook for Mental Health Professionals and Lawyers (3d ed 2007). A standardized assessment uses empirically validated competence evaluation tools. Reports generated from standardized assessments may include data and references to established research. An extrapolated diagnosis, on the other hand, combines professional judgment with standardized assessment tools and confirmatory research specific to the test taker, such as record review, investigation, and consultation with defense counsel. Unstandardized assessments based solely on interviews and personal knowledge are not favored, because they provide no way to effectively assess an expert's work or to compare the expert's conclusions with what another expert might conclude from the same information. See generally Rogers & Shuman, Fundamentals of Forensic Practice: Mental Health and Criminal Law, p 405 (2005).

To assess an accused's reasoning abilities and decision-making skills, competence tests often require the examiner to describe a typical courtroom scene and record the content, cogency, and relevance of the examinee's responses to questions about the scene. Although useful to organize information about the accused's basic knowledge of court vocabulary and legal situational awareness, most competence assessment devices cover little that would generate a legally useful understanding of the accused's ability to assist counsel. Rogers & Shuman, Fundamentals of Forensic Practice: Mental Health and Criminal Law (2005).

Typical competence assessment devices include the following:

- MacArthur Competence Assessment Tool—Criminal Adjudication (MacCAT-CA);
- Competence Assessment Inventory (CAI);
- Updated Georgia Court Competency Test; and
- Evaluation of Competency to Stand Trial—Revised (ECST-R).

NOTE: The Competence Assessment for Standing Trial for Defendants with Mental Retardation (CAST-MR) is the only validated competence assessment tool aimed at mentally retarded defendants. The CAST-MR does not generate data for all of the legal elements of competence to stand trial, most notably the ability of the accused to assist counsel in the preparation of the defense. Several scholars have pointed out that the validity of the CAST-MR is uncertain, because the test was normed and validated on a relatively small sample that included only one female.

Some experts minimize or fail to understand the limits of these tests' validity and reliability and draw exaggerated or inappropriate inferences from their results. Attorneys should be vigilant in pointing out to the court the speculative nature of any such inferences.

Observation or clinical interviews, even when combined with standardized competence assessments, may not reveal whether a defendant meets legal standards of competence, and a mentally retarded defendant in particular cannot necessarily be educated into competence. For a discussion of the U.S. Supreme Court's definition of competence and 18 USC §4241, see *U.S. v Duhon* (WD La 2000) 104 F Supp 2d 663.

None of the competence assessment instruments and tools discussed in the scientific literature adequately provide definitive evidence of an accused's ability to assist in the preparation of his or her defense. See generally Philipsborn, *Searching for Uniformity in Adjudications of the Accused's Competence to Assist and Consult in Capital Cases,* 10 Psychol, Pub Pol'y & L 417 (2004).

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§16.42 d. Importance of Information From Defendant's Attorney

Consistent with the protocols discussed in §16.41, both mental health assessment literature and case law have stressed the importance of obtaining information from a defendant's attorney when determining the defendant's competence to stand trial. See, *e.g.,* Melton, Petrila, Poythress & Slobogin, Psychological Evaluations for the Courts: A Handbook for Mental Health Professionals and Lawyers, p 158 (3d ed 2007). The California Supreme Court has observed that "one might reasonably expect that the defendant and his counsel would have better access than the People to the facts relevant to the court's competency inquiry … [With respect to] the defendant's possible inability to cooperate with his counsel in establishing his incompetence: Counsel can readily attest to any such defect or disability." *People v Medina* (1990) 51 C3d 870, 885, 274 CR 849; but see *People v Garcia* (2008) 159 CA4th 163, 170, 70 CR3d 837 (doubt in mind of counsel, or anyone else other than the trial court, is not sufficient to require competency hearing).

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§16.43 e. Testimony on Competence

Hearings on competence to stand trial may include testimony from defense counsel, the prosecution, witnesses who observed the defendant in the community or in jail, and mental health and functioning experts. There may also be testimony from attorney experts whose function is to explain to the trier of fact how clients and counsel typically interact, the standards of practice for attorney-client communication, and the tasks that competent clients and their attorneys usually agree to perform. It is counsel's role to determine if a defendant should testify at a competency hearing. *People v Bell* (2010) 181 CA4th 1071, 1074, 105 CR3d 259 (court erred in allowing defendant to testify over objection of counsel).

For a comprehensive discussion of competence assessment instruments, see *U.S. v Duhon* (WD La 2000) 104 F Supp 2d 663 (discussing pertinent case law, literature, and evidence of incompetence in detail); *U.S. v Gigante* (ED NY 1997) 996 F Supp 194 (discussing methods used to assess the competence of a defendant who later admitted to having malingered during testing).

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E. Mental Retardation, Developmental Disability, and Related Conditions

§16.44 1. Relevance to Legal Proceeding

A defendant's mental retardation, developmental disability, or other mental impairment may be important if competence to stand trial, insanity, or another defense based on a mental state is at issue. See *People v Leonard* (2007) 40 C4th 1370, 1391, 58 CR3d 368 (citing *Drope v Missouri* (1975) 420 US 162, 172, 43 L Ed 2d 103, 113, 95 S Ct 896, for the proposition that states are constitutionally required to protect a defendant's right not to be tried or convicted while incompetent); *U.S. v Duhon* (WD La 2000) 104 F Supp 2d 663 (discussing competence of defendant with mild mental retardation). See also Pen C §§1001.20-1001.34 (persons charged with misdemeanors may be eligible for diversion if found to have cognitive impairments caused by developmental disabilities).

For further discussion of mental retardation and other mental and developmental impairments in criminal proceedings, see California Criminal Law Procedure and Practice, chap 48 (Cal CEB Annual).

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§16.45 2. Legal Definitions

The U.S. Supreme Court held that the execution of mentally retarded individuals is cruel and unusual punishment prohibited by the Eighth Amendment. *Atkins v Virginia* (2002) 536 US 304, 153 L Ed 2d 335, 122 S Ct 2242. The states are responsible for "developing appropriate ways to enforce the constitutional restriction." See *Atkins,* 536 US at 317, 153 L Ed 2d at 348; *Bobby v Bies* (2009) ___ US ___, 173 L Ed 2d 1173, 129 S Ct 2145 (state did not put defendant, previously determined for purposes of mitigation to be borderline mentally retarded, twice in jeopardy by ordering postconviction *Atkins* hearing). California has implemented the *Atkins* rule by enacting Pen C §1376, which defines "mentally retarded" and establishes a procedure in capital cases for determining whether a defendant is mentally retarded. See *People v Jackson* (2009) 45 C4th 662, 678, 88 CR3d 558; *Campbell v Superior Court* (2008) 159 CA4th 635, 648, 71 CR3d 594. Penal Code §1376 sets forth trial level procedure for a declaration and adjudication of mental retardation in a California capital case. One who is mentally retarded has "the condition of significantly sub-average general intellectual functioning existing concurrently with deficits in adaptive behavior and manifested before the age of 18." Pen C §1376(a). For a similar definition in a diversion statute, see Pen C §1001.20(a)(1).

Mental retardation is "a question of fact. It is not measured according to a fixed intelligence test score or a specific adaptive behavior deficiency, but rather constitutes an assessment of the individual's overall capacity based on a consideration of all the relevant evidence." *People v Superior Court (Vidal)* (2007) 40 C4th 999, 1012, 56 CR3d 851 (citing *In re Hawthorne* (2005) 35 C4th 40, 49, 24 CR3d 189). See also *Campbell v Superior Court* (2008) 159 CA4th 635, 650, 71 CR3d 594.

NOTE: The California Supreme Court upheld the trial court's finding that a capital murder defendant was mentally retarded, even though the defendant's score on a standardized intelligence test was above the general range for mental retardation. Because the legal definition of mental retardation does not require a particular test score, the trial court had discretion to give less weight to the defendant's test score than to other evidence of the defendant's intellectual impairment. *People v Superior Court (Vidal)* (2007) 40 C4th 999, 1012, 56 CR3d 851.

In a death penalty case, after the defendant files a declaration from a qualified expert under Pen C §1376(b)(1), he or she may seek a determination of mental retardation from the court at the outset of trial or by jury after a finding of murder with special circumstances. Pen C §1376; *People v Jackson* (2009) 45 C4th 662, 678 n8, 88 CR3d 558. But postconviction, a defendant is not entitled to a jury trial on the issue, and Pen C §1376 is inapplicable. If a convicted death penalty defendant seeks to assert that he or she is mentally retarded and exempted from the death penalty under *Atkins,* his or her remedy is through a petition for writ of habeas corpus. 45 C4th at 679.

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§16.46 3. Mental Health Assessment Definitions

Mental health researchers have noted that legal definitions of mental retardation do not necessarily parallel definitions found in the mental health literature. A mental health assessment based on a definition of retardation found in professional literature may not be consistent with the legal definition of retardation found in Pen C §1376. See *Campbell v Superior Court* (2008) 159 CA4th 635, 648, 71 CR3d 594.

There are different methods of assessing cognitive and adaptive functioning with mental retardation. Litigation on the definition of mental retardation and accepted methodologies specific to criminal cases is still in its infancy. As litigation aimed at defining acceptable mental retardation assessment methods in capital cases grows, protocols for professionals dealing with the mentally retarded will likely be refined.

Typical intelligence tests include American Association on Intellectual and Developmental Disabilities (AAIDD), Intellectual Disability: Definition, Classification, and Systems of Supports, chap 4 (11th ed 2010):

- The Wechsler Adult Intelligence Scale (WAIS IV and WAIS-III) (*People v Superior Court (Vidal)* (2007) 40 C4th 999, 1012, 56 CR3d 851);
- The Stanford-Binet Intelligence Scale, Fifth Edition (SB5);
- The Kaufman Adolescent and Adult Intelligence Test (KAIT); and
- The Kaufman Brief Intelligence Test, Second Edition (KBIT-2).

For discussion of tests of nonverbal intelligence, see Sadock, Sadock & Ruiz, Comprehensive Textbook of Psychiatry, chap 34 (9th ed 2009).

Mentally retarded people often have difficulties with adaptive behavior, lacking skills in such areas as social functioning, self-management, and the ability to engage in constructive activity. Common tests that measure adaptive behavior include (Sadock, Sadock & Ruiz, Comprehensive Textbook of Psychiatry, chap 34 (9th ed 2009); AAIDD, Intellectual Disability, Chapter 5):

- AAMR Adaptive Behavior Scale (ABS);
- Vineland Adaptive Behavior Scales (VABS) and Vineland Adaptive Behavior Scales, Second Edition (Vineland-II or VABS-II);
- Scales of Independent Behavior—Revised (SIB-R);
- Kaufman Functional Academic Skills Test (K-FAST);
- Street Survival Skills Questionnaire (SSSQ);
- Comprehensive Test of Adaptive Behavior (CTAB); and
- Adaptive Behavior Assessment System, Second Edition (ABAS-II) (see *Campbell v Superior Court* (2008) 159 CA4th 635, 642 n3, 71 CR3d 594).

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§16.47 4. Professional Texts and Resources

Courts occasionally look to professional texts and articles for guidance on the definition of various mental states. For example, when considering whether it is constitutional to execute a mentally retarded offender, the U.S. Supreme Court used the following sources for information on mental retardation (*Atkins v Virginia* (2002) 536 US 304, 309 n3, 153 L Ed 2d 335, 342 n3, 122 S Ct 2242):

- American Psychiatric Association, Diagnostic and Statistical Manual of Mental Disorders: DSM-IV-TR (4th ed, text rev, 2000);
- American Association on Intellectual and Developmental Disability, Intellectual Disability: Definition, Classification, and Systems of Supports (2010);
- Sadock, Sadock, & Ruiz, Comprehensive Textbook of Psychiatry (9th ed 2009);
- McGee & Menolascino, *The Evaluation of Defendants With Mental Retardation in the Criminal Justice System,* in Conley, Luckasson & Bouthilet, eds., The Criminal Justice System and Mental Retardation: Defendants and Victims (1992);
- Appelbaum & Appelbaum, *Criminal-Justice-Related Competencies in Defendants With Mental Retardation,* 14 J Psychiatry & L 483 (Winter 1994);
- Levy-Shiff, Kedem & Sevillia, *Ego Identity in Mentally Retarded Adolescents,* 94(5) Am J Mental Retardation 541 (Mar. 1990);
- Whitman, *Self-Regulation and Mental Retardation,* 94(4) Am J Mental Retardation 347 (Jan. 1990); and
- Everington & Fulero, *Competence to Confess: Measuring Understanding and Suggestibility of Defendants with Mental Retardation,* 37(3) Mental Retardation 212 (June 1999); Grisso, *Reply to "A Critical Review of Published Competency to Confess Meanures,"* 28 Law & Human Behavior No. 6 (1999).

The American Association on Intellectual and Developmental Disabilities (AAIDD) (previously known as the American Association on Mental Retardation (AAMR)), which is considered by many professionals to be the field's most influential organization, publishes the American Journal on Mental Retardation. Other valuable resources include the journal Mental Retardation and, for scholarship outside of the United States, the Journal of Intellectual Disabilities Research. Organizations such as the Council for Exceptional Children (http://www.cec.sped.org//AM/Template.cfm?Section=Home) and The Arc (http://www.thearc.org/netcommunity/) are sources for information on legislation related to mental retardation and developmental disabilities.

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F. Risk of Violence and Other Criminal Behaviors

§16.48 1. Development of Risk Assessment as Mental Health Discipline

The current focus on risk assessment may have developed as a result of laws that balance the state's power to involuntarily hospitalize those in need of treatment with the rights of the individual. Risk assessment helps courts decide whether the criteria for involuntary hospitalization—whether the individual is likely to cause harm to him- or herself or to others—has been met. See Welf & I C §5150; see also Monahan & Steadman, *Toward a Rejuvenation of Risk Assessment Research,* in Monahan & Steadman, eds., Violence and Mental Disorder: Developments in Risk Assessment (1994).

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§16.49 2. Nature of Risk Assessment

Risk assessment, a relatively new field, may be used in a criminal case to determine sentencing, predict tendency for violence for purposes of a bail application, make outpatient placement decisions in insanity cases, and calculate the likelihood of future dangerousness in capital cases. Risk assessment plays a critical role in Sexually Violent Predator Act (SVPA) (Welf & I C §§6600-6609.3) and Mentally Disordered Offender (MDO) Law (Pen C §§2960-2981) proceedings. For further discussion of MDO proceedings, see California Criminal Law Procedure and Practice, chap 48 (Cal CEB Annual). For further discussion of SVPA proceedings, see chap 18.

Civil courts are starting to use risk assessments, too. Research and assessment methodologies are evolving to assess risk for issues relevant to civil cases (such as fitness for duty in a particular occupation; fitness for family visitation; fitness for child custody; and the likelihood of drug relapse, sexual misbehavior, or domestic violence).

Deep divisions of opinion exist among acknowledged scholars in the risk assessment field. Slobogin, Proving the Unprovable: The Role of Law, Science, and Speculation in Adjudicating Culpability and Dangerousness (2007). Some scholars are concerned about the potential for misuse of standardized risk assessment measures. See Rogers & Shuman, Fundamentals of Forensic Practice: Mental Health and Criminal Law, chap 11 (2005). In addition, some scholars have criticized risk assessment scales, saying that they "focus exclusively on static factors and neglect dynamic factors in making their predictions." Rogers & Shuman, Fundamentals of Forensic Practice, p 277. See Craig, Browne & Stringer, *Risk Scales and Factors Predictive of Sexual Offense Recidivism,* 4(1) Trauma, Violence & Abuse 45 (Jan. 2003). See also Gottfredson & Moriarty, *Statistical Risk Assessment: Old Problems and New Applications,* 52(1) Crime & Delinquency 178 (Jan. 2006).

Some risk assessments measure psychopathy, which some say is scientifically linked to criminal activity. See, *e.g.,* Hare, Development of the Psychopathy Checklist; see also Hare, Psychopathy Checklist Revised (PCL-R) (2d ed 2003). For discussion of various versions of Hare's psychopathy checklists, the use of psychopathy measurement in risk assessment, and other risk assessment devices, see Melton, Petrila, Poythress & Slobogin, Psychological Evaluations for the Courts: A Handbook for Mental Health Professionals and Lawyers §9.09 (3d ed 2007). For more technical critiques of psychopathy and antisocial personality inventories, including the PCL-R, see Rogers & Shuman, Fundamentals of Forensic Practice: Mental Health and Criminal Law, chap 9 (2005).

The MacArthur Research Network on Mental Health and the Law has published a bibliography on the assessment of violence, building on data obtained and methodologies used in a famous MacArthur Violence Risk Assessment Study of more than 1000 patients conducted from 1992 to 1995. For the online version of this bibliography, see http://www.macarthur.virginia.edu/risk.html (visited June 2, 2010). Although the MacArthur Study and follow-up bibliography do not necessarily comprise a definitive treatise on assessing the risk of violence, attorneys may find it useful to review this information, because the study involved well-known experts and yielded new risk assessment tools.

For information on the prediction of violence, see Volavka, Neurobiology of Violence (2d ed 2002). For additional understanding of research and scholarship surrounding risk assessment, see Melton, Petrila, Poythress & Slobogin, Psychological Evaluations for the Courts: A Handbook for Mental Health Professionals and Lawyers §9.09 (3d ed 2007).

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§16.50 3. Methods of Assessing Risk for Sex Offenders

Although the American Psychiatric Association and other mental health professionals have criticized sexually violent predator (SVP) laws for labeling a clinical condition that has not yet been formally defined by scientists, specific measurement devices have been designed to evaluate risks presented by sex offenders, including the following:

- Rapid Risk Assessment for Sexual Offense Recidivism (RRASOR);
- Minnesota Sex Offender Screening Tool—Revised (MnSOST-R);
- STATIC-99, which combines items from RRASOR with items from a shortened version of the Structured Anchored Clinical Judgment Minimum (SACJ-Min); and
- Multifactorial Assessment of Sex Offender Risk for Recidivism (MASORR).

Issues frequently raised in SVP risk assessment include the following:

- The definition of the underlying disorder and its connection to sexually related violence;
- Volitional impairment (impulsiveness);
- Disregard for personal consequences;
- Incapacity to delay behavior; and
- Chronic focus on sexual violence.

There have been some legal challenges to risk assessment evaluations and methodologies in SVP cases. See, *e.g.*, *Cooley v Superior Court* (2002) 29 C4th 228, 127 CR2d 177, and *People v Flores* (2006) 144 CA4th 625, 50 CR3d 567, which both focus on the STATIC-99 test. Also, some scholars believe that a number of the current tests for SVP risk assessment may be irrelevant, in part because of the way that they were purportedly validated. See Rogers & Shuman, Fundamentals of Forensic Practice: Mental Health and Criminal Law, chap 11 (2005).

Risk assessment with regard to SVPs is further discussed in chap 18.

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§16.51 4. Evaluating Risk Assessment Methods

Counsel should seek access to the entire evaluation and assessment file of an opposing party's testifying expert to determine whether the expert adhered to published protocols on risk assessment. For discussions of issues that might be raised in cross-examining a risk assessment expert, see Rogers & Shuman, Fundamentals of Forensic Practice: Mental Health and Criminal Law, chap 11 (2005); Slobogin, Proving the Unprovable: The Role of Law, Science, and Speculation in Adjudicating Culpability and Dangerousness, chaps 6-7 (2007).

Counsel should also review the relevance of any given testing instrument, particularly if actuarial data was used in the risk assessment. Actuarial data typically is derived from studies of large numbers of persons; extrapolating from such data to assess the risk posed by one individual has inherent limitations.

A risk assessment instrument that does not report its standard error of measurement (SEM) is likely not in compliance with published testing standards. In addition, risk assessment instruments with large standard errors of measurement may not properly place test takers on a standardized comparison scale. On risk assessment testing standards published by the American Psychological Association (APA) and other organizations, see §§16.19, 16.22-16.23, 16.33 and Rogers & Shuman, Fundamentals of Forensic Practice: Mental Health and Criminal Law, p 274 (2005).

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Source: Criminal Law/Scientific Evidence in California Criminal Cases/17 Gang Expert Testimony/Chapter Outline

17

Gang Expert Testimony

Andy Gutierrez

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I. THE CALIFORNIA STREET TERRORISM ENFORCEMENT AND PREVENTION (STEP) ACT

§17.1 A. Enactment of Act; Purpose

The California Street Terrorism Enforcement and Prevention (STEP) Act (Pen C §§186.20-186.33) was enacted in 1988 on a legislative finding that California was in a crisis caused by nearly 600 violent street gangs operating within the state. The legislature found that gang members threatened, terrorized, and committed a multitude of crimes against peaceful citizens, creating a clear and present danger to public order and safety. The legislature's intent was to eradicate criminal activity by street gangs by focusing on patterns of criminal gang-related activity and on the organized nature of street gangs, which together, it deemed, were the chief sources of terror created by street gangs. Stats 1998, ch 1242.

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Source: Criminal Law/Scientific Evidence in California Criminal Cases/17 Gang Expert Testimony/§17.2 B. Effect on Expert Testimony

§17.2 B. Effect on Expert Testimony

Prior to *People v McDaniels* (1980) 107 CA3d 898, 902, 166 CR 12 (approving expert testimony regarding general social customs, mores, and practices of south central Los Angeles street gangs), and the enactment of the California Street Terrorism Enforcement and Prevention (STEP) Act (Pen C §§186.20-186.33) in 1988, the use of expert testimony in California regarding gangs was limited. Early cases involving the admissibility of gang-related evidence reflect a concern that, like traditional "bad character" evidence, such evidence would be improperly used to show a mere criminal disposition or "guilt by association." See, *e.g., People v Cardenas* (1982) 31 C3d 897, 904, 184 CR 165; *In re Wing Y.* (1977) 67 CA3d 69, 79, 136 CR 390; *People v Perez* (1981) 114 CA3d 470, 477, 170 CR 619. Prior to the STEP Act, gang-related evidence, if permitted at all, was usually introduced to prove a noncharacter trait (such as motive, identity, or knowledge) or to impeach a witness through bias and motive to fabricate. See *In re Wing Y.,* 67 CA3d at 76 ("common group membership" evidence admissible to show witness bias of defense alibi witness). But see *Cardenas,* 31 C3d at 904 (evidence of common gang membership to show bias was cumulative and, hence, prejudicial in light of other evidence showing possible bias).

With enactment of the STEP Act, the nature and prevalence of gang-related evidence changed dramatically. Expert opinion testimony regarding the culture, habits, and mores of street gangs became more commonplace as prosecutors were required to prove both the statutory definition of a "criminal street gang" and that the current offense was gang-related. See Pen C §186.22(a)-(b), (d), (f); see also *People v Hernandez* (2004) 33 C4th 1040, 1044, 16 CR3d 880 (when criminal street gang allegation alleged, prosecution will often present evidence that would be inadmissible in a trial limited to charged offense); *People v Gutierrez* (2009) 45 C4th 789, 820, 89 CR3d 225. Since the passage of the STEP Act, courts have permitted expert testimony in a wide range of areas, including:

- The size, composition, or existence of a gang (*People v Zermeno* (1999) 21 C4th 927, 929, 89 CR2d 863; *People v Villegas* (2001) 92 CA4th 1217, 1227, 113 CR2d 1; *People v Galvan* (1998) 68 CA4th 1135, 1137, 80 CR2d 853);

- Gang turf or territory (*People v Castenada* (2000) 23 C4th 743, 745, 97 CR2d 906; *People v Loeun* (1997) 17 C4th 1, 7, 69 CR2d 776; *People v Williams* (1997) 16 C4th 153, 192, 66 CR2d 123);

- An individual's membership in, or association with, a street gang (*People v Gutierrez* (2009) 45 C4th 789, 819, 89 CR3d 225; *People v Castenada* (2000) 23 C4th 743, 753, 97 CR2d 906; *People v Zermeno* (1999) 21 C4th 927, 929, 89 CR2d 863; *People v Duran* (2002) 97 CA4th 1448, 1464, 119 CR2d 272; *People v Villegas* (2001) 92 CA4th 1217, 1228, 113 CR2d 1);

- The primary activities of a specific gang (*People v Sengpadychith* (2001) 26 C4th 316, 323, 109 CR2d 851; *People v Margarejo* (2008) 162 CA4th 102, 106, 75 CR3d 465; *People v Vy* (2004) 122 CA4th 1209, 1221, 19 CR3d 402; *People v Galvan* (1998) 68 CA4th 1135, 1139, 80 CR2d 853);

- Motivation for a particular crime (*e.g.,* retaliation or intimidation) (*People v Zermeno* (1999) 21 C4th 927, 930, 89 CR2d 863; *People v Loeun* (1997) 17 C4th 1, 7, 69 CR2d 776; *People v Williams* (1997) 16 C4th 153, 192, 66 CR2d 123; *People v Villegas* (2001) 92 CA4th 1217, 1227, 113 CR2d 1; *People v Zepeda* (2001) 87 CA4th 1183, 1208, 105 CR2d 187);

- Whether an offense was committed for the benefit of, at the direction of, or in association with a street gang (*People v Gutierrez,* 45 C4th at 820; *People v Gardeley* (1996) 14 C4th 605, 612, 59 CR2d 356; *People v Leon* (2008) 161 CA4th 149, 161, 73 CR3d 786; *People v Morales* (2003) 112 CA4th 1176, 5 CR3d 615; *People v Ferraez* (2003) 112 CA4th 925, 930, 5 CR3d 640; *People v Duran* (2002) 97 CA4th 1448, 1455, 119 CR2d 272);

- Rivalries between gangs (*People v Williams* (1997) 16 C4th 153, 192, 66 CR2d 123; see *e.g.*, *People v Ayala* (2010) 181 CA4th 1440, 1450, 105 CR3d 575 (expert testimony concerning gang rivalry laid foundation for second degree murder conviction under natural and probable consequences doctrine)); and

- Gang-related tattoos, graffiti, hand signs and monikers (*People v Ochoa* (2001) 26 C4th 398, 438, 110 CR2d 324; *People v Loeun* (1997) 17 C4th 1, 6, 69 CR2d 776; *People v Williams* (1997) 16 C4th 153, 192, 66 CR2d 123; *People v Champion* (1995) 9 C4th 879, 919, 39 CR2d 547; *People v Leon* (2010) 181 CA4th 452, 462, 104 CR3d 601 (evidence relating to derivation of defendant's "Chucky" moniker from horror film)).

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§17.3 C. Penalty Provisions Under STEP Act

The California Street Terrorism Enforcement and Prevention (STEP) Act (Pen C §§186.20-186.33) makes the commission of criminal offenses by individuals who are members of street gangs a separate and distinctly punished offense, imposing certain penal consequences in the form of the following:

- A substantive offense violation (Pen C §186.22(a); see §17.4);
- A sentence enhancement (Pen C §186.22(b); see §17.5); and
- Alternate penalty provisions (Pen C §186.22(d); see §17.6).

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Source: Criminal Law/Scientific Evidence in California Criminal Cases/17 Gang Expert Testimony/§17.4 1. Substantive Offense Provision--Pen C §186.22(a)

§17.4 1. Substantive Offense Provision—Pen C §186.22(a)

Under the substantive offense provision, "any person who actively participates in a criminal street gang with knowledge that its members are engage[d] in or have engaged in a pattern of criminal gang activity, and who willfully promotes, furthers, or assists in any felonious criminal conduct by members of that gang, shall be punished" by imprisonment in the county jail or state prison. Pen C §186.22(a); *People v Castenada* (2000) 23 C4th 743, 97 CR2d 906. See also CALCRIM 1400. Actual knowledge is required. *People v Green* (1991) 227 CA3d 692, 702, 278 CR 140, overruled on other grounds in *Castenada*, 23 C4th at 752. This applies to both direct perpetrators of the underlying offense and to aiders and abettors. *People v Ngoun* (2001) 88 CA4th 432, 437, 105 CR2d 837 (rejecting language from *Castenada* suggesting that only aiders and abettors can be liable under §186.22(a); *People v Salcido* (2007) 149 CA4th 356, 367, 56 CR3d 912 (same). Interestingly, *Salcido* recommended that the CALCRIM committee review and revise CALCRIM 1400, which defines the elements of §186.22(a) only in terms of whether the defendant aided and abetted another gang member.

Expert testimony in a case alleging a Pen C §186.22(a) violation might be necessary to support the element of "active participation," "criminal street gang," "knowledge," or "promotes, furthers, or assists." Pen C §186.22(a). See §17.18.

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Source: Criminal Law/Scientific Evidence in California Criminal Cases/17 Gang Expert Testimony/§17.5 2. Sentence Enhancement Provision--Pen C §186.22(b)

§17.5 2. Sentence Enhancement Provision—Pen C §186.22(b)

The sentence enhancement provision provides a range of additional punishment for "any person who is convicted of a felony committed for the benefit of, at the direction of, or in association with any criminal street gang, with the specific intent to promote, further, or assist in any criminal conduct by gang members." Pen C §186.22(b). See also CALCRIM 1401; *People v Stallworth* (2008) 164 CA4th 1079, 1104, 80 CR3d 347 (rejecting argument that absence of word "specific" somehow establishes that CALCRIM 1401 omitted element of specific intent).

The sentence enhancement provision of the STEP Act carries the greatest range of penalty options and consequences, including life in prison. See Pen C §186.22(b)(1). It is arguably the most widely used provision of the STEP Act, and the one with the greatest number of cases involving use of expert testimony. In a typical criminal street gang case involving the sentence enhancement provision, a gang expert may offer testimony as to all of the elements. Thus, the gang expert testifies not only as to the existence of a "criminal street gang" but also as to whether the offense was gang-related. See Pen C §186.22(b).

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§17.6 3. Alternate Penalty Provision—Pen C §186.22(d)

The alternate penalty provision provides either a county jail or prison term and attaches to any misdemeanor or felony "which is committed for the benefit of, at the direction of or in association with, any criminal street gang with the specific intent to promote, further, or assist in any criminal conduct by gang members." Pen C §186.22(d); *Robert L. v Superior Court* (2003) 30 C4th 894, 135 CR2d 30. See *In re Damien V.* (2008) 163 CA4th 16, 77 CR3d 107 (§186.22(d) applies to juveniles as well as adults).

Like the sentence enhancement provision, an expert testifying in support of a Pen C §186.22(d) prosecution might testify to all of the elements in the statute, namely the existence of a criminal street gang as defined by Pen C §186.22(f), as well as the commission of the crime in relation to (benefit/direction/association) and in support of (to promote, further, or assist) the gang. See Pen C §186.22(d).

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§17.7 4. Constitutional Considerations

"Mere membership" in a gang should be contrasted with committing a crime for the benefit of, at the direction of, or in association with a criminal street gang. See Pen C §186.22(b), (d). The practitioner should watch out for cases where there are few, if any, facts indicating that the crime was gang-related other than mere membership in a criminal street gang. In many urban neighborhoods, youth may associate with or belong to a criminal street gang yet commit offenses for reasons having nothing to do with a gang. Nonetheless, if a gang allegation is charged in such situations, an argument might be made that the State is simply punishing "mere membership" or "association" with a particular group in violation of the First Amendment (association) and the Due Process Clause of the Fifth Amendment (punishing status versus personal guilt). See *Scales v U.S.* (1961) 367 US 203, 226, 6 L Ed 2d 782, 799, 81 S Ct 1469; *Dawson v Delaware* (1992) 503 US 159, 117 L Ed 2d 309, 112 S Ct 1093. Mere membership in a criminal street gang is insufficient to trigger criminal liability under Pen C §186.22(a) or (b). "Membership, without more, in an organization engaged in illegal advocacy, it is now said, has not heretofore been recognized" as satisfying "the concept of personal guilt in order to withstand attack under the Due Process Clause of the Fifth Amendment." *Scales,* 367 US at 225.

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II. EXPERT TESTIMONY ON STEP ACT PROVISIONS

§17.8 A. Use of Expert Opinion Testimony

The use of experts to testify in court on the subject of gangs in criminal cases is increasingly common. Expert gang testimony generally falls into two categories:

- Testimony involving statutory gang allegations under Pen C §186.22; and
- Testimony involving some other material issue in dispute such as motive, identity, knowledge, or bias.

Whether offered to prove up a statutory gang element or a disputed issue, expert opinion testimony regarding gangs typically revolves around the general custom, culture, and habits of the gang in question. See, e.g., *People v Gardeley* (1996) 14 C4th 605, 618, 59 CR2d 356 (subject matter of criminal street gang culture and habits sufficiently beyond "common experience" under Evid C §801); *People v Killebrew* (2002) 103 CA4th 644, 656, 126 CR2d 876 (summarizing cases dealing with expert gang testimony).

NOTE: The term "gang" is used in this chapter in the vernacular sense unless otherwise specified, and it should not be confused with the statutory term "criminal street gang" as defined by the STEP Act. See Pen C §186.22(f).

"The use of expert testimony in the area of gang sociology and psychology is well established." *People v Olguin* (1994) 31 CA4th 1355, 1370, 37 CR2d 596. For instance, one appellate court found that a deputy sheriff was qualified as an expert to render opinions "at some length regarding the general social customs, mores and practices of south central Los Angeles street gangs." *People v McDaniels* (1980) 107 CA3d 898, 902, 166 CR 12. The deputy sheriff testified that (1) "a person who lives in the territory of a particular gang is automatically associated with that gang by members" of rival gangs; (2) fist fights between two rival gang members usually take place at "mutual" sites; (3) if a gang traveled to a rival gang's territory, one would expect more than just a fist fight; and (4) it would be unusual for various Crip factions (an African-American gang founded in Los Angeles) to band together when taking retaliatory action. 107 CA3d 902.

NOTE: The California Supreme Court has held that "the subject matter of the culture and habits of criminal street gangs" is of "particular relevance" where a gang enhancement is alleged. *People v Gardeley* (1996) 14 C4th 605, 617, 59 CR2d 356.

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§17.9 B. Areas of Expert Testimony

While the substantive offense, sentence enhancement, and alternate penalty provisions obviously differ in application and, to some extent, criteria, they each require proof of the existence of the statutorily defined "criminal street gang" and that the current offense was gang-related. See §§17.3-17.6. The substantive offense provision requires that a person actively participates in a *criminal street gang* with *knowledge* that members are engaging in, or have engaged in, a pattern of criminal gang activity, and who *willfully* promotes, furthers, or assists in any felonious criminal conduct by members of that gang. Pen C §186.22(a); see §17.4. The enhancement and alternate penalty provisions, for instance, require that an offense was "committed for the benefit of, at the direction of, or in association with[,] a criminal street gang[,] with the specific intent to promote, further, or assist in any criminal conduct by gang members." Pen C §186.22(b), (d); see §§17.5-17.6.

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Source: Criminal Law/Scientific Evidence in California Criminal Cases/17 Gang Expert Testimony/§17.10 1. Expert Opinion on 'Criminal Street Gang'

§17.10 1. Expert Opinion on "Criminal Street Gang"

A "criminal street gang" is defined as any "ongoing organization, association, or group of three or more persons, whether formal or informal, having as one of its primary activities the commission of one or more of the criminal acts" enumerated in Pen C §186.22(e)(1)-(25) or §186.22(e)(31)-(33), having a "common name or common identifying sign or symbol, and whose members individually or collectively engage in or have engaged in a pattern of criminal gang activity." Pen C §186.22(f). Case law has evolved and refined this definition into four criteria (*People v Gardeley* (1996) 14 C4th 605, 620, 59 CR2d 356):

- Primary activities include commission of enumerated criminal acts;
- Members engage in a pattern of criminal gang activity;
- Organization, association, or group includes three or more persons, whether formal or informal; and
- Organization, association, or group has a common name or common identifying sign or symbol.

The two criteria that involve the greatest amount of litigation are the "primary activities" and "pattern of criminal gang activity" elements. These are the criteria most susceptible to challenge because they break down into further legal components. Close attention should be paid to the establishment of either of those criteria.

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§17.11 a. Primary Activities Criterion

The term "primary activities," as used in Pen C §186.22(f), implies that "the commission of one or more of the statutorily enumerated crimes is one of the group's 'chief' or 'principal' occupations. That definition would necessarily exclude the occasional commission of those crimes by the group's members." *People v Sengpadychith* (2001) 26 C4th 316, 323, 109 CR2d 851. Proof that the group's members "consistently and repeatedly" have committed criminal activity listed in the statute would suffice. 26 C4th at 324. A determination of a group's "primary activities" may include past or present conduct by gang members involving enumerated offenses. "Both past and present offenses have some tendency in reason to show the group's primary activity [see Evid C §210] and therefore fall within the general rule of admissibility." 26 C4th at 323. See also *People v Galvan* (1998) 68 CA4th 1135, 1142, 80 CR2d 853.

In proving the primary activities element, the prosecutor will typically offer a combination of documentary evidence and expert opinion testimony. However, in *People v Gardeley* (1996) 14 C4th 605, 618, 59 CR2d 356, the primary activities criterion was based exclusively on the opinion of the gang expert regarding "the primary purpose or activity of the Family Crip gang." 14 C4th at 612. The detective expert testified (14 C4th at 612):

based on his investigations of hundreds of gang-related offenses, conversations with defendants and other Family Crip members, as well as information from fellow officers, and various law enforcement agencies, it was his opinion that the Family Crip gang's primary purpose was to sell narcotics, but that it also engaged in witness intimidation and other acts of violence to further its drug-dealing activity.

The prosecution must establish a sufficient foundation for the expert's testimony regarding "primary activities" that includes specific personal knowledge. In *In re Alexander L.* (2007) 149 CA4th 605, 57 CR3d 226, when asked about the primary activities of the gang, a prosecution gang expert replied (149 CA4th at 611):

I know they've committed quite a few assaults with a deadly weapon, several assaults. I know they've been involved in murders. I know they've been involved with auto thefts, auto/vehicle burglaries, felony graffiti, narcotic violations.

Finding this testimony wanting, the court explained (149 CA4th at 612):

We cannot know whether the basis of Lang's testimony on this point was reliable, because information establishing reliability was never elicited from him at trial. It is impossible to tell whether his claimed knowledge of the gang's activities might have been based on highly reliable sources, such as court records of convictions, or entirely unreliable hearsay.

The best practice would involve introducing documentary evidence in conjunction with the expert opinion testimony. Documentary evidence will provide the objective evidence to adequately bolster the expert's opinion. It may consist of certified copies of charging documents, abstracts of judgments, and other official court records used to prove the pattern of criminal gang activity (predicates). See §§17.12-17.13. *People v Duran* (2002) 97 CA4th 1448, 1458, 119 CR2d 272 (discussion of documentary evidence used to prove predicates).

The prosecutor may want to elicit from the gang expert the number of enumerated offenses committed by the criminal street gang in relation to the non-enumerated crimes. It may also be useful to determine over what time span these offenses occurred and whether those crimes involved many of the gang members or just a few of them. In *People v Perez* (2004) 118 CA4th 151, 160, 12 CR3d 821, the court found that "evidence of the retaliatory shootings of a few individuals over a period of less than a week, together with a beating six years earlier," was insufficient to establish those crimes as the primary activities of the gang. By contrast, in *People v Vy* (2004) 122 CA4th 1209, 1225, 19 CR3d 402, the court found that three offenses committed over a 3-month period was sufficient:

Defendant urges us to look at the entire two-year period of YA's existence in order to conclude that the gang did not "consistently and repeatedly" engage in predicate criminal acts. Under the circumstances presented here, however, we reject defendant's invitation to essentially "spread out" the predicate crimes over YA's entire existence. Instead, we find the existence of three violent felonies by a gang as small as YA over less than three months to be sufficient to satisfy the 'primary activities' element.

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Source: Criminal Law/Scientific Evidence in California Criminal Cases/17 Gang Expert Testimony/ b. Pattern of Criminal Gang Activity (Predicates)/§17.12 (1) Manner of Proof

b. Pattern of Criminal Gang Activity (Predicates)

§17.12 (1) Manner of Proof

The prosecution must establish that the members of the identified street gang individually or collectively engage in, or have engaged in, a pattern of criminal gang activity. See Pen C §186.22(b)-(e). The requisite "pattern" is defined as the following (Pen C §186.22(e); *People v Gardeley* (1996) 14 C4th 605, 618, 59 CR2d 356):

the commission of, attempted commission of, conspiracy to commit, or solicitation of, sustained juvenile petition for, or conviction of two or more of the following offenses, provided at least one of those offenses occurred after the effective date of this chapter and the last of those offenses occurred within three years after a prior offense, and the offenses were committed on separate occasions, or by two or more persons.

In establishing a pattern of criminal gang activity, the prosecution need not establish that a prior offense was gang-related. 14 C4th at 620. The prosecution may rely on the charged offense as one of the "two or more" offenses necessary to show a pattern of criminal gang activity. If it does, however, it must prove that such offense was gang-related. 14 C4th at 625 n12. While many cases refer to the pattern requirement as the "predicate" offenses, the term is not entirely accurate as it implies precedence, which is not a statutory requirement. See *People v Olguin* (1994) 31 CA4th 1355, 1383 n13, 37 CR2d 596. For discussion of non-gang-related offenses, see §17.13.

Expert opinion testimony, in conjunction with documentary evidence, is also commonly used to prove the predicate offenses. See, *e.g., People v Duran* (2002) 97 CA4th 1448, 1458, 119 CR2d 272 (gang expert testimony coupled with certified copy of minute order); *People v Gardeley* (1996) 14 C4th 605, 624, 59 CR2d 356 (expert testimony that individual was gang member coupled with evidence of the gang member's conviction); *People v Villegas* (2001) 92 CA4th 1217, 1228, 113 CR2d 1 (predicate sufficiently established by testimony of gang expert and documentary evidence); *People v Gamez* (1991) 235 CA3d 957, 965, 286 CR 894, disapproved on other grounds in *People v Gardeley* (1996) 14 C4th 605, 624 n10, 59 CR2d 356 (expert testimony regarding gang's activities to establish gang's past criminal conduct).

To admit documentary evidence (such as a minute order or other certified records of conviction) into evidence, counsel may need to rely on Evid C §452.5(b), which creates a hearsay exception allowing the admission of "qualifying court records to prove not only the fact of conviction, but also that the offense reflected in the record occurred." *Duran,* 97 CA4th at 1460. While Evid C §452.5 does not define the term "official record of conviction," courts will likely look to an analogous case involving proof of prior convictions for guidance. The *Duran* court noted *People v Myers* (1993) 5 C4th 1193, 1195, 22 CR2d 911, as an example. *Duran,* 97 CA4th at 1462. Hence, in *Duran,* the gang expert testified that the minute order reflected a conviction of a gang member he personally knew, he had seen that individual's records and "rap sheet," and he had reviewed the certified minute order. *Duran,* 97 CA4th at 1464. This testimony, coupled with the minute order, was sufficient to prove a predicate offense.

It is important to remember that the prosecution may establish the predicate offenses either by proof of the underlying conduct or by proof of the fact of conviction. Given the legislature's inclusion of language regarding a "sustained juvenile petition for" or "conviction of" predicate offenses in Pen C §186.22(e), it follows that "predicate offenses may be proved by a showing of the fact of the convictions, rather than proof of the underlying conduct, if the People so choose." *Duran,* 97 CA4th at 1461 n5. Accordingly, a gang expert may testify as to evidence of prosecution to prove the predicate offenses. In *In re I. M.* (2005) 125 CA4th 1195, 23 CR3d 375, one of the predicate offenses was proved by such evidence (125 CA4th at 1207):

Officer Keck here had personal knowledge that Monstro was a member of the Sureño 13 gang. The police reports, although hearsay as to Monstro's conduct, were admissible to show that the police were investigating Monstro in connection with the specified crimes. Officer Keck's testimony reasonably demonstrates his personal knowledge that Monstro was being prosecuted for shooting the man looking for his dog.

The court concluded that the fact that a particular individual gang member was being prosecuted "permits the conclusion that there was significant evidence that he had in fact committed the offense." 125 CA4th at 1208.

In contrast to the expert in *In re I. M.,* who had personal knowledge as to the predicate offense, expert testimony that is conclusory or involves nonspecific hearsay and arrest information is insufficient to prove a predicate offense. "Evidence that an individual has been arrested for an offense, without more, is not sufficient to establish either that a crime has been committed or that any particular individual is guilty of its commission." *In re Leland D.* (1990) 223 CA3d 251, 258, 272 CR 709. The prosecution gang expert in *In re Leland D.* testified that members of a street gang engaged in the sale of drugs, auto thefts, and assaults with

deadly weapons, but did not provide details as to exactly "who, when, where and under what circumstances." 223 CA3d at 259. The source of the expert's information appeared to have been hearsay statements from unidentified gang members and information pertaining to arrests of purported gang members made without a definite time frame. The court held that this form of nonspecific hearsay and arrest information falls "far short" of the showing necessary to prove a predicate offense. 223 CA3d at 259.

Likewise, the testimony of a police gang expert who had no personal knowledge of a suspected gang shooting but who simply repeated what other officers had told him they believed about the incident was found to be "plainly insufficient." *In re Nathaniel C.* (1991) 228 CA3d 990, 279 CR 236 (vague, secondhand testimony cannot constitute substantial evidence that required predicate offense occurred). See also *In re Alexander L.* (2007) 149 CA4th 605, 57 CR3d 226.

NOTE: In a case in which the prosecutor, in order to establish predicate crimes under Pen C §186.22(a)-(b), introduced evidence of at least eight crimes committed by gang members, and referred to several other incidents in argument to the jury, the court noted that it was "unaware of any authority in which the court directly addressed the volume of evidence that may be introduced to establish the primary activities and predicate crimes elements of a gang enhancement or gang charge." The court indicated, however, that any such evidence was subject to scrutiny under Evid C §352, including an analysis of whether the evidence was cumulative. See *People v Williams* (2009) 170 CA4th 587, 609, 88 CR3d 401. In *People v Leon* (2008) 161 CA4th 149, 168, 73 CR3d 786, the court held that it was an abuse of discretion to allow use of the defendant's prior juvenile robbery adjudication to prove the Pen C §186.22 allegation when there were robbery convictions from other gang members that could have been used.

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Source: Criminal Law/Scientific Evidence in California Criminal Cases/17 Gang Expert Testimony/§17.13 (2) 'Self-Predicating' Offenses

§17.13 (2) "Self-Predicating" Offenses

The pattern of criminal gang activity requirement of the California Street Terrorism Enforcement and Prevention (STEP) Act (Pen C §§186.20-186.33) is somewhat confusing and, in some instances, not very intuitive. Much of this confusion stems from the fact that courts are still wrestling with competing interpretations of the STEP Act's language. Whether a prosecutor uses a gang expert or documentary evidence to establish a pattern of criminal gang activity, it is important to keep a few points in mind.

A current offense may be used to "self-predicate." The term "predicate" is somewhat of a misnomer given that the pattern of criminal gang activity need not be established by prior offenses; the current offense or offenses can be used to "self predicate." The STEP Act's language permits a prosecutor "the choice of proving the requisite 'pattern of criminal gang activity' by evidence of 'two or more' predicate offenses committed 'on separate occasions' or by evidence of such offenses committed 'by two or more persons' on the same occasion." *People v Loeun* (1997) 17 C4th 1, 10, 69 CR2d 776. This means that the current offense can be used to "self-predicate." Thus, for example, the prosecution may rely on the current offense and one other from a separate prior occasion by a fellow gang member. See *People v Gardeley* (1996) 14 C4th 605, 624, 59 CR2d 356; *People v Bragg* (2008) 161 CA4th 1385, 1401, 75 CR3d 200. Alternatively, the prosecution may rely on the current offense and the contemporaneous commission of a second predicate offense by a fellow gang member on the same occasion. *Loeun,* 17 C4th at 10.

Separate occasions. The phrase "separate occasions" as used in Pen C §186.22(e) is not defined in the STEP Act. Some courts have looked to Pen C §654 (prohibition of separate punishment for crimes committed during an indivisible course of conduct with single criminal objective) and Pen C §667.6(d) (mandatory full consecutive sentencing when certain sexual offenses involve the same victim on "separate occasions") for assistance in interpreting the term. For example, in the sexual offense arena under Pen C §667.6, determining whether "separate occasions" exist requires the court to consider "whether, between the commission of one sex crime and another, the defendant had a reasonable opportunity to reflect upon his or her actions and nevertheless resumed sexually assaultive behavior." *In re Jose T.* (1991) 230 CA3d 1455, 1462, 282 CR 75. Another analogy is found in the prohibition against separately punishing a defendant for crimes that are committed during "an indivisible course of conduct with a single criminal objective." 230 CA3d at 1462. See Pen C §654. This interpretation provides that if a defendant entertains "multiple criminal objectives which are independent of and not merely incidental to each other," separate punishment may be ordered for the independent violations committed in pursuit of each objective, even if the violations are part of an indivisible course of conduct. 230 CA3d 1463.

Non-gang-related. Predicate offenses do not have to be gang-related. *People v Gardeley* (1996) 14 C4th 605, 624 n10, 59 CR2d 356. There is an exception, however, when the current offense is used to self-predicate; in that situation, the prosecution must still show that the charged offense was gang-related. 14 C4th at 625 n12.

Aiding and abetting. Proof that one gang member committed a single crime and was aided and abetted in the commission of that crime by another gang member establishes only one predicate offense. *People v Zermeno* (1999) 21 C4th 927, 932, 89 CR2d 863.

Conviction not required. Given the wording of the STEP Act, a conviction is not required to prove a predicate offense. Pen C §186.22(e); *People v Duran* (2002) 97 CA4th 1448, 1461 n5, 119 CR2d 272.

Subsequent offenses. Crimes occurring after the charged offense cannot serve as predicate offenses to prove a pattern of criminal gang activity. *People v Duran* (2002) 97 CA4th 1448, 1458, 119 CR2d 272; *People v Godinez* (1993) 17 CA4th 1363, 1368, 22 CR2d 164.

Unanimity. Predicate offenses under the gang statute fall within the "continuing course of conduct" exception to the unanimity requirement; therefore, a jury does not have to unanimously agree on which two (or more) of the offenses offered as predicates qualify for the "pattern of criminal gang activity" determination. *People v Bragg,* 161 CA4th at 1402; *People v Funes* (1994) 23 CA4th 1506, 1525, 28 CR2d 758.

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§17.14 c. Ongoing Organization, Association, or Group

Unlike the "primary activities" and "pattern of criminal gang activity" elements of a "criminal street gang," the requirement of an "ongoing organization, association, or group of three or more persons, whether formal or informal" is generally straightforward, and may not require the testimony of an expert. See *In re Nathaniel C.* (1991) 228 CA3d 990, 1001, 279 CR 236 (court relied on testimony of two lay witnesses and one expert witness to identify at least three gang members as well as lay testimony that gang had membership roll written on a wall).

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§17.15 d. Common Name, Identifying Sign, or Symbol

The requirement of a "common name or common identifying sign or symbol" to establish a "criminal street gang" is similarly straightforward. A gang expert's testimony regarding a name or names common to members of the gang is sufficient to establish this criteria, as is testimony that specific graffiti symbols signify that gang. *In re Nathaniel C.* (1991) 228 CA3d 990, 1001, 279 CR 236.

The question may arise concerning whether the prosecution must allege a specific criminal street gang as opposed to simply naming its larger "umbrella" organization. For instance, in *People v Valdez* (1997) 58 CA4th 494, 68 CR2d 135, the Sixth District approved of expert testimony that was received to explain how a diverse group of Norteno cliques, each with separate names, could nonetheless gather at times for a common purpose. Later, in *In re Jose P.* (2003) 106 CA4th 458, 467, 130 CR2d 810, the Sixth District specifically found the evidence sufficient to establish that "Norteno" was a criminal street gang. The court noted that the expert testified that

the Norteno gang was an ongoing association of around 600 persons, identified by the color red and the number 14, and that it had as one of its primary activities the commission of the criminal acts listed in Pen C §186.22. She detailed the gang's pattern of criminal activity by describing the firearms offenses and the convenience store robbery.

In *People v Ortega* (2006) 145 CA4th 1344, 1356, 52 CR3d 535, the Sixth District held that the prosecution did not need to prove the existence of a specific subset of Nortenos. In that case, the gang expert testified that there were thousands of Nortenos in the Sacramento area with numerous subsets.

In *People v Williams* (2008) 167 CA4th 983, 86 CR3d 130, however, the court found the evidence insufficient to conclude that the group "Small Town Peckerwoods" was part of a larger statewide group called "Peckerwoods" within the meaning of Pen C §186.22 (167 CA4th at 135):

In our view, something more than a shared ideology or philosophy, or a name that contains the same word, must be shown before multiple units can be treated as a whole when determining whether a group constitutes a criminal street gang. Instead, some sort of collaborative activities or collective organizational structure must be inferable from the evidence, so that the various groups reasonably can be viewed as parts of the same overall organization.

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Source: Criminal Law/Scientific Evidence in California Criminal Cases/17 Gang Expert Testimony/§17.16 2. Expert Opinion on 'Benefit/Direction/Association'

§17.16 2. Expert Opinion on "Benefit/Direction/Association"

In order to prove the gang enhancement provision, the felony offense charged must have been "committed for the benefit of, at the direction of, or in association with any criminal street gang, with the specific intent to promote, further, or assist in any criminal conduct by [members of that gang]." Pen C §186.22(b). Typically, in proving this element, a prosecutor will rely on the facts of the current case, expert opinion testimony regarding the nature of the particular gang in general, and a fact-specific hypothetical posed to the expert on the benefit/direction/association element. *People v Gardeley* (1996) 14 C4th 605, 618, 59 CR2d 356. See also *People v Medina* (2009) 46 C4th 913, 918, 95 CR3d 202; *People v Morales* (2003) 112 CA4th 1176, 5 CR3d 615; *People v Ferraez* (2003) 112 CA4th 925, 930, 5 CR3d 640; *People v Duran* (2002) 97 CA4th 1448, 1455, 119 CR2d 272.

In *Gardeley,* the prosecutor simply gave the gang expert a hypothetical based on the specific facts of the current offense and asked whether in his opinion the crime could be described as "gang-related activity." 14 C4th at 612. The case involved a robbery and assault of a victim who happened to wander into the gang's drug-dealing area. The gang expert opined that it is common practice for several gang members to assault in full view of residents where they sell drugs to intimidate and dissuade reporting, and gang members view a dispute with nonmembers as a "challenge" and respond by trying to "dominate" the person with extreme violence. 14 C4th at 613. The court found that from this testimony a jury could reasonably conclude that the attack by members of the Family Crip gang including defendants was committed "for the benefit of, at the direction of, or in association with" that gang, and with the requisite specific intent to "promote, further, or assist in criminal conduct by gang members." 14 C4th at 619.

NOTE: It does not follow that expert opinion testimony is always necessary and admissible as to the benefit/direction/association element. Evidence Code §801 requires that the expert opinion testimony be on a topic "sufficiently beyond common experience that the opinion of an expert would assist the trier of fact." *People v Gardeley* (1996) 14 C4th 605, 617, 59 CR2d 356. Accordingly, depending on the facts of the case, expert opinion testimony as to whether or not a particular offense was committed for the benefit/direction/association of a criminal street gang or with the requisite specific intent may not be required.

In cases in which there is a serious question concerning whether the charged offense was gang-related, *e.g.,* when the crime instead appears opportunistic or personally motivated, the practitioner should draw out the distinction between gang-motivated crimes and crimes that simply happen to be committed by individuals suspected or known to be gang members. See, *e.g., People v Ochoa* (2009) 179 CA4th 650, 661, 102 CR3d 108 (no evidence that *only* gang members commit carjacking or that gang member could not commit carjacking for personal benefit, rather than for benefit of gang).

That distinction is obviously critical in prosecutions involving a statutory gang allegation. However, it has been recommended that law enforcement gang experts themselves draw out that same distinction. In *Urban Street Gang Enforcement,* a publication focused on model strategies for the prosecution of criminal street gangs and funded by the United States Department of Justice, the authors wrote:

Agencies may classify a crime as a gang crime if it is gang related, gang motivated, or both. A gang-related crime is any crime in which a gang member is the suspect, offender, or victim, regardless of motivation or circumstances. The theft of clothing on a whim by a gang member acting alone or a home invasion by gang members acting collectively would fall under the category of gang-related crime. But only the home invasion would qualify as a gang crime if the agency were counting only gang-motivated crimes—those committed at the direction of, for the benefit of, or in association with a street gang—as gang crimes.

U.S. Dep't of Justice, Bureau of Justice Assistance, *Urban Street Gang Enforcement,* p 30 (Jan. 1997), available at http://www.ncjrs.gov/pdffiles/161845.pdf.

The Department of Justice report added that by making a distinction between gang-motivated versus gang-related crimes, law enforcement will (1) obtain a "broad" picture of criminal gang member activity, (2) allow the agency "to conform to whatever gang crime definitions are used in new or amended anti-gang legislation," and (3) enable the agency "to more accurately compare gang crime across jurisdictions." *Urban Street Gang Enforcement,* p 31.

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Source: Criminal Law/Scientific Evidence in California Criminal Cases/17 Gang Expert Testimony/§17.17 3. Expert Opinion on 'Specific Intent to Promote, Further, or Assist'

§17.17 3. Expert Opinion on "Specific Intent to Promote, Further, or Assist"

To prove the sentence enhancement, the prosecution must establish that the current offense was not only "committed for the benefit of, at the direction of, or in association with any criminal street gang," but that it was also committed "with the specific intent to promote, further, or assist in any criminal conduct by gang members." Pen C §186.22(b). As with the benefit/direction/association element, the specific intent element is often established through expert opinion testimony. The expert is given a hypothetical question containing critical facts from the case and asked whether or not that "hypothetical" offense was committed with the requisite specific intent. In *People v Gardeley* (1996) 14 C4th 605, 59 CR2d 356, after being given a hypothetical based on facts of the case, the gang expert testified that an assault of the type described "was a 'classic' example of gang-related activity." 14 C4th at 619. The expert explained "that criminal street gangs rely on such violent assaults to frighten the residents of an area where the gang members sell drugs, thereby securing the gang's drug-dealing stronghold." 14 C4th at 619. The court held that this testimony permitted the jury to reasonably conclude the attack was committed with the necessary specific intent to further other criminal activity of the gang. See also *People v Augborne* (2002) 104 CA4th 362, 372, 128 CR2d 258 (facts of present case coupled with expert's fact-based specific opinion and instances of past criminal activities sufficient to infer specific intent); *In re Ramon T.* (1997) 57 CA4th 201, 207, 66 CR2d 816 (expert testimony supported specific intent finding, as did fact that attack was against police officer who was arresting gang member to assist that member's escape); *People v Morales* (2003) 112 CA4th 1176, 1198, 5 CR3d 615 (evidence that defendant intended to commit current offenses (robberies) during drug buy with individuals he knew to be members of his gang supported finding of intent).

Note that there is a schism between the Ninth Circuit Court of Appeals and certain state appellate courts concerning what constitutes sufficient proof of the specific intent requirement. In *Garcia v Carey* (2005) 395 F3d 1099, 1101, the defendant, a member of the El Monte Flores (EMF) gang, confronted and robbed a customer, saying "I'm Little Risky from EMF. You want to get jacked?" The prosecution gang expert testified to three other robberies committed by EMF, that the defendant was a member of the EMF gang, that the robbery was committed on gang territory, and, finally, that the EMF gang was "turf-oriented." The Ninth Circuit found that this record was insufficient to support an inference that the defendant committed the robbery "in order to facilitate other gang related criminal operations within El Monte." 395 F3d at 1103. The court noted (395 F3d at 1104):

Detective Hernandez did not offer any testimony, however, on what was meant by being "turf oriented," what implications arose from a gang being "turf-oriented," or how the gang's 'turf-oriented' nature could support the conclusion that this robbery was committed with the specific intent to promote, further, or assist other gang-related criminal activity.

The Ninth Circuit's decision in *Garcia v Carey* came under immediate criticism. In *People v Romero* (2006) 140 CA4th 15, 19, 43 CR3d 862, the Second District Court of Appeal disagreed with *Garcia*'s statutory interpretation insofar as it read Pen C §186.22(b) to require the specific intent to promote, further, or assist in "other" criminal conduct by the gang. *Romero* instead found that by its plain language the statute requires a showing of specific intent to promote, further, or assist in "any" criminal conduct by gang members. The Third District Court of Appeal in *People v Hill* (2006) 142 CA4th 770, 774, 47 CR3d 875, reached the same conclusion, finding that there is no requirement in §186.22(b) that the defendant's intent must relate to criminal activity apart from the offense the defendant commits.

However, in *Briceno v Scribner* (2009) 555 F3d 1069, the Ninth Circuit recently affirmed and expanded on its decision in *Garcia v Carey*. In *Briceno,* the gang expert testified that the defendant's robberies "would enhance the reputation not only of the gang itself but of the individual participants as well." 555 F3d at 1078. The Ninth Circuit found that generic testimony of this sort, comprised "almost exclusively in hypotheticals" and "generalities" about how such crimes glorified the gang and enhanced the status of offenders, was plainly insufficient. Such testimony "says nothing about Briceno's specific intent in committing the robberies." 555 F3d at 1079. Guided by the extent to which the California Supreme Court has provided an authoritative interpretation of §186.22, the court stated that "merely being a gang member, or committing a crime in association with another gang member, is not enough to trigger the sentencing enhancements of §186.22(b)." 555 F3d at 1080.

The Second District Court of Appeal continues to reject the Ninth Circuit's reasoning, finding no statutory requirement that "criminal conduct by gang members" (see Pen C §186.22(b)(1)) "be distinct from the charged offense, or that the evidence establish specific crimes the defendant intended to assist his fellow gang members in committing." *People v Vazquez* (2009) 178 CA4th 347, 354,100 CR3d 351.

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§17.18 4. Expert Opinion on "Active Participation With Knowledge"

"Active participation" has been construed to mean "involvement with a criminal street gang that is more than nominal or passive." *People v Castenada* (2000) 23 C4th 743, 747, 97 CR2d 906. It does not require proof that the person devote "all, or a substantial part of his time and efforts" to the gang. 23 C4th at 752, overruling in part *People v Green* (1991) 227 CA3d 692, 700, 278 CR 140. Neither does it require that the individual be a gang member. *In re Jose P.* (2003) 106 CA4th 458, 466, 130 CR2d 810. Additionally, "[i]t is not enough that a defendant have actively participated in a criminal street gang at any point in time.... A defendant's active participation must be shown at or reasonably near the time of the crime." *People v Garcia* (2007) 153 CA4th 1499, 1509, 64 CR3d 104.

The California Supreme Court found that a defendant had "actively participated" in a criminal street gang based on the crimes committed by defendant, his bragging to police that he associated with or was a member of a gang, and the fact that police had seen him many times in the company of known gang members. 23 C4th at 752. Evidence of active participation may be sufficient, even in the face of conflicting evidence that a defendant was not an active participant in the gang; issues regarding credibility and the resolution of conflicting evidence are the jury's domain. *People v Martinez* (2008) 158 CA4th 1324, 1331, 70 CR3d 680. See also *People v Lamas* (2007) 42 C4th 516, 67 CR3d 179. In *People v Garcia, supra,* there was little, if any direct evidence of the defendant's active participation at or about the time of the underlying offense. The court noted that the defendant had no gang-related tattoos, was not seen wearing gang clothing or flashing gang hand signs, had not been seen in the presence of other gang members in the recent past, and his name had not come up as an active member in the gang detective's recent extensive interviews with gang members. Nonetheless, the court found that through the testimony of the prosecution gang expert, evidence was presented that the defendant had intimate and current knowledge of "the gang's activities that could only be obtained from gang members by other active gang members." 153 CA4th at 1509.

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III. ADMISSIBILITY OF GANG EXPERT OPINION TESTIMONY

§17.19 A. In Camera Evidentiary Hearings in Gang Cases

Issues regarding the qualification, subject matter, and basis of expert testimony regarding gangs should be addressed outside the presence of the jury through motions in limine and, if necessary, with an in camera evidentiary hearing. See Evid C §§402-403, 405; *People v Williams* (1997) 16 C4th 153, 191, 66 CR2d 123; *People v Gardeley* (1996) 14 C4th 605, 612, 59 CR2d 356 (expert's familiarity with gang and reliance on hearsay statements addressed out of the presence of the jury).

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Source: Criminal Law/Scientific Evidence in California Criminal Cases/17 Gang Expert Testimony/§17.20 B. Evidence Code §§402-403 and 405

§17.20 B. Evidence Code §§402-403 and 405

Evidence Code §402 addresses the admissibility of evidence that depends on the existence of a preliminary fact under the terms of Evid C §§403 and 405. See Evid C §§402(a), 403, 405. While both Evid C §§403 and 405 involve the procedure for the determination of preliminary facts, there is a key difference between the two. Under Evid C §405(a), the trial court makes the final determination of the existence of the preliminary fact, while under Evid C §403, the trial court's determination is only preliminary; the ultimate determination of the existence of the preliminary fact goes to the jury. Evid C §403(c)(1)-(2). This is so because Evid C §403 specifically states that if the court admits the proffered evidence under this section, the court "may, and on request shall, instruct the jury to determine whether the preliminary fact exists and to disregard the proffered evidence unless the jury finds that the preliminary fact does exist." Evid C §403(c)(1).

While Evid C §§403 and 405 divide the procedure for determining the existence of preliminary facts necessary to admit proffered evidence, Evid C §403 specifically states that preliminary fact issues should go to the jury upon request when (Evid C §403(a)):

- The relevance of the proffered evidence depends on the existence of the preliminary fact;
- The preliminary fact is the personal knowledge of a witness concerning the subject matter of his or her testimony;
- The preliminary fact is the authenticity of a writing; or
- The proffered evidence is of a statement or other conduct of a particular person, and the preliminary fact is whether that person made the statement or so conducted him- or herself.

In certain instances, a specific statute will control or override the application of Evid C §403. See, *e.g.,* Evid C §§1221-1227, 1235-1236, 1417-1418.

Given the nature of gang expert testimony, in particular the varied sources that a typical gang expert may rely on, it is not hard to imagine a situation in which the relevance of the expert opinion turns on the existence of a preliminary fact listed by Evid C §403. This is an important consideration as it will determine whether the jury, and not the judge, makes the final determination as to the existence of the preliminary fact at issue.

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§17.21 C. The *Kelly* Test

The foundational requirement for admission of new scientific evidence in California is referred to as the *Kelly* test (formerly, the *Kelly-Frye* test). *People v Bolden* (2002) 29 C4th 515, 545, 127 CR2d 802; *People v Kelly* (1976) 17 C3d 24, 30, 130 CR 144; *Frye v U.S.* (DC Cir 1923) 293 F 1013, superseded by Fed R Evid 702 as stated in *Primiano v Cook* (9th Cir 2010) 2010 US App Lexis 8859. In *Kelly,* the U.S. Supreme Court held that evidence of "a new scientific technique" may be admitted only after its reliability has been established under a three-pronged test. The test applies only to that "limited class of expert testimony which is based, in whole or part, on a technique, process, or theory which is *new* to science and, even more so, the law." *People v Leahy* (1994) 8 C4th 587, 605, 34 CR2d 663. A technique may be deemed "scientific" for purposes of *Kelly* if "the unproven technique or procedure appears in both name and description to provide some definitive truth which the expert need only accurately recognize and relay to the jury." *People v Stoll* (1989) 49 C3d 1136, 1156, 265 CR 111.

Given that expert opinion relating to gangs and "criminal street gangs" revolves around the general psychology and sociology of such groups, it is not considered scientific in the *Kelly* sense. Expert opinion testimony involving the general customs, habits, and mores of gangs or criminal street gangs is not based on the type of scientific foundation contemplated by the *Kelly* test. See, *e.g., U.S. v Hankey* (9th Cir 2000) 203 F3d 1160, 1169. Gang experts typically ground their opinions in their own investigations, conversations, observations, and training; they do not rely on any novel scientific technique. For further discussion of the *Kelly* test, see chap 2.

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§17.22 D. Application of *Daubert/Kumho Tire Co.* to Gang Experts in Federal Court

This chapter primarily addresses the admissibility of gang testimony in state courts, whereas the rule of *People v Kelly* (1976) 17 C3d 24, 130 CR 144, applies to novel scientific techniques. Expert testimony on gangs does not implicate novel scientific techniques, so *Kelly* is generally not applied to expert gang testimony in state court. See §17.21. However, it is useful for the state court practitioner to be aware of recent case law highlighting several emerging trends in the potential application of the different "gatekeeping" standards to gang testimony in federal courts. These cases illustrate important differences between federal and state admissibility standards as well as trends in the introduction of gang evidence in California. The two most relevant cases discussing the applicable federal standard are *Daubert v Merrell Dow Pharms., Inc*. (1993) 509 US 579, 125 L Ed 2d 469, 113 S Ct 2786, and *Kumho Tire Co., Ltd. v Carmichael* (1999) 526 US 137, 143 L Ed 2d 238, 119 S Ct 1167.

In *Daubert,* the U.S. Supreme Court addressed the admissibility of "scientific evidence" in federal courts and held that Fed R Evid 702 imposes a "gatekeeping" function on the trial court to "ensure that any and all scientific testimony … is not only relevant, but reliable." *Daubert,* 509 US at 589. Later, in *Kumho Tire Co.,* the high court clarified that the "gatekeeping function" is not limited to "scientific" expert testimony, but applies to all expert testimony, ruling that the district court did not abuse its discretion in excluding the testimony of a tire failure analyst on the ground that the expert's methodology was unreliable. 526 US at 175. The court in *Kumho Tire Co.* added that "it would prove difficult, if not impossible, for judges to administer evidentiary rules under which a gatekeeping obligation depended upon a distinction between 'scientific' knowledge and 'technical' or 'other specialized' knowledge. There is no clear line that divides the one from the others." 526 US at 174.

As of the date of this printing, there are no published California cases explicitly applying *Daubert/Kumho Tire Co.* to gang experts. However, in *U.S. v Hankey* (9th Cir 2000) 203 F3d 1160, the Ninth Circuit discussed extending the trial court's gatekeeper function under *Daubert/Kumho Tire Co.* to gang experts. The court concluded, however, that "*Daubert* factors (peer review, publication, potential error rate, etc.) simply are not applicable to this kind of testimony, whose reliability depends heavily on the knowledge and experience of the expert, rather than the methodology or theory behind it." 203 F3d at 1169. The Ninth Circuit noted that the gang expert "had devoted years working with gangs, knew their 'colors,' signs, and activities. He heard the admissions of the specific gang members involved. He had communicated and worked undercover with thousands of other gang members. This type of street intelligence might be misunderstood as either remote (some dating back to the late 1980's) or hearsay (based upon current communications about 'retaliation' and 'code of silence'), but FRE 702 works well for this type of data gathered from years of experience and special knowledge." 203 F3d at 1169.

It is noteworthy, however, that while the Ninth Circuit in *Hankey* held that *Daubert/Kumho Tire Co.* did not apply to the "street intelligence" testimony offered by the gang expert in that case, the trial court nonetheless satisfied any obligation it would have had under *Daubert* and *Kumho Tire Co.* by conducting extensive voir dire of the gang expert. "Here, the district court conducted extensive voir dire to assess the basis for and the relevance and reliability of Officer Andersen's testimony.… Given the type of expert testimony proffered by the government, it is difficult to imagine that the court could have been more diligent in assessing relevance and reliability." *Hankey,* 203 F3d at 1169.

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E. Relevance of Expert Testimony

§17.23 1. STEP Act Violation Alleged

In general, when a statutory gang allegation is charged, expert testimony concerning the culture, habits, and psychology of gangs is relevant and permissible because these subjects are "sufficiently beyond common experience that the opinion of an expert would assist the trier of fact." Evid C §801(a); *People v Gardeley* (1996) 14 C4th 605, 619, 59 CR2d 356; *People v Duran* (2002) 97 CA4th 1448, 1455, 119 CR2d 272; *People v Olguin* (1994) 31 CA4th 1355, 1370, 37 CR2d 596; see *People v Gamez* (1991) 235 CA3d 957, 966, 286 CR 894, disapproved on other grounds in *People v Gardeley* (1996) 14 C4th 605, 624 n10, 59 CR2d 356. To establish a gang enhancement, a prosecutor must prove facts beyond the elements of the underlying offense. *People v Hernandez* (2004) 33 C4th 1040, 1044, 16 CR3d 880 (when prosecution charges criminal street gang allegation, it will often present evidence inadmissible in a trial limited to charged offense).

It is important to note, however, that it is not the rule that the prosecution may introduce cumulative evidence, without limitation, simply because a criminal street gang allegation is alleged. In *People v Williams* (2009) 170 CA4th 587, 610, 88 CR3d 401, the trial court stated that the district attorney "is entitled to the full force of their evidence" and if "they want to over-prove their case or put on all the evidence that they have, that's their right." Rejecting that view, the appellate court stated that "neither the prosecution nor the defendant has a right to present "cumulative evidence that creates a substantial danger of undue prejudice" or "that unduly consumes the court's time." 170 CA4th at 611.

Likewise, in *People v Leon* (2008) 161 CA4th 149, 73 CR3d 786, the court held that it was an abuse of discretion for the trial court to admit evidence of the defendant's prior juvenile robbery adjudication to help establish the criminal street gang allegation. *Leon* observed that the evidence of the defendant's gang membership was overwhelming and that the robbery convictions of other gang members were sufficient to meet the prosecutor's needs. 161 CA4th at 168.

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§17.24 2. No STEP Act Violation Alleged

In cases not involving a statutory sentence enhancement, evidence of gang membership can be highly inflammatory and should not be admitted if its probative value is minimal. See Evid C §352; *People v Cox* (1991) 53 C3d 618, 660, 280 CR 692, disapproved on other grounds by *People v Doolin* (2009) 45 C4th 390, 421 n22, 87 CR3d 209 (evidence of gang membership condemned when "only tangentially relevant, given its highly inflammatory impact"); *People v Cardenas* (1982) 31 C3d 897, 184 CR 165 (error to admit evidence of gang membership when probative value of evidence was outweighed by risk of prejudice on close question of identity of perpetrator).

Gang evidence should not be admitted when its sole primary relevance is to show a defendant's criminal disposition or bad character. Evid C §1101(a). See *e.g.*, *People v Memory* (2010) 182 CA4th 835, 859, 105 CR 353 (inflammatory gang evidence used solely to show defendant's criminal disposition).

Gang evidence may still be relevant, however, as to some noncharacter disputed trait or fact. Evid C §210; *People v Carter* (2003) 30 C4th 1166, 1195, 135 CR2d 553 (motive and intent); *People v Ochoa* (2001) 26 C4th 398, 438, 110 CR2d 324 (gang rivalry as motive); *People v Garcia* (2008) 168 CA4th 261, 274, 85 CR3d 393 (motive and intent); *People v Ruiz* (1998) 62 CA4th 234, 239, 72 CR2d 572 (veracity of third-party confession); *People v Sanchez* (1997) 58 CA4th 1435, 1449, 69 CR2d 16 (witness credibility). Evidence of gang membership has also been admitted to prove bias, provided it is not cumulative to other properly admitted and less inflammatory evidence. See, *e.g., People v Cardenas* (1982) 31 C3d 897, 904, 184 CR 165; *People v Maestas* (1993) 20 CA4th 1482, 1497, 25 CR2d 644.

In a typical gang case, whether or not a gang allegation is alleged, the expert may base his or her opinion on a wide variety of sources, with varied reliability. Thus, it is important that the basis of any expert opinion be closely scrutinized to ensure that it is both reliable and of a type reasonably relied on by experts in the field. *People v Killebrew* (2002) 103 CA4th 644, 653, 126 CR2d 876; *People v Gardeley* (1996) 14 C4th 605, 617, 59 CR2d 356. The law "does not accord to the expert's opinion the same degree of credence or integrity as it does the data underlying the opinion. Like a house built on sand, the expert's opinion is no better than the facts on which it is based." *Gardeley,* 14 C4th at 618, quoting *Kennemur v State of Cal.* (1982) 133 CA3d 907, 923, 184 CR 393. If it is shown that the evidence relied on by the gang expert is unreliable, then it has no relevance and should be excluded. Evid C §§352, 402-403.

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IV. SUBJECT MATTER AND BASIS OF EXPERT OPINION

§17.25 A. Expert Gang Opinion as to Subjective Mental States

A recurring issue with expert testimony in gang cases is whether and to what extent the gang expert can render an opinion as to the subjective mental state of the defendant or his or her associates. One appellate court found it inappropriate for the gang expert to offer his opinion as to the "subjective knowledge and intent" of the defendant and his fellow gang members. *People v Killebrew* (2002) 103 CA4th 644, 652, 126 CR2d 876. The defendant in that case was charged with conspiring to possess a handgun (a felony) in violation of Pen C §12031(a)(2)(C), which requires proof that a defendant was an active participant in a criminal street gang under Pen C §186.22(a). The expert testified at length about gangs and gang psychology, but also testified that Killebrew was part of a conspiracy to possess the handgun, even though it was not in his possession. The expert testified that "when one gang member in a car possesses a gun, every other gang member in the car knows of the gun and will constructively possess the gun." 103 CA4th at 652. The court found that the expert's opinion on Killebrew's subjective knowledge and intent was improperly admitted. 103 CA4th at 647. After a review of numerous gang cases for guidance, the court found that none of the cases permitted testimony that "a specific individual had specific knowledge or possessed a specific intent." 103 CA4th at 658.

The court noted that *People v Olguin* (1994) 31 CA4th 1355, 1371, 37 CR2d 596, "came close to addressing this issue when the appellate court held the officer's testimony was admissible since it was framed in terms of gangs in general, not a specific defendant's subjective expectation." *Killebrew,* 103 CA4th at 658. It noted that the gang expert's testimony went much further than the officer's testimony in *Olguin* did. Through the use of hypothetical questions, the gang expert testified that "each of the individuals in the three cars (1) knew there was a gun in the Chevrolet and a gun in the Mazda, and (2) jointly possessed the gun with every other person in all three cars for their mutual protection." The expert essentially testified to the subjective knowledge and intent of each occupant in each vehicle, which the court distinguished from testimony regarding the *expectations* of gang members in general when confronted with a specific action. 103 CA4th at 658. The gang expert's testimony, in other words, "simply informed the jury of his belief of the suspects' knowledge and intent on the night in question, issues properly reserved to the trier of fact." The beliefs of the gang expert, the court added, were irrelevant. 103 CA4th at 658. See also *People v Gonzalez* (2005) 126 CA4th 1539, 1551, 25 CR3d 124 (gang expert's testimony did not embrace defendant's particular knowledge or his intent, specific or otherwise; it simply addressed the motives of jailhouse gang members in general).

The enhancement, substantive offense, and alternate penalty provision of Pen C §186.22, all require proof of one or more subjective elements. Pen C §186.22(b), (d) (requiring proof that the charged offense was "committed for the benefit of, at the direction of, or in association with[,] any criminal street gang[,] with the specific intent to promote, further, or assist in any criminal conduct by gang members"); Pen C §186.22(a) (requiring proof the accused actively participates in a criminal street gang with knowledge that its members are engaging in or have engaged in a pattern of criminal gang activity). Thus, in some instances, notwithstanding *Killebrew*, some courts have permitted gang experts to go beyond the general psychology and sociology of the gang or criminal street gang and, through the use of a fact-specific hypothetical, render an opinion as to a suspect's purpose or intent as to a particular offense. *People v Gardeley* (1996) 14 C4th 605, 612, 59 CR2d 356; *People v Morales* (2003) 112 CA4th 1176, 1197, 5 CR3d 615; *People v Duran* (2002) 97 CA4th 1448, 1455, 119 CR2d 272. This approach, however, should be closely scrutinized by litigants and the trial courts to make sure that the expert is not simply offering an opinion "which amounts to no more than an expression of his general belief as to how the case should be decided." *Killebrew,* 103 CA4th at 651, quoting *Summers v A.L. Gilbert Co*. (1999) 69 CA4th 1155, 1182, 82 CR2d 162. See also *People v Ramon* (2009) 175 CA4th 843, 849, 96 CR3d 459 (testimony that simply informed jury of how gang expert felt case should be resolved was improper opinion that could not provide substantial evidence to support jury's finding under Pen C §186.22(b)(1)).

Moreover, as pointed out by *Killebrew,* and as was done by the trial court in *People v Gardeley* (1996) 14 C4th 605, 59 CR2d 356, a trial court in a gang case, not unlike a case involving other types of experts, is "required to apply the law to the facts and opinions offered by the witness." *Killebrew,* 103 CA4th at 654. The trial court may not conclude "without analysis that all officer opinions on gangs are admissible." 103 CA4th at 654. The expert opinion testimony of all expert witnesses, including gang experts, must be on a topic "sufficiently beyond common experience that the opinion of an expert would assist the trier of fact." Evid C §801; *Gardeley,* 14 C4th at 617. Accordingly, depending on the facts of the case, expert opinion testimony as to whether or not a particular offense was committed for the benefit of, at the direction of, or in association with a criminal street gang, or with the requisite specific intent, may not be required. That might be the case, for example, when the facts of the case make the intent and purpose of an offense obvious.

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§17.26 B. Basis of Gang Expert's Opinion

The general rules of evidence relating to expert opinion testimony apply to the use of gang expert witnesses. In California, a person may qualify as an expert and give testimony in the form of an opinion so long as he or she possesses "special knowledge, skill, experience, training, or education" in a particular field. Evid C §§720, 801. Expert opinion testimony is only admissible, however, if the subject matter of the testimony is "sufficiently beyond common experience that the opinion of an expert would assist the trier of fact." Evid C §801(a).

Once properly qualified, a gang expert is subject to evidentiary rules regarding the basis of his or her opinion. Expert opinion testimony is limited to an opinion that is "[b]ased on matter … perceived by or personally known to the witness or made known to [the expert] at or before the hearing, whether or not admissible, that is of a type that reasonably may be relied upon by an expert in forming an opinion upon the subject matter to which [the expert] testimony relates." Evid C §801(b).

Evidence Code §801 thus allows for expert opinion testimony based on myriad sources. An expert may render an opinion based on a "hypothetical question that asks the expert to assume their truth" so long as the hypothetical question is rooted in facts actually shown by the evidence. *People v Gardeley* (1996) 14 C4th 605, 618, 59 CR2d 356. See also *Rowe v Such* (1901) 134 C 573, 576, 66 P 862. Expert testimony may also be premised on material that is not admitted into evidence so long as it is material of a type that is reasonably relied on by experts in the particular field in forming their opinions. Evid C §801(b); *Gardeley,* 14 C4th at 618. Finally, even matter that is normally inadmissible, such as hearsay, may form the basis of expert opinion testimony. Evid C §801; *In re Fields* (1990) 51 C3d 1063, 1070, 275 CR 384.

A good summary of the rules relating to the use of experts in gang cases can be found in *Gardeley* as well as in *People v Killebrew* (2002) 103 CA4th 644, 126 CR2d 876, and *People v Gamez* (1991) 235 CA3d 957, 286 CR 894, disapproved on other grounds in *People v Gardeley* (1996) 14 C4th 605, 624 n10, 59 CR2d 356.

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Source: Criminal Law/Scientific Evidence in California Criminal Cases/17 Gang Expert Testimony/§17.27 C. Sources of Expert Opinion in Gang Cases

§17.27 C. Sources of Expert Opinion in Gang Cases

The gang expert will usually base his or her opinion on one or more of the following sources of information: personal observations or investigations of street gangs and individuals; conversations with other former or current gang members; other law enforcement reports and field interview cards; and formal training. In *People v Gardeley* (1996) 14 C4th 605, 59 CR2d 356, perhaps the most-cited example of gang expert testimony, the gang expert based his opinion on conversations he had with Gardeley and fellow gang members, on personal investigations of hundreds of crimes committed by gang members, and on information from colleagues in his police department and from other law enforcement agencies. 14 C4th at 620. Other examples of support used by experts include the following:

- Photos of defendant throwing gang signs as well as expert's "own personal knowledge, crime and victim reports, conversations with other officers and statements by gang members" (*People v Gamez* (1991) 235 CA3d 957, 964, 286 CR 894, disapproved on other grounds in *People v Gardeley* (1996) 14 C4th 605, 624 n10, 59 CR2d 356);

- Extensive time spent with Vietnamese street gangs (approximately 90 percent of expert's time and 450 cases), and conversations with approximately 500 members of Vietnamese gangs in the course of his investigations (*People v Vy* (2004) 122 CA4th 1209, 1218 n6, 19 CR3d 402);

- "Gang intelligence" gathered personally by expert through interviews with hundreds of gang members, arrests of gang members, and investigations of gang-related homicides (*People ex rel Reisig v Acuna* (2010) 182 CA4th 866, 876-879, 106 CR 560; *People v Duran* (2002) 97 CA4th 1448, 1455, 119 CR2d 272);

- Gang expert's position as leader of gang suppression and enforcement team, and familiarity with gangs in and outside of the city (*People v Zermeno* (1999) 21 C4th 927, 929, 89 CR2d 863);

- Gang detective's personal experience in the gang unit (*People v Gutierrez* (2009) 45 C4th 789, 819, 89 CR3d 225; *People v Loeun* (1997) 17 C4th 1, 7, 69 CR2d 776);

- Expert's testimony regarding seven prior police contacts that defendant had when he was in company with known gang members (*People v Castenada* (2000) 23 C4th 743, 752, 97 CR2d 906); and

- Series of field contacts between defendant and members of the Salinas Police Department as well as defendant's high-school records showing gang-related conduct (*In re Jose P.* (2003) 106 CA4th 458, 463, 130 CR2d 810).

Whatever source the gang expert relies on as the basis of his or her opinion, it must meet the "threshold requirement of reliability." *Gardeley,* 14 C4th at 618. Thus, special attention should be given to opinions based on hearsay, whether they be from documentary sources such as arrest reports or from conversations the expert had with out-of-court declarants, *e.g.,* gang members or associates.

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Source: Criminal Law/Scientific Evidence in California Criminal Cases/17 Gang Expert Testimony/§17.28 D. Expert's Opinion Based on Hearsay

§17.28 D. Expert's Opinion Based on Hearsay

A gang expert, like any other expert, can base his or her opinion on reliable hearsay, including out-of-court declarations of other persons. *In re Fields* (1990) 51 C3d 1063, 1070, 275 CR 384. In *People v Gardeley* (1996) 14 C4th 605, 618, 59 CR2d 356, the police gang expert testified to a conversation he had with a fellow gang member as well as the defendants. During an in camera hearing, the prosecutor offered these conversations not as hearsay but simply as the basis of the expert's opinion that the crime "was gang activity in furtherance of … the Family Crip gang." 14 C4th at 612. It is important to note, however, that the expert in *Gardeley* did not rely solely on hearsay to support his opinions. That expert also had personal knowledge given his 23 years of experience in the investigation of criminal street gangs. 14 C4th at 611. In general, gang experts should not "simply recite" what they have been told without relying on further corroborating foundational evidence. *People v Gamez* (1991) 235 CA3d 957, 969, 286 CR 894, disapproved on other grounds in *People v Gardeley* (1996) 14 C4th 605, 624 n10, 59 CR2d 356.

NOTE: As in *Gardeley,* one may request an in camera hearing where the prosecution identifies the specific hearsay he or she intends to offer through the gang expert. The chief concerns will be that it is relevant, competent, and not offered in a manner that prejudices the defendant.

However, under *Crawford v Washington* (2004) 541 US 36, 158 L Ed 2d 177, 124 S Ct 1354, "testimonial" hearsay is inadmissible unless there is a showing of unavailability and the accused has had a prior opportunity to cross-examine. In *People v Thomas* (2005) 130 CA4th 1202, 30 CR3d 582, the Fourth Appellate District held that a gang expert's reliance on hearsay statements did not violate *Crawford* because the statements were not offered for the truth of the matter asserted; instead, they were offered as the basis of the expert opinion. *Thomas,* 130 CA4th at 1210. See also *People v Sisneros* (2009) 174 CA4th 142, 153, 94 CR3d 98 (gang expert opinion testimony proper where expert did not "attempt to pass off" reports of other experts as his own).

There is obviously some tension between the general rule as set forth in *Thomas*, 130 CA4th 1202 and the right to confront and cross examine out-of-court declarants. This tension is highlighted by California's criminal jury instructions which advise jurors: "You must decide whether information on which the expert relied was true and accurate." CALCRIM 332 (Expert Witness Testimony). In some instances, where it is clear that the gang expert opinion is entirely dependent upon the accuracy and substantive content of the hearsay statement, and the statement appears to be testimonial within the meaning of *Crawford*, a Confrontation Clause violation may be triggered.

For instance, in *United States v Mejia* (2nd Cir 2008) 545 F3d 179, 198, the Second Circuit found that a prosecution gang expert violated *Crawford* when he communicated testimonial statements of cooperating witnesses and informants:

In *Crawford*, 541 U.S. 36, 124 S Ct. 1354, 158 L.Ed.2d 177, the Supreme Court held that the Confrontation Clause of the Sixth Amendment prohibits the introduction into evidence of the out-of-court testimonial statements made by an absent witness unless that witness is unavailable and the defendant had a prior opportunity for cross-examination. *Id.* at 54, 124 S Ct 1354. While the Court did not provide a comprehensive definition for the term "testimonial," it placed custodial interrogations within the "core class" covered by the rule it had just announced. *Id.* at 51, 124 S Ct 1354; see also *Davis v Washington*, 547 U.S. 813, 822, 126 S Ct 2266, 2273, 165 L.Ed.2d 224 (2006) (explaining that a custodial police interrogation after a *Miranda* warning "'qualifies under any conceivable definition' of an 'interrogation'" (quoting *Crawford*, 541 U.S. at 53, 124 S Ct 1354)).

When faced with the intersection of the *Crawford* rule and officer experts, we have determined that an officer expert's testimony violates *Crawford* "if [the expert] communicated out-of-court testimonial statements of cooperating witnesses and confidential informants directly to the jury in the guise of an expert opinion."

Further, it is important to remember that it is not the law that an expert may testify to the details of any information on which he or she relied to form his or her opinion. The trial court has an obligation to limit admission of otherwise inadmissible evidence and prejudicial hearsay. *People v Montiel* (1993) 5 C4th 877, 918, 21 CR2d 705; *People v Coleman* (1985) 38 C3d 69, 91, 211 CR 102; *People v Chapman* (1968) 261 CA2d 149, 178-179, 67 CR 601. "The rule which allows an expert to state the reasons upon which his opinion is based may not be used as a vehicle to bring before the jury incompetent evidence." *People v Young* (1987) 189 CA3d 891, 913, 234 CR 819.

Given the highly inflammatory nature of gang evidence in general and the risk of a Confrontation Clause violation, at least where the expert is relying upon testimonial statements, it is a best practice to have the gang expert first testify at an Evid C §402 hearing. This *in limine* hearing not only benefits the trial court and counsel in spotting problem areas, but it also helps the expert tailor his or her testimony in strict accordance with the trial court's rulings.

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§17.29 1. Expert's Reliance on Conversations With Gang Members and Associates

Reliability concerns may be greatest when the expert relies on conversations with gang members to form his or her opinion. At a minimum, courts appear willing to admit such opinions so long as the expert does not give a full, detailed recitation of the conversations. "The statements of gang members, which in part formed the bases of the officers' opinions, were not recited in detail during the officers' testimony but were referenced in a more general fashion, along with other, corroborating information." *People v Gamez* (1991) 235 CA3d 957, 968, 286 CR 894, disapproved on other grounds in *People v Gardeley* (1996) 14 C4th 605, 624 n10, 59 CR2d 356. See also *People v Sisneros* (2009) 174 CA4th 142, 147, 94 CR 98; *People v Duran* (2002) 97 CA4th 1448, 1465, 119 CR2d 272. Likewise, a gang expert who bases his or her opinion solely on hearsay statements from other unidentified gang members, without further support, runs the risk of having his or her opinion stricken as unreliable. "The statements of gang members were only a portion of the foundation for the officers' opinions. The situation here is thus not analogous to that in *Isaacs v Huntington Mem. Hosp.* (1985) 38 C3d 112, 211 CR 356, where the entirety of the expert's opinion was based upon one source who was unidentified." *Gamez,* 235 CA3d at 967.

NOTE: When the gang expert relies on hearsay statements from other gang members or former gang members, counsel should consider arguing that such hearsay statements are "presumptively unreliable." This would be apparent, for example, when the hearsay statement was obtained during arrests, prosecutions, and other situations raising questions as to the motivation or bias of the declarant. See *People v Duarte* (2000) 24 C4th 603, 101 CR2d 701 (accomplice's self-serving statements shifting blame unreliable). See also *Lilly v Virginia* (1999) 527 US 116, 130, 144 L Ed 2d 117, 130, 119 S Ct 1887 (confession by accomplice incriminating defendant inherently unreliable); *Lee v Illinois* (1986) 476 US 530, 541, 90 L Ed 2d 514, 526, 106 S Ct 2056 (self-inculpatory statements by codefendants that also inculpate the defendant at issue are "presumptively unreliable").

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§17.30 2. Expert Relies on Incompetent Hearsay

Problems can arise when the proposed expert opinion testimony is not based on the personal knowledge and observations of the expert but rather primarily on the out-of-court statements of others. In some instances, the proposed gang expert may simply offer to recite what others told him about a particular gang or what he had read in law enforcement reports written by others. In that situation, the expert may simply not be in a position to provide the trial court enough information to determine whether the proposed testimony meets the threshold reliability requirement to prove a STEP Act violation. That was the situation in *In re Nathaniel C.* (1991) 228 CA3d 990, 279 CR 236, where the gang expert offered only nonspecific hearsay of a suspected shooting of one gang member by another. The officer had no personal knowledge of the incident and only repeated what other officers had told him they believed about the shooting. 228 CA3d at 1003.

Similarly, in *In re Leland D.* (1990) 223 CA3d 251, 272 CR 709, the court found that the nonspecific hearsay and arrest information offered by the gang expert as the basis for his opinion as to the predicate offenses fell "far short." 223 CA3d at 259. The expert testified that the gang in question had been involved in several enumerated offenses. However, "[e]xactly who, when, where and under what circumstances are not specified. The sources of such conclusional pronouncements appear to have been hearsay statements from unidentified gang members and information pertaining to arrests of purported gang members all made without a definite timeframe being established." 223 CA3d at 259.

If the proposed expert is otherwise qualified but cannot lay a sufficient foundation to establish the reliability of proposed testimony, then such testimony necessarily lacks relevance and should be excluded. Evid C §§352, 402-403, 405. "'While an expert may state on direct examination the matters on which he relied in forming his opinion, he may not testify as to the details of such matters if they are otherwise inadmissible. [Citations] The rule rests on the rationale that while an expert may give reasons on direct examination for his opinions, including the matters he considered in forming them, he may not under the guise of reasons bring before the jury incompetent hearsay evidence.'" *People v Gamez* (1991) 235 CA3d 957, 968, 286 CR 894, disapproved on other grounds in *People v Gardeley* (1996) 14 C4th 605, 624 n10, 59 CR2d 356, quoting *People v Coleman* (1985) 38 C3d 69, 92, 211 CR 102.

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Source: Criminal Law/Scientific Evidence in California Criminal Cases/17 Gang Expert Testimony/§17.31 E. Ultimate Issue Opinion Testimony in Gang Allegation Cases

§17.31 E. Ultimate Issue Opinion Testimony in Gang Allegation Cases

In a typical criminal street gang case, the gang expert will often render an opinion that encompasses or coincides with an ultimate issue in the case. Thus, in a Pen C §186.22(b) sentence enhancement case, the gang expert may be given a hypothetical based on critical facts from the case and then be asked to render an opinion as to whether or not the "hypothetical" offense was "committed for the benefit of, at the direction of, or in association with any criminal street gang, with the specific intent to promote, further, or assist in any criminal conduct by gang members." *People v Gardeley* (1996) 14 C4th 605, 612, 59 CR2d 356; *People v Ferraez* (2003) 112 CA4th 925, 930, 5 CR3d 640; *People v Morales* (2003) 112 CA4th 1176, 1197, 5 CR3d 615; *People v Duran* (2002) 97 CA4th 1448, 1455, 119 CR2d 272.

While this type of testimony states the existence of a key statutory element and, therefore, constitutes ultimate opinion testimony, courts may allow this type of testimony under Evid C §801, which permits the admission of expert opinion testimony that embraces the ultimate issue to be decided by the jury. Evid C §805. This does not mean, however, that the expert may express any opinion he or she may have (*People v Killebrew* (2002) 103 CA4th 644, 651, 126 CR2d 876, quoting *Summers v A.L. Gilbert Co.* (1999) 69 CA4th 1155, 1182, 82 CR2d 162):

Undoubtedly there is a kind of statement by the witness which amounts to no more than an expression of his general belief as to how the case should be decided.… There is no necessity for this kind of evidence; to receive it would tend to suggest that the judge and jury may shift responsibility for decision to the witnesses; and in any event it is wholly without value to the trier of fact in reaching a decision.

While case law holds that a "bright line cannot be drawn to determine when opinions that encompass the ultimate fact in the case are or are not admissible" (*Killebrew,* 103 CA4th at 653), the final determination turns on the issues and facts of the case (*Killebrew,* 103 CA4th at 652, quoting *People v Wilson* (1944) 25 C2d 341, 349, 153 P2d 720; see also *People v Valdez* (1997) 58 CA4th 494, 507, 68 CR2d 135):

There is no hard and fast rule that the expert cannot be asked a question that coincides with the ultimate issue in the case. "We think the true rule is that admissibility depends on the nature of the issue and the circumstances of the case, there being a large element of judicial discretion involved.… Oftentimes an opinion may be received on a simple ultimate issue, even when it is the sole one, as for example where the issue is the value of an article, or the sanity of a person; because it cannot be further simplified and cannot be fully tried without hearing opinions from those in better position to form them that the jury can be placed in."

Not every case involving a criminal street gang allegation will necessarily require ultimate opinion testimony from the gang expert. Depending on the nature of the issue and the facts of the case, the jury may be perfectly capable of determining the issue just as easily and intelligently as the expert. In *Valdez,* the court stated that had the facts of the case been simpler and involved only one gang (as opposed to diverse gang affiliations), "then perhaps expert testimony about rivalries, turf, respect, and forms of violence used by gangs might enable a jury to determine the 'for the benefit etc.' element as easily and intelligently as a gang expert could, thereby precluding the need for an expert opinion on that specific issue." *Valdez,* 58 CA4th at 508.

The need for ultimate opinion testimony by the gang expert should be closely scrutinized on a case-by-case basis. While it may generally be said that the more complex the relevant factual issues, the more likely it is that ultimate opinion testimony will be useful and, in some cases, necessary, this does not obviate the need to ensure that the expert is not simply telling the trier of fact how he or she thinks the case should be decided. In *Killebrew,* the appellate court found that the gang expert did just that when he testified as to the subjective knowledge and intent of alleged gang participants. The gang expert testified that each of the individuals in three cars knew there were guns in other associates' cars and that they jointly possessed the gun with every other person in all three cars for mutual protection. The court found that this testimony "is the type of opinion that did nothing more than inform the jury how [the gang expert] believed the case should be decided. It was an improper opinion on the ultimate issue and should have been excluded." *Killebrew,* 103 CA4th at 658.

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18

Assessing Evidence Under the Sexually Violent Predator Act

Michael J. Aye

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I. THE SEXUALLY VIOLENT PREDATOR ACT (SVPA)

§18.1 A. Overview and Effective Dates

In 1995, the California Legislature adopted the Sexually Violent Predator Act (SVPA) (Welf & I C §§6600-6609.3), which took effect January 1, 1996 (Stats 1995, ch 763, §3). In describing the underlying purpose, the Legislature expressed concern about a select group of criminal offenders considered extremely dangerous as the result of mental impairment and likely to continue committing acts of sexual violence even after they have been punished for such crimes. The Legislature indicated that to the extent such persons are currently incarcerated and readily identifiable, commitment under the SVPA is warranted immediately on their release from prison. The SVPA provides treatment for the mental disorders from which such persons currently suffer and reduces the threat of harm otherwise posed to the public. No punitive purpose is intended. *Hubbart v Superior Court* (1999) 19 C4th 1138, 1165, 81 CR2d 492.

The *Hubbart* court declared that the SVPA is civil in nature. Because of its civil nature, the act is not subject to ex post facto or double jeopardy challenges. Likewise, on its face, the SVPA meets due process requirements. This does not mean that due process challenges cannot be waged. Since there is very little established procedure associated with the SVPA, it will probably be many years before all due process challenges are exhausted.

The *Hubbart* court relied on the holding of the U.S. Supreme Court in *Kansas v Hendricks* (1997) 521 US 346, 138 L Ed 2d 501, 117 S Ct 2072, which upheld a similar law in the State of Kansas. Because of facts particular to the *Hendricks* case, the Court suggested that it is constitutional to civilly commit a person who has completed a criminal sentence yet remains dangerous as the result of a mental disorder that causes the person to be unable to control dangerous criminal behavior. *Hubbart*, 19 C4th at 1164.

To determine if an individual qualifies for civil commitment, "there must be proof of serious difficulty controlling behavior." *Kansas v Crane* (2002) 534 US 407, 413, 151 L Ed 2d 856, 122 S Ct 867. This difficulty (534 US at 413),

when viewed in light of such features of the case as the nature of the psychiatric diagnosis, and the severity of the mental abnormality itself, must be sufficient to distinguish the dangerous sexual offender whose serious mental illness, abnormality, or disorder subjects him to civil commitment from the dangerous but typical recidivist convicted in an ordinary criminal case.

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§18.2 B. California's Unique Standard of Risk

The Sexually Violent Predator Act (SVPA) states, "'Sexually violent predator' means a person who has been convicted of a sexually violent offense against one or more victims and who has a diagnosed mental disorder that makes the person a danger to the health and safety of others in that it is likely that he or she will engage in sexually violent criminal behavior." Welf & I C §6600(a)(1).

All states that have laws similar to the SVPA require the state to prove that the person is at least "likely" to reoffend in a sexual manner. Some states go further and set the standard at "highly likely." The California Supreme Court, on the other hand, has stated (*People v Superior Court (Ghilotti)* (2002) 27 C4th 888, 922, 119 CR2d 1):

"*likely* to engage in acts of sexual violence".... as used in section 6601, subdivision (d), connotes much more than the mere *possibility* that the person will reoffend as a result of a predisposing mental disorder that seriously impairs volitional control. On the other hand, the statute does not require a precise determination that the chance of reoffense is *better than even*. Instead, an evaluator applying this standard must conclude that the person is "likely" to reoffend if, because of a current mental disorder which makes it difficult or impossible to restrain violent sexual behavior, the person presents a *substantial danger*, that is, *a serious and well-founded risk*, that he or she will commit such crimes if free in the community.

In other words, in California, the likelihood of reoffense does not have to be greater than 50 percent. See CALCRIM 3454. Thus, the California standard for commitment or recommitment under the SVPA is markedly different from the standard used in other jurisdictions.

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§18.3 1. Jury Instructions

For the purpose of jury instruction in California, the California Supreme Court has held that the constitution does not require any instruction on the issue of ability to control behavior above and beyond the language set forth in CALCRIM 3454. On the application of CALCRIM 3454, see, *e.g.,* *People v McRoberts* (2009) 178 CA4th 1249, 1258, 101 CR3d 115. The court has not addressed the right of a respondent, specifically in a petition brought pursuant to the Sexually Violent Predator Act (SVPA), to have a pinpoint instruction consistent with a theory of defense. See, *e.g.,* *People v Roldan* (2005) 35 C4th 646, 715, 27 CR3d 360, disapproved on other grounds by *People v Doolin* (2009) 45 C4th 390, 421 n22, 87 CR3d 209. However, according to Couzens and Bigelow, California Benchbook: The Adjudication of Sex Crimes, §15.68 (2006), the court should instruct the jury on the likelihood of reoffense in accord with the standard articulated in *People v Superior Court (Ghilotti)* (2002) 27 C4th 888, 922, 119 CR2d 1, even though the language (see §18.2) does not appear in CALCRIM 3454.

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§18.4 2. Predatory Acts

The California Supreme Court held that "before a defendant can be committed or recommitted under the Sexually Violent Predator Act …, the trier of fact must find, beyond a reasonable doubt, that the defendant is likely to commit sexually violent *predatory*" acts if released. *People v Hurtado* (2002) 28 C4th 1179, 1182, 124 CR2d 186. "Thus, the judge or jury trying the case must determine not only whether the defendant is likely to 'engage in sexually violent criminal behavior' …, but also whether that behavior is likely to be directed 'toward a stranger, a person of casual acquaintance with whom no substantial relationship exists, or an individual with whom a relationship has been established or promoted for the primary purpose of victimization.'" 28 C4th at 1141, quoting Welf & I C §6600(e).

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C. Procedure Under SVPA

§18.5 1. Referral From Department of Corrections and Rehabilitation

The process for civil commitment under the Sexually Violent Predator Act (SVPA) begins whenever the California Department of Corrections and Rehabilitation (CDCR) determines that a person in custody under its jurisdiction, who is serving a determinate sentence or whose parole has been revoked, may be a sexually violent predator. At least 6 months prior to the person's release date (unless the person was received by the CDCR with less than 9 months to serve), the CDCR must refer the person to the Department of Mental Health (DMH) for evaluation. Welf & I C §6601(a)(1). Upon a showing of good cause, the CDCR may keep a person in custody for an additional 45 days in order to complete the evaluation process. Welf & I C §6601.3. After the 45-day hold period, however, the person's custody becomes unlawful and a petition filed after that time period must be dismissed, unless a good faith mistake of law or fact is shown. *People v Superior Court (Small)* (2008) 159 CA4th 301, 309, 71 CR3d 462. See *In re Hovanski* (2009) 174 CA4th 1517, 1523, 95 CR3d 370 (finding valid a 45-day hold placed 1 day before parole discharge date of person returned to prison for parole violation (habeas corpus proceeding)).

In *Hovanski*, *supra,* the Board of Prison terms determined that more time was necessary to complete evaluations. To date, no case has addressed the meaning of "good cause" for the purposes of Welf & I C §6601.3 or if the *Small* limitations would prevent a finding of good cause under §6601.3 when a hold is placed merely because the District Attorney was dilatory in timely filing a petition, though the evaluations were completed well in advance of the parole date. The statutory language suggests that the *Small* limitations would apply.

NOTE: Though the petition does not necessarily have to be dismissed, SVP proceedings cannot continue against a person following reversal on appeal of the conviction that was the basis for the person's custody at the initiation of the proceedings. To continue SVP proceedings against an individual whose current conviction has been reversed, the people must retry and reconvict. *In re Smith* (2008) 42 C4th 1251, 1269, 73 CR3d 469. Compare *In re Franklin* (2008) 169 CA4th 386, 392, 86 CR3d 702 (petition dismissed with prejudice when reversal was final *before* petition filed and defendant was no longer in custody on determinate sentence, but as misdemeanant awaiting transportation, therefore, did not meet statutory criteria for initiation of SVP proceedings).

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§18.6 2. Department of Mental Health (DMH) Evaluation; Request for Petition for Commitment

The Department of Mental Health (DMH) must designate two practicing psychiatrists or psychologists, or one practicing psychiatrist *and* one practicing psychologist, to evaluate the person in accordance with a standardized assessment protocol, developed by the DMH, to determine whether the person is a sexually violent predator. The standardized assessment protocol must require the assessment of diagnosable mental disorders and various factors known to be associated with the risk of reoffense. Welf & I C §6601(c)-(d).

NOTE: Until January 1, 2011, the two evaluators may be "independent professionals" not employed by the State. Welf & I C §6601(c)-(d), (g), (m)(3) (repealed effective January 1, 2011), §6601(c)-(d), (g), (m) (effective January 1, 2011).

If both evaluators agree that "the person has a diagnosed mental disorder so that he or she is likely to engage in acts of sexual violence without appropriate treatment and custody," the DMH must forward a request for a petition for commitment to the county from which the offender was committed on the current prison term. Welf & I C §6601(d); *People v Krab* (2003) 114 CA4th 534, 545, 7 CR3d 853.

If, however, only one of the evaluators concludes that the person meets the criteria for commitment, the DMH must arrange for further examination of the person by two independent professionals as designated in Welf & I C §6601(g). The DMH may request a petition for commitment only if both of the independent professionals conclude that the person meets the criteria for commitment. Welf & I C §6601(f).

On September 9, 2009, 9 Cal Code Regs §§4000 and 4005 were finalized as the new regulatory authority under which the DMH must conduct evaluations. For persons who were evaluated prior to the adoption by the DMH of 9 Cal Code Regs §4005, there is now authority for asking the court to order a new evaluation pursuant to Welf & I C §6601(c). *In re Ronje* (2009) 179 CA4th 509, 101 CR3d 689. The DMH has taken the position that only an addendum to the existing report addressing whether the new regulations change the evaluation is necessary. At the time of this writing, no case has addressed the scope of new evaluations or whether new evaluators are required for conducting new evaluations.

NOTE: The regulations purport to vest evaluators with the authority to select in each case appropriate, "generally accepted," "peer reviewed" research when assessing a person under the SVPA. Not only does the adoption of the procedure suggested by these regulations seem inconsistent with the DMH's statutory duty to develop a standardized assessment protocol but also, in practice, it has not resulted in a significant change from the evaluations that were done under the DMH, Clinical Evaluator Handbook and Standardized Assessment Protocol, which provided the framework for evaluations conducted prior to 2009 and to which only minor changes were made between 2007 and 2008. For the sake of consistency, the references herein are generally to the 2007 handbook. The 2007 Clinical Evaluator Handbook is available at http://www.defenseforsvp.com/Resources/EvaluatorsHandbook/2007_Evaluators_Handbook0001a.pdf.

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§18.7 3. Probable Cause Determination

At a probable cause hearing under Welf & I C §6602(a), a superior court judge must determine whether a reasonable person could entertain a strong suspicion that (1) the offender has been convicted of a qualifying sexually violent offense against at least one victim; (2) the offender has a diagnosable mental disorder; (3) the disorder makes it likely that he or she will engage in sexually violent criminal conduct if released; and (4) the sexually violent criminal conduct will be predatory in nature. *Cooley v Superior Court* (2002) 29 C4th 228, 236, 127 CR2d 177 (listing the elements of the statute as they existed prior to the 2006 amendment, which changed the number of victims from two to one). Under *Cooley* the standard of review is the same as in a preliminary hearing in criminal cases.

Upon the filing of a petition and request for review, a judge may make a finding of probable cause, order the person detained, and set the matter for a full probable cause hearing within 10 calendar days of the date of the order finding probable cause. Welf & I C §6601.5. The statute suggests that the preliminary finding of probable cause should be made at the time of the filing of the petition, but in *People v Badura* (2002) 95 CA4th 1218, 116 CR2d 336, the court upheld a finding under Welf & I C §6601.5 made 3 days after the defendant's commitment had expired and before a full probable cause hearing had begun. The court made a finding beyond a reasonable doubt that the trial court would have made the same determination had it acted 3 days earlier, so there was no prejudice to the respondent. No court has addressed what happens if the petitioner files a timely petition and then asks for a finding under Welf & I C §6601.5 after the 10-day extension period has passed.

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§18.8 4. Trial

At trial, the court or jury must determine whether, beyond a reasonable doubt, the person is a sexually violent predator. Welf & I C §6604. That is, the People must prove that (1) the defendant was convicted of a sexually violent offense; (2) the defendant has a diagnosable mental disorder that makes him or her a danger to the health or safety of others; (3) the defendant's disorder makes it likely that he or she will engage in sexually violent criminal conduct if released; and (4) the defendant's sexually violent criminal conduct will be predatory in nature. *People v Fulcher* (2006) 136 CA4th 41, 52, 38 CR3d 702; see also *People v Hurtado* (2002) 28 C4th 1179, 1182, 124 CR2d 186 (trier of fact must determine not only whether defendant is likely to engage in sexually violent criminal behavior (Welf & I C §6600(a)), but also whether that behavior is likely to be predatory).

The defendant is entitled to a trial by jury, assistance of counsel, "the right to retain experts or professional persons to perform an examination on his or her behalf, and to have access to all relevant medical and psychological records and reports." Welf & I C §6603(a). The defendant has a right under the due process clauses of the federal and state Constitutions to testify in the proceeding, in accordance with the rules of evidence and procedure, over the objection of counsel. *People v Allen* (2008) 44 C4th 843, 860, 80 CR3d 183. Conversely, the Fifth Amendment guarantee against compulsory self-incrimination does not apply to proceedings under the Sexually Violent Predator Act (SVPA), and the prosecutor can call the defendant as a witness. *Allen,* 44 C4th at 860. See also *People v O'Shell* (2009) 172 CA4th 1296, 1305, 92 CR3d 57 (although harmless, trial court erred in excluding as irrelevant defendant's proposed testimony that he was particularly motivated to seek treatment and avoid reoffending because he faced a life term if he did so). There is no Sixth Amendment right of self-representation in proceedings under the SVPA.

Although there is no statutory time in which to bring an action under the SVPA to trial, the trial must commence within a time period and under conditions that are not violative of due process. *People v Litmon* (2008) 162 CA4th 383, 76 CR3d 122. On the other hand, the mandatory dismissal for failure to bring a matter to trial within 5 years under CCP §583.310 is not applicable to petitions brought under the SVPA. *People v Evans* (2005) 132 CA4th 950, 34 CR3d 35.

The California Supreme Court appears prepared to address the issue of competency in SVP proceedings. It has granted review in two cases that held that the principles of due process dictate that the state may proceed with SVPA proceedings only when the defendant is competent. See *Wilson v Superior Court* (review granted July 14, 2010, ___; superseded opinion at 182 CA4th 1457, 1475, 107 CR3d 122) (initial SVPA proceedings); *Moore v Superior Court* (review granted Sept. 17, 2009, S174633; superseded opinion at 174 CA4th 920, 94 CR3d 771) (trial).

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§18.9 5. Commitment

If the court or jury finds beyond a reasonable doubt that the person is a sexually violent predator (SVP), the person must be committed for an indefinite term in the custody of the Department of Mental Health (DMH) for appropriate treatment and confinement in a secure facility designated by the DMH. If the court or jury does not determine that the person is an SVP, the court must direct that the person be unconditionally released at the end of parole. Welf & I C §6604. Time on parole is tolled if a finding or placement is made pursuant to the provisions of the Sexually Violent Predator Act. Welf & I C §6601(k).

NOTE: In 2006, Proposition 83, essentially changed commitment under the Sexually Violent Predator Act (SVPA) from a 2-year renewable term to an indefinite commitment. In response to a challenge to Proposition 83, the California Supreme Court held that California "has not yet carried its burden of demonstrating why SVPs, but not any other ex-felons subject to civil commitment, such as mentally disordered offenders, are subject to indefinite commitment." *People v McKee* (2010) 47 C4th 1172, 1184, 104 CR3d 427. The court remanded the case to provide "the People the opportunity to justify the differential treatment in accord with established equal protection principles." 47 C4th at 1184. The court rejected challenges to Proposition 83 on due process and ex post facto grounds (47 C4th at 1188). In another case, the court ruled that in light of the uncertainty surrounding the litigation over indeterminate terms, a stipulation to a 2-year commitment entered into by the parties and the court cannot be challenged on appeal by the Attorney General. *People v Castillo* (2010) 49 C4th 145, ___ CR3d ___, citing extensively to the rationale of *People v Litmon* (2008) 162 CA4th 383, 76 CR3d 122.

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§18.10 6. Strategy for Challenging the Proceeding

In order to present a strong challenge to a commitment proceeding, the attorney needs to keep several things in mind. First, get good experts and get them early; do not wait to talk to these experts until just before trial, but learn from them what the science is, and be sure to pick experts who have a good working knowledge of this small specialized area.

Second, do not be afraid to ask questions of the state evaluators. Much of the discussion here has been about defending these petitions, mainly because the state's case is almost always based on what the person has done in the past. The questioning of the state experts has to be based on the science that is discussed in this chapter and the information gleaned from defense experts. For example, when the state's evaluator claims that the STATIC-99, STATIC-99R or any other so-called actuarial, has been cross-validated many times, the attorney must keep asking what the method of cross-validation was and how that relates to the accuracy of the prediction. Even if the attorney has to walk through the definition of the receiver operating characteristic (ROC) curve (see §18.64) in front of the jury, he or she should not be afraid to do so. Some research reveals a poor correlation in some cases between factors identified in the STATIC-99 and the risk of recidivism. Looman and Abracen, *Comparison of Measures of Risk for Recidivism in Sexual Offenders*, 25(5) J of Interpersonal Violence (May 2010); Sjostedt and Langstrom, *Actuarial Assessment of Sex Offender Recidivism Risk: A Cross-Validation of the RRASOR and the Static-99 in Sweden*, 25(6) Law and Human Behavior (December 2001).

When an evaluator talks about factors not included in the actuarial instrument, the attorney should insist that the evaluator disclose exactly how he or she is considering those factors. If there is no established methodology that has been empirically validated for weighing those factors, then the evaluator is merely using clinical judgment, which is difficult or nearly impossible to justify using to predict risk, unless the case falls outside the parameters of any accepted actuarial tool. A meta-analysis of 536 findings drawn from 118 distinct samples (45,398 sexual offenders, 16 countries), showed that empirically derived actuarial measures were more accurate than unstructured professional judgment for all outcomes (sexual, violent, or any recidivism). The accuracy of structured professional judgment was determined to be intermediate between the accuracy found for the actuarial measures and for unstructured professional judgment. Hanson and Morton-Bourgon, *The Accuracy of Recidivism Risk Assessments for Sexual offenders: A Meta-Analysis of 118 Prediction Studies*, 21(1) Psychological Assessment 1 (2009). Moreover, to date, the research does not show any incremental validity in adding dynamic factors to actuarial instruments. Philipse, et al., *Static and Dynamic Patient Characteristics as Predictors of Criminal Recidivism: A Prospective Study in a Dutch Forensic Psychiatric Sample*, 30(3) Law and Human Behavior (June 2006).

Aside from prediction methodologies, an attorney should discuss with his or her own experts the viability of any diagnosis that has been made of the prospective SVP (see §18.24) as well as examine the course of any diagnosis from the Diagnostic And Statistical Manual, now in it Fourth Edition, Text Revision, (DSM IV-TR). Despite frequent testimony by state evaluators that paraphilias are chronic and lifelong, it is clear that many may remit with age. See §18.88.

Third, a live probable cause hearing with the evaluators present is usually preferable to the defense, even if time has to be waived. Various counties differ on procedure, but the respondent's attorney, absent an agreement with the petitioner, is responsible for subpoenaing the doctors. The attorney should take whatever time he or she needs and walk the state's expert through his or her qualifications, how much money the expert makes, and what each and every document the expert mentions in the evaluation means to the conclusion.

Frequently, at the probable cause hearing, the attorney can set up a basis for motions in limine; evaluators often toss bad things to say about the client into the report that do not relate to a diagnosed mental disorder or the risk of reoffense. Examples of highly prejudicial material which may be subject to exclusion at trial are non-sexual CDC 115's and uncharged sexual misconduct. Such information, even if marginally relevant, may have little probative value and be overly prejudicial. This is the attorney's opportunity to narrow the scope of trial testimony. Remember that Proposition 115 does not apply to these proceedings, and the attorney can treat these proceedings like depositions to a certain degree. The attorney can also ask evaluators about studies the attorney thinks are important; if the evaluator has not read the study or cannot remember it, then the attorney can send it to the evaluator prior to trial. (The author suggests using certified mail.)

Finally, at trial, with the attorney's own experts and with the state's evaluators, the attorney should try to use graphics to illustrate the various studies that the experts relied on. Although on direct examination, an expert may not parrot the opinion of other non-testifying experts, the data in such studies can be discussed in detail as well as the conclusion that the testifying expert draws from the data. Graphed out data can help a juror who does not understand all of the technical talk see the importance of the research that the expert is talking about.

PRACTICE TIP: In a proceeding under the Sexually Violent Predator Act (SVPA), it appears as if the prosecution does not have the due process rights afforded it under Cal Const art 1, §29; on its face, that provision applies only to criminal proceedings.

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II. THE EVALUATION

§18.11 A. The Protocol

Welfare & Institutions Code §6601(c) requires that a person referred from the California Department of Corrections and Rehabilitation (CDCR) be evaluated in accordance with a standardized assessment protocol developed and updated by the California Department of Mental Health (DMH). The Clinical Evaluator Handbook and Standardized Assessment Protocol (Clinical Evaluator Handbook) was historically, according to the DMH, the centerpiece of that protocol.

In 2008, a petition was filed with the Office of Administrative Law (OAL) challenging 10 provisions in the Clinical Evaluator Handbook as "regulations" that should have been adopted under the Administrative Procedure Act (APA). See 2008 OAL Determination No. 19 (Aug. 15, 2008) available at http://www.oal.ca.gov/Determinations_Issued_in_2008.htm. The OAL found the challenged provisions invalid, which "effectively invalidates the operative content of the protocol." *People v Medina* (2009) 171 CA4th 805, 814, 89 CR3d 830 (finding that defendant's challenge to original SVP commitment as act in excess of court's jurisdiction was not subject to collateral attack as well as forfeited by defendant's admissions to allegations in original petition and further concluding that any challenge defendant might have waged on recommitment procedures would be forfeited by his consent to entry of recommitment order). See also *People v Taylor* (2009) 174 CA4th 920, 937, 94 CR3d 756 (underground regulation claim forfeited). Agreeing with the OAL's findings, the court in *In re Ronje* (2009) 179 CA4th 509, 101 CR3d 689, granted a pre-trial petition for habeas corpus and ordered a re-evaluation under a valid assessment protocol and a new probable cause hearing.

On September 9, 2009, 9 Cal Code Regs §§4000 and 4005 were finalized as the new regulatory authority under which DMH evaluators must conduct their evaluations. As of this writing, the DMH is attempting to have these new regulations replace the old Clinical Evaluator Handbook as the assessment protocol, except for those parts of the Handbook that are merely restatements of law and therefore not subject to the Administrative Procedures Act (APA). The latest form of the Clinical Evaluator Handbook consists of only eight pages and contains the language of the new regulations; however, that handbook has not gone through the APA process either. The new regulations purport to vest evaluators with the authority to select in each case the appropriate, "generally accepted," "peer reviewed" research for use in their assessment. At the time of this writing, it remains to be seen whether or not the courts will allow the DMH to effectively delegate its duty to establish a standardized assessment protocol under Welf & I C §6601(c) to state evaluators by directing them to choose what research to rely on and how to apply it to specific cases.

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§18.12 1. Field Testing

The Department of Mental Health (DMH) protocol laid out in the Clinical Evaluator Handbook and Standardized Assessment Protocol (2007) has never been subject to any kind of field testing or validation study. There is no research confirming that the protocol actually performs as intended. There is nothing to suggest that by using the protocol a given evaluator or the DMH, in general, can accurately identify a person who is likely to reoffend in a sexually violent predatory manner. Additionally, while the DMH provides ongoing training to its evaluators (both its employees and subcontractors), there have been no inter-rater reliability studies done with respect to the protocol. That is, it is unknown how frequently two evaluators will arrive at the same result using the DMH standardized protocol. Despite the fact that the operative content of pre-2009 editions of the Clinical Evaluator Handbook has been invalidated as an illegal underground regulation, many evaluators will undoubtedly exercise their discretion to continue to employ that methodology and the DMH seems likely to continue to train its evaluators in a manner consistent with that protocol.

The only data which reflects upon the accuracy of the DMH protocol comes from that gathered by Jesus Padilla, PhD, when he was an employee at Atascadero State Hospital. Part of Dr. Padilla's duties was to supervise the hospital research. As part of that research, a group of non-treating SVPs were followed after release by the courts. For those for whom the researchers could find data, the recidivism rate was about 5 to 6 percent over a 5-year period. Although based on rough data and an incomplete study, these findings suggest that the DMH protocol in use, up to that time, grossly over predicted recidivism. (The Padilla data was obtained by subpoena and is available from the author on request.)

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§18.13 2. "Additional Instructions"

In the past, the DHM has supplemented the Clinical Evaluator Handbook with "additional instructions." It has never been determined by a court whether these "additional instructions" are sufficiently standardized or consistently applied enough to fall within the meaning of Welf & I C §6601(c). These instructions were certainly never subject, as regulations, to the Administrative Procedures Act. See *In re Ronje* (2009) 179 CA4th 509, 101 CR3d 689. Welfare and Institutions Code §6601(c) imposes specific standards on evaluators' assessments. Evaluators must consider "diagnosable mental disorders as well as various factors known to be associated with the risk of reoffense among sex offenders," including the individual's "criminal and psychosexual history, type, degree and duration of sexual deviance, and severity of mental disorder." Welf & I C §6601(c). On the basis of these criteria, evaluators are to answer a crucial question, that is, whether "'the person has a diagnosed mental disorder so that he or she is *likely* to engage in acts of sexual violence *without appropriate treatment and custody.*'" *People v Superior Court (Ghilotti)* (2002) 27 C4th 888, 910, 119 CR2d 1. In a given case, "additional instructions" might defeat the very notion of standardization that the legislature has mandated. It seems likely that after the promulgation of 9 Cal Code Regs §4005, the DMH will continue to provide the same material as it did under the former rubric of "additional instructions," but now will couch the information in terms of new research or training information.

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§18.14 3. *Ghilotti* Standard

In *People v Superior Court (Ghilotti)* (2002) 27 C4th 888, 912, 119 CR2d 1, the California Supreme Court addressed the question whether an evaluator's application of the legal standard for the likelihood to reoffend was judicially reviewable. The court found that evaluators' reports are subject to judicial review solely on the issue of whether any of those reports were "infected with material legal error." "An evaluator's report is infected with legal error if, on its face, it reflects an inaccurate understanding of the statutory criteria governing the evaluation." The legal error is material if it likely affects the outcome. In other words, if the court sends the evaluation back to the evaluator with instructions to consider the proper legal standard, would the evaluator's opinion likely change?

Ghilotti addresses how an evaluator's professional judgment is to be exercised within a specific legal framework. The court does not address what should occur when the Department of Mental Health (DMH) protocol for conducting assessments is, itself, in error. Nor does it tell a lower court how to deal with an evaluator who fails to follow protocol as mandated by Welf & I C §6601(c) when arriving at a conclusion. *Ghilotti* specifically precludes judicial review of the evaluators' professional judgments. Even with the switch from the Clinical Evaluator Handbook to 9 Cal Code Regs §4005, it appears that unvarnished clinical opinion may be violative of the new regulations.

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B. The Scope

§18.15 1. California Department of Corrections and Rehabilitation (CDCR) Screening

Welfare and Institutions Code §6601(a)-(b) requires the California Department of Corrections and Rehabilitation (CDCR) and the Board of Parole Hearings to screen individuals in custody who "may be" sexually violent predators (SVPs). The screening should be conducted according to a standardized screening protocol developed in association with the Department of Mental Health (DMH). A person shall be screened "based on" whether he or she has been convicted of a sexually violent predatory offense and on review of his or her social, criminal, and institutional history. If the CDCR determines that a person is likely to be a SVP, it refers the person to the DMH for a full assessment.

It is presently unclear whether the CDCR is screening only for the existence of an offense enumerated under Welf & I C §6600(b), and the DMH has to rescreen the CDCR referrals to determine whether individuals meet the criteria for a full assessment under the Sexually Violent Predator Act or whether some methodology is now in place for a more thorough screening. What is clear is that the DMH evaluators are now evaluating a lot of inmates who are found not to meet the criteria and that these negative evaluations are very lucrative to state evaluators.

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Source: Criminal Law/Scientific Evidence in California Criminal Cases/18 Assessing Evidence Under the Sexually Violent Predator Act/§18.16 2. Department of Mental Health (DMH) Assessment

§18.16 2. Department of Mental Health (DMH) Assessment

The Department of Mental Health (DMH) assesses individuals referred to it to determine whether they meet the definition of sexually violent predator as delineated by statute and, if so, whether, nonetheless, their dangerousness and likelihood of reoffense can be ameliorated through voluntary treatment out in the community rather than through involuntary custodial treatment. See *Cooley v Superior Court* (2002) 29 C4th 228, 127 CR2d 177; *People v Superior Court (Ghilotti)* (2002) 27 C4th 888, 929, 119 CR2d 1; Clinical Evaluator Handbook.

The Clinical Evaluator Handbook organized the elements of Welf & I C §6600(a)(1) (defining a sexually violent predator) into three major categories. The nomenclature frequently used by DMH evaluators is not contained in the statute and has been the source of some confusion to both attorneys and courts who are unfamiliar with this convention. Evaluators generally refer to Criteria A, B, and C as the following:

- Criteria A corresponds to the predicate offense;
- Criteria B corresponds to the diagnosed mental disorder; and
- Criteria C corresponds to the likelihood of reoffending.

NOTE: While the DMH inserted into its protocol a requirement that evaluators make a determination of Criteria A, arguably this is an issue for the trier of fact that does not require the assistance of an expert under Evid C §801 and, therefore, is not properly the area of expert opinion. *People v Torres* (1995) 33 CA4th 37, 45, 39 CR2d 103.

At the present time, it does not appear that the promulgation of 9 Cal Code Regs §4005 has resulted in any change to the report format that was suggested in the Clinical Evaluator Handbook. The old protocol still provides a fair guide to the structure and methodology in use by DMH with SVP evaluations.

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C. Criteria A: The Predicate Offense

§18.17 1. Sexually Violent

Criteria A refers to the predicate offense. Under the Sexually Violent Predator Act (SVPA), to qualify, a person must have been convicted of a sexually violent offense against one or more victims. Welf & I C §6600. The existence of the prior conviction(s) may be shown with documentary evidence. *People v Otto* (2001) 26 C4th 200, 206, 109 CR2d 327. See also *People v Dean* (2009) 174 CA4th 186, 192, 94 CR3d 478 (when documentary evidence properly established that defendant had sustained two qualifying convictions, no error to allow experts to testify on direct to fact of said prior convictions).

Sexually violent offenses are acts committed by force, violence, duress, menace, fear of immediate and unlawful bodily injury on the victim or another person, or threatening to retaliate in the future against the victim or any other person. There must be a conviction or a finding of not guilty by reason of insanity. A sexually violent act is further defined as a felony violation of Pen C §261, §262, §264.1, §269, §286, §288, §288a, §288.5, or §289, or any felony violation of Pen C §207, §209, or §220, committed with the intent to commit a violation of Pen C §261, §262, §264.1, §286, §288, §288a, or §289. Welf & I C §6600(b). When the victim of a sex offense is under the age of 14 the offense is automatically a sexually violent offense.

NOTE: Victim witnesses are not relevant to establish the fact of conviction, which is the operative fact for a predicate offense. Also, most offenses will qualify by definition under the SVPA. Lastly, state evaluators normally will not base their opinion concerning a disorder on statements directly from victims but rather from the documents in the case, which themselves are frequently admissible to prove the circumstances surrounding the offense. Welf & I C §6600(3).

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§18.18 2. Predatory Acts

At trial, the trier of fact is not required to find that a defendant's *qualifying convictions* involved "predatory" acts as defined by the Sexually Violent Predator Act (SVPA). *People v Torres* (2001) 25 C4th 680, 106 CR2d 824. This is true at probable cause hearings as well. The jury at trial, or the court at a probable cause hearing, needs only to find that *future* acts will be predatory in nature. *People v Hurtado* (2002) 28 C4th 1179, 124 CR2d 186. "'Predatory' means an act is directed toward a stranger, a person of casual acquaintance with whom no substantial relationship exists, or an individual with whom a relationship has been established or promoted for the primary purpose of victimization." Welf & I C §6600(e). Of course, evidence of prior predatory behavior is used as evidence of future predatory behavior.

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§18.19 3. Juvenile Offenses

Notwithstanding any other provisions of law, a qualifying offense for commitment under the Sexually Violent Predator Act (SVPA) may be a juvenile offense if the juvenile was 16 years of age or older at the time of commission. Welf & I C §6600(g). There must have been an adjudication within the meaning of Welf & I C §602 with an ensuing commitment to the California Youth Authority (now the California Department of Corrections and Rehabilitation: Division of Juvenile Justice (DJJ)). See, *e.g.*, *People v McRoberts* (2009) 178 CA4th 1249, 1254, 101 CR3d 115. It is not a defense or a bar to commitment proceedings under the SVPA that the person was not provided with sex offender treatment as a juvenile, even though, under the law, juveniles are entitled to treatment for sexually violent offenses. Welf & I C §6600(h). Given the specific criteria listed in Welf & I C §6600(g) that must be met before a juvenile adjudication qualifies as a predicate offense under the SVPA, there is certainly some question as to whether or not an out-of-state juvenile adjudication would qualify. This question does not appear to apply, however, to juveniles tried and convicted out of state as adults for sexually violent offenses. If the client has only juvenile offenses, a critical look must be taken at the risk assessment instruments used in the case. Some of these instruments, such as the STATIC-99R and STATIC-2002R may not be useful with juvenile-only offenses.

PRACTICE TIP: Since Criteria A is often a given in sexually violent predator cases, the practitioner should become intimately familiar with how Criteria B determinations are derived and prepare to address diagnoses and criteria contained in the DSM-IV-TR (see §18.23).

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D. Criteria B: Currently Diagnosed Mental Disorder

§18.20 1. Definition

In order to be subject to commitment under the Sexually Violent Predator Act (SVPA), a person must be currently suffering from a "diagnosed mental disorder." This is defined as "… a congenital or acquired condition affecting the emotional or volitional capacity that predisposes the person to the commission of criminal sexual acts in a degree constituting the person a menace to the health and safety of others." Welf & I C §6600(c). This definition is a construct of the legislature, not the psychiatric community.

Psychiatrists or psychologists, whose expert testimony is central to commitments under the SVPA, rely primarily on the Diagnostic and Statistical Manual (DSM), a compendium of mental disorders and their symptoms, first published by the American Psychiatric Association in 1952 and now in its revised fourth edition (American Psychiatric Association, Diagnostic and Statistical Manual of Mental Disorders: DSM-IV-TR (4th ed, text rev, 2000)), for the diagnosis of mental disorders. However, the editors of the DSM caution:

The purpose of DSM-IV is to provide clear descriptions of diagnostic categories in order to enable clinicians and investigators to diagnose, communicate about, study, and treat people with various mental disorders. It is to be understood that inclusion here, for clinical and research purposes, of a diagnostic category such as Pathological Gambling or Pedophilia does not imply that the condition meets legal or other nonmedical criteria for what constitutes mental disease, mental disorder, or mental disability. The clinical and scientific considerations involved in categorization of these conditions as mental disorders may not be wholly relevant to legal judgments, for example, that take into account such issues as individual responsibility, disability determination, and competency.

Thus, the psychiatric and legal communities recognize mental illness and mental disorders for different purposes, and psychiatrically diagnosed mental disorders do not wholly reflect the legal requirements of "mental disorder" as defined under the SVPA. See also *Kansas v Hendricks* (1997) 521 US 346, 359, 138 L Ed 2d 501, 513, 117 S Ct 2072.

NOTE: In 2000, the American Psychiatric Association purportedly revised the text, but not the substance, of the DSM-IV and published what is referred to as the DSM-IV-TR (text revision). However, some substantive changes were, in fact, made, particularly to the paraphilia diagnostic criteria. The DSM-V is not anticipated until at least 2012.

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§18.21 2. Constitutionality

The U.S. Supreme Court took up the issue whether the disparate definitions of "mental disorder" between psychiatric and legislative bodies created a substantive due process problem. The Court noted that the right to liberty is not absolute and can be overridden in a civil context for the public good. To that end, the Court has consistently upheld civil commitment statutes concerning people unable to control their behavior who are a danger to public health and safety. *Kansas v Hendricks* (1997) 521 US 346, 138 L Ed 2d 501, 117 S Ct 2072. The Court indicated that it has never required states "to adopt any particular nomenclature in drafting civil commitment statutes" and leaves to the states "the task of defining terms of a medical nature that have legal significance." 521 US at 359, 138 L Ed 2d at 513. The legislature may adopt the definition of mental disorder it chooses so long as it relates to a person's inability to control his or her dangerousness. See 521 US at 359, 138 L Ed 2d at 513. The California definition (see §18.20) requires a causal relationship between both the mental disorder and sexually violent behavior (dangerousness) and the mental disorder and volitional control (inability to control behavior). See *Cooley v Superior Court* (2002) 29 C4th 228, 248, 127 CR2d 177.

PRACTICE TIP: Because of the required causal connection between the mental disorder and lack of volitional control to commit sexually violent acts, it is not enough that a person falls within the definition of a mental disorder as defined by the DSM-IV-TR to qualify for commitment under the Sexually Violent Predator Act (SVPA). The mental disorder must prevent the person from currently being able to control him or herself and drive him or her to commit sexually violent, predatory acts. This is important because the evidence of lack of control frequently comes from the respondent's failure to control his behavior in the distant past, regardless of whether or not he ever tried to.

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§18.22 3. Common Diagnoses

Generally speaking, there are two major populations subject to the Sexually Violent Predator Act (SVPA): rapists and child molesters. Although there are individuals who commit sexually violent crimes against both adults and children as well as those who offend sexually in a variety of other ways, the majority of offenders subject to SVPA proceedings appear to be typed within one of these two broad classifications. Child molesters are frequently further broken down into those who offend against male children, those who offend against female children, and those who offend against both. These distinctions reflect diagnostic categories used by evaluators when making an initial determination whether Criteria B is met. Although the DSM-IV-TR cautions that its diagnostic criteria are not meant to meet the legal criteria for a mental disorder, such diagnoses are the starting point for analyzing whether the legal criteria is met. Also, because a great deal of the literature on sexual recidivism refers to these categories, the reports of the state evaluators will reflect these distinctions.

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§18.23 a. The Diagnostic and Statistical Manual (DSM-IV-TR)

The DSM-IV-TR is a diagnostic tool containing nearly 400 disorders organized into five major areas or axes:

- Axis I: Clinical Disorders;
- Axis II: Personality Disorders and Mental Retardation;
- Axis III: General Medical Conditions;
- Axis IV: Psychosocial and Environmental Problems (stressors); and
- Axis V: Global Assessment of Functioning.

Although any or all of these categories can be important in a given case, the first three are the most frequently discussed by sexually violent predator evaluators. The first category is principally applicable to Criteria B, the diagnosable mental disorder, while the second and third are most applicable to Criteria C and the likelihood of reoffense. See §§18.38-18.54.

NOTE: The first DSM, published in 1952, contained merely 66 disorders. The "multiaxial" diagnostic feature was introduced in the third edition (DSM-III), published in 1979.

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§18.24 b. Axis I Diagnoses

With regard to Axis I Clinical Disorders, the subcategory of "paraphilias" (sexual deviancies) is the most relevant to Sexually Violent Predator Act (SVPA) cases. The most commonly diagnosed of these for SVPA commitment purposes are pedophilia, a sexual orientation toward children, and the catchall, "Paraphilia Not Otherwise Specified (NOS)," frequently attributed to rapists.

Although an evaluator may occasionally assert that a particular DSM-IV-TR diagnosis, in itself, implies a lack of behavioral control such that Criteria B is met, this assertion is contradicted by the DSM-IV-TR. The introduction to the manual emphasizes (American Psychiatric Association, Diagnostic and Statistical Manual of Mental Disorders: DSM-IV-TR (4th ed, text rev, 2000))

the fact that an individual's presentation meets the criteria for a DSM-IV diagnosis does not carry any necessary implication regarding the individual's degree of control over the behaviors that may be associated with the disorder. Even when diminished control over one's behavior is a feature of the disorder, having the diagnosis in itself does not demonstrate that a particular individual is (or was) unable to control his or her behavior at a particular time.

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§18.25 c. Axis II Diagnoses

There is controversy in the mental health research community as to whether Axis II personality disorders constitute a sufficient basis for commitment under the Sexually Violent Predator Act (SVPA) or whether there must be a diagnosed sexual psychopathology as indicated by an Axis I diagnosis. *Foucha v Louisiana* (1992) 504 US 71, 75, 118 L Ed 2d 437, 445, 112 S Ct 1780, suggests, without actually stating, that an antisocial personality disorder may not be sufficient to support a civil commitment. This difference of opinion is reflected within the ranks of state evaluators. See, *e.g.,* Sreenivasan, Weinberger & Garrick, *Expert Testimony in Sexually Violent Predator Commitments*: *Conceptualizing Legal Standards of "Mental Disorder" and "Likely to Reoffend,"* 31 J Am Acad Psychiatry & L 471-485 (Dec. 2003) (in favor of using Axis II diagnosis for civil commitments), and Vognsen & Phenix, *Antisocial Personality Disorder Is Not Enough*: *A Reply to Sreenivasan, Weinberger, and Garrick*, 32 J Am Acad Psychiatry & L 440-442 (Dec. 2004) (against). From the standpoint of *Foucha*, "dangerousness" alone is not constitutionally sufficient for preventative detention.

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§18.26 d. Axis III Diagnoses

Axis III diagnoses concern general medical conditions. Even though a general medical condition is unlikely to cause a person to commit sexually violent offenses, such conditions may well affect an individual's ability or desire to engage in such activities.

PRACTICE TIP: Such diagnoses, to the extent they could limit future behavior, may present a defense against commitment under the Sexually Violent Predator Act (SVPA).

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§18.27 4. Paraphilias

Dangerousness alone is not sufficient to support a civil commitment under the Sexually Violent Predator Act (SVPA). A person subject to commitment under the SVPA must suffer from a mental disorder sufficient to distinguish him or her from the "dangerous but typical recidivist convicted in an ordinary criminal case." *Kansas v Hendricks* (1997) 521 US 346, 138 L Ed 2d 501, 117 S Ct 2072, reiterated in *Kansas v Crane* (2002) 534 US 407, 413, 151 L Ed 2d 856, 863, 122 S Ct 867. For the exact quote from the *Crane* court, see §18.1. The mental disorder must prevent a person from being able to control him- or herself and cause him or her to commit sexually violent, predatory acts. For further discussion, see §18.20.

Although there appears to be some disagreement among evaluators, the majority view seems to be that a person must suffer from some form of deviant psychopathology, or paraphilia, in order to have a qualifying diagnosis under the SVPA. The position of state evaluators is that paraphilias are chronic and life long. Note that the course of paraphilias, as stated in the DSM IV-TR is:

Certain of the fantasies and behaviors associated with Paraphilias may begin in childhood or early adolescence but become better defined and elaborated during adolescence and early adulthood. Elaboration and revision of paraphilic fantasies may continue over the lifetime of the individual. By definition, the fantasies and urges associated with these disorders are recurrent. Many individuals report that the fantasies are always present but that there are periods of time when the frequency of the fantasies and intensity of the urges vary substantially. The disorders tend to be chronic and lifelong, but both the fantasies and the behaviors often diminish with advancing age in adults. The behaviors may increase in response to psychosocial stressors, in relation to other mental disorders, or with increased opportunity to engage in the Paraphilia.

PRACTICE TIP: In cases where there is a disagreement among experts regarding a qualifying mental disorder, courts have been known to give instructions, tendered from both the prosecution and the defense, that reflect the *Crane* language. However, there is no right to a unanimity instruction. *People v Carlin* (2007) 150 CA4th 322, 58 CR3d 495.

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§18.28 a. Diagnostic Criteria

The "paraphilias," a subset of Axis I Clinical Disorders contained in the DSM-IV-TR (Diagnostic and Statistical Manual of Mental Disorders: DSM-IV-TR (4th ed, text rev, 2000) from the American Psychiatric Association), are the focus of Sexually Violent Predator Act (SVPA) evaluations. The general criteria essential to a paraphilia diagnosis are (1) "recurrent, intense sexually arousing fantasies, sexual urges, or behaviors" involving (a) a nonhuman object; (b) a nonconsenting person, such as a child; or (c) the suffering or humiliation of oneself or one's partner, that occurs over a period of at least 6 months; and (2) "the fantasies, urges or behaviors [that] cause clinically significant distress or impairment in social, occupational or other important areas of functioning." For more information about specific paraphilias and their diagnoses, see the DSM-IV-TR. For those paraphilias frequently associated with SVPA cases (*e.g.,* pedophilia and sexual sadism), acting on the behavior is sufficient for a diagnosis, but the individual need not be distressed by the behavior.

PRACTICE TIP: This cautionary language contained in the introduction to the DSM IV-TR seems to be largely ignored by most state evaluators doing SVP evaluations:

"Whatever its original cause, it must currently be considered a manifestation of a behavioral, psychological, or biological dysfunction in the individual. Neither deviant behavior (*e.g.*, political, religious, or sexual) nor conflicts that are primarily between the individual and society are mental disorders unless the deviance or conflict is a symptom of a dysfunction in the individual."

NOTE: Although there is a statement in the DSM-IV-TR cautioning against using its contents like a cookbook, it is inevitable that during testimony explaining or attacking a diagnosis contained within the DSM-IV-TR the jury will hear the "recipe" or the listed criteria for the specific diagnosis. It is important for attorneys to be prepared to address symptoms and behaviors "outside the box" (*e.g.,* that do not fit specified diagnostic criteria). It is likewise important that the attorney be prepared to address issues underlying the various diagnoses and to remember that a DSM-IV-TR paraphilic diagnosis alone does not meet the criteria for the mental disorder necessary for commitment as a sexually violent predator.

PRACTICE TIP: A good source of information about the identification and development of the diagnoses contained in the DSM-IV-TR, the controversies surrounding those diagnoses, and the empirical evidence and associated rationales for the decisions made with regard to those diagnoses is the DSM-IV Sourcebook, published by the American Psychiatric Association, which is currently a four-volume set of papers authored by the participants in the processes leading to the publication of DSM-IV.

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b. Concerns Regarding the Diagnosis

§18.29 (1) DSM Paraphilia Diagnosis Does Not Meet Legal Criteria for Commitment Under SVPA

An individual may be diagnosed by the Diagnostic and Statistical Manual (DSM) with a paraphilia without having acted on the behavior. The introduction to the DSM-IV-TR (Diagnostic and Statistical Manual of Mental Disorders: DSM-IV-TR (4th ed, text rev, 2000)) specifically states that a diagnosis of any one of the disorders listed therein, including those "where diminished control is a feature of the disorder" (for direct quote, see §18.24), does not implicate an individual's inability to control behavior. Because there is no causal link between the diagnosis and the inability to control behavior, a paraphilia diagnosis alone does not meet the specific legal criteria for the "mental disorder" necessary for commitment under the Sexually Violent Predator Act (SVPA).

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§18.30 (2) Validity and Reliability of a Paraphilia Diagnosis as a Predisposition Toward Sexual Violence Has Been Questioned

When speaking in the scientific community of the reliability and validity of a test, procedure, or classification, "reliability" refers to the consistency of results, or whether a test, procedure, or classification can be repeated among different evaluators with the same results; and "validity" refers to the accuracy of results, or whether the test, procedure, or classification is measuring what is intended. Frequently, these concepts are discussed in peer review journals that describe the history, development, and acceptance of various scientific tests, procedures, and classifications.

Serious questions have been raised concerning the reliability and validity of the Diagnostic and Statistical Manual (DSM) paraphilia diagnoses used to determine whether a sex offender has a mental illness that meets the criteria for civil commitment. See Levenson, *Reliability of Sexually Violent Predator Civil Commitment Criteria in Florida,* 28(4) Law & Hum Behav 357-368 (Aug. 2004).

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§18.31 (3) Experts Do Not Agree That Paraphilias Are Mental Disorders

Although the paraphilias are currently presented as Axis I disorders in the Diagnostic and Statistical Manual (DSM), there is argument among professionals whether they more accurately belong in Axis II or should be eliminated from the DSM altogether. See Moser & Kleinplatz, *DSM-IV-TR and the Paraphilias: An Argument for Removal,* 17(3/4) J Psychol & Hum Sexuality 91-109 (2005); O'Donohue, Regev & Hagstrom, *Problems With the DSM-IV Diagnosis of Pedophilia,* 12(2) Sex Abuse: J Research & Treatment 95-105 (Apr. 2000).

Justice Thomas, writing for the (5-4) majority of the Supreme Court in *Kansas v Hendricks* (1997) 521 US 346, 360, 138 L Ed 2d 501, 514, 117 S Ct 2072, acknowledges the controversy over paraphilias as mental illnesses and refers to opposing amicus briefs submitted by the American Psychiatric Association and the Menninger Foundation.

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§18.32 (4) Paraphilias Reflect Societal Norms as Much as Mental Health Conditions

It is important for the practitioner to remember that paraphilias are not set in stone and often reflect societal attitudes as much as mental health conditions. For example, homosexuality was previously listed as a paraphilia in the Diagnostic and Statistical Manual (DSM) and was removed in 1973. The notion that certain diagnosed disorders are subject to change, and even deletion from the DSM, is emphasized in the introduction to the DSM-IV-TR. The editors assert that the use of the DSM-IV-TR in forensic settings should be informed by an awareness of the risks and limitations of such use. American Psychiatric Association, Diagnostic and Statistical Manual of Mental Disorders: DSM-IV-TR (4th ed, text rev, 2000).

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§18.33 c. Sexual Sadism

Sexual sadism is perhaps one of the most clear-cut paraphilias in the DSM-IV-TR. American Psychiatric Association, Diagnostic and Statistical Manual of Mental Disorders: DSM-IV-TR (4th ed, text rev, 2000). Like other paraphilias, sexual sadism consists of intense urges, fantasies, or behaviors occurring over a period of at least 6 months. The key feature of this disorder is that the gratification must come from the pain or suffering of an unwilling partner. The problem in classifying sexual sadism is that rape is a vicious, brutal crime, and it is frequently difficult to discern whether the victim's pain and humiliation was the objective of the assault or incidental to it.

When a sexual crime is driven by sexual sadism, the record will frequently disclose facts that suggest brutality, torture, or mutilation significantly beyond that necessary to obtain gratification by intercourse or oral copulation. Sexual sadists are rare in Sexually Violent Predator Act (SVPA) cases possibly because their underlying crimes are frequently so brutal that they have resulted in convictions for which there will be no parole. It is not uncommon to have state evaluators talk about "sadistic features" of crimes even though the respondent has never been diagnosed with sexual sadism.

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§18.34 d. Paraphilia Not Otherwise Specified (NOS)

Paraphilia Not Otherwise Specified, or NOS, is the catch-all category, or diagnosis, for individuals whose sexual proclivities do not meet the criteria of the other enumerated categories. The DSM-IV-TR offers a nonexclusive list of examples of paraphilias not otherwise specified that includes telephone scatologia (obscene phone calls), necrophilia (corpses), partialism (exclusive focus on part of body), zoophilia (animals), coprophilia (feces), klismaphilia (enemas), and urophilia (urine). American Psychiatric Association, Diagnostic and Statistical Manual of Mental Disorders: DSM-IV-TR (4th ed, text rev, 2000).

NOTE: One of the purposes of the DSM is to assign codes to sets of symptoms collected together and categorized into recognized disorders so that mental health practitioners can bill insurance companies for treatment provided. A diagnosis of Paraphilia NOS permits a practitioner to seek reimbursement for treatment provided to an individual whose set of symptoms do not meet the criteria of existing categories (or, in other words, to provide and be reimbursed for treatment to individuals who might not otherwise qualify for services paid by their insurance plans).

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§18.35 (1) How Paraphilia NOS Is Used by Evaluators and DMH

Paraphilia Not Otherwise Specified (NOS) is the frequently derived diagnosis of Diagnostic and Statistical Manual (DSM) evaluators after assessing individuals convicted of rape or other nonconsensual sex offenses. The use of this diagnosis for this type of behavior is extremely controversial and objectionable to members of the psychiatric community. See Zonana et al., *Dangerous Sex Offenders: A Task Force Report of the American Psychiatric Association* (1999).

Opponents of the diagnosis point out that Dr. Gene Able, one of the authors of the American Psychiatric Association's Task Force Report mentioned above, previously proposed to the DSM-III-R committee the inclusion into the manual of a diagnosis called Paraphilic Coercive Disorder, to take into account behaviors associated with rape. However, this diagnosis was rejected as an unrecognized disorder. Although some clinicians consider rape to be a paraphilia, most do not. For most rapists, rape is neither a preferred sexual activity nor a consistent fantasy preoccupation—the hallmarks of a diagnosis of paraphilia. *Sadock, Sadock & Ruiz Comprehensive Textbook of Psychiatry,* (9th ed 2009).

Proponents of Paraphilia NOS as an appropriate diagnosis for rapists and individuals committing other nonconsensual sexual offenses will sometimes point to discussion in the DSM-IV Case Book.

Michael First, M.D., the text editor of the DSM-IV-TR, indicates that the manner in which sexually violent predator evaluators get to a diagnosis of Paraphilia NOS for rape behaviors is contrary to the intent of the DSM-IV-TR authors and suggests that if there is such a thing as paraphilic rape, there would need to be evidence of specific arousal to non-consent as opposed to arousal despite non-consent. First and Halon, *Use of DSM Paraphilia Diagnoses in Sexually Violent Predator Commitment Cases*, 36 J Am Acad Psychiatry Law 443 (December 2008).

Other noted authors and researchers in the area have indicated in their papers that paraphilic rape or Coercive Paraphilic Disorder, as it is sometimes referred to, is not a supportable diagnosis. Knight, *Is a Diagnostic Category for Paraphilic Coercive Disorder Defensible?* Arch Sex Behav, (November 2009); Laws and O'Donohue, Sexual Deviance: *Theory, Assessment, and Treatment* chap 1 (2nd ed 2008); Quinsey, *Coercive Paraphilic Disorder*, Arch Sex Behav (October, 2009). Even proponents of such a diagnosis agree that the diagnosis still needs to be formulated. Thornton, *Evidence Regarding the Need for a Diagnostic Category for a Coercive Paraphilia*, Arch Sex Behav (November 2009). The *Case Book* example that is frequently used as an example of Paraphilia NOS non-consent, is actually an example of Paraphilic Coercive Disorder with many more facets to the diagnosis than that of mere rape behaviors over time for which the person was caught and punished.

NOTE: The key point to remember is that rape is a legal term and not one employed by the mental health community. No amount of criminal behavior can make a mental disorder. The fact that a person engages in criminal behavior does not establish the criteria for a diagnosis of a mental disorder.

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§18.36 (2) Other Behaviors and Paraphilia NOS

Occasionally, in cases brought under the Sexually Violent Predator Act (SVPA), the diagnostic criteria for pedophilia are not met. There are cases where one of the predicate offenses is against a child and the second is against an adult. While the statute does not require the evaluator to say anything more than that the respondent suffers from some undefined mental disorder, which causes him to engage in illegal sexual violence, the value of opinion evidence rests not in the conclusion reached but in the factors considered and the reasoning employed. When an expert bases his or her conclusion on assumptions that are not supported by the record, on matters which are not reasonably relied on by other experts, or on factors that are speculative, remote, or conjectural, then his or her conclusion has no evidentiary value. *In re Lockheed Litig. Cases* (2004) 115 CA4th 558, 563, 10 CR3d 34. For further discussion of the *Lockheed* cases, see chap 3. The attorney must keep in mind that there will be an instruction at the end of the trial that tells the jury to base their evaluation of the expert's opinion on the facts and reasons relied on by the expert. The respondent is not entitled to a unanimity instruction with respect to a diagnosis. *People v Carlin* (2007) 150 CA4th 322, 58 CR3d 495.

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§18.37 e. Other Disorders

Although the diagnosis that will most frequently support a petition for commitment under the Sexually Violent Predator Act (SVPA) is a paraphilia, there are other diagnoses that may come into play. Various psychotic and mood disorders may have manifested sexually in the past, or may even be presently manifesting. The Department of Mental Health, Clinical Evaluator Handbook and Standard Assessment Protocol (2007) makes it clear that, when referencing such disorders, the evaluator should point out the nexus between such a disorder and the statutory diagnosed mental disorder.

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E. Criteria C: Likelihood of Reoffense

§18.38 1. Legal Standard

People v Superior Court (Ghilotti) (2002) 27 C4th 888, 119 CR2d 1, and *Kansas v Crane* (2002) 534 US 407, 151 L Ed 2d 856, 122 S Ct 867, offer what guidance there is with respect to a legal standard for the likelihood of reoffense. See §§18.2, 18.13-18.14. Though the likelihood of reoffense does not have to be greater than 50 percent, there must be a "serious and well founded risk," not just a "mere possibility."

The California Supreme Court in *People v Williams* (2003) 31 C4th 757, 3 CR3d 684, has held that lower courts are not constitutionally compelled to give additional jury instructions or require special findings concerning a respondent's inability to control behavior since that requirement is clearly articulated in the language of the Sexually Violent Predator Act (SVPA).

But aside from the constitutional considerations, a defendant has a right to an instruction that pinpoints the theory of the defense, if the instructions are supported by substantial evidence. *People v Roldan* (2005) 35 C4th 646, 715, 27 CR3d 360, disapproved on other grounds by *People v Doolin* (2009) 45 C4th 390, 421 n22, 87 CR3d 209. When the instruction is an accurate statement of the law and not merely argument or duplicative, the instruction should be given as a matter of right. *People v Panah* (2005) 35 C4th 395, 486, 25 CR3d 672. Couzens and Bigelow indicate that the court should instruct that "likely to reoffend" means much more than a mere possibility of reoffense. See Couzens and Bigelow, California Benchbook: The Adjudication of Sex Crimes, §15.68 (2006).

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2. Determining Likelihood to Reoffend

§18.39 a. Initial Risk Assessment

Department of Mental Health (DMH) evaluators can reach their conclusions regarding a respondent's likelihood to reoffend through document review, psychological testing, and risk assessment.

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§18.40 b. Document Review

Every Department of Mental Health (DMH) evaluation report should begin with a list of documents that were reviewed by the evaluator during the assessment. When an evaluator is assigned a case, whether for an initial assessment or a recommitment assessment, the DMH provides the evaluator with a packet of information concerning the person to be evaluated. This packet includes documents such as police reports, probation reports, parole revocations, abstracts of judgments, psychological evaluations done for the courts, California Department of Corrections and Rehabilitation (CDCR) rules violations, or any other material that the DMH thinks is relevant to the evaluation. If the person is being housed at a state hospital, whether for a sexually violent predator (SVP) commitment or otherwise, the DMH evaluators are given access to those files. If someone is being evaluated as an SVP for the first time and the person is housed in the CDCR, then the evaluators are provided with access to the inmate's central file, or C-File as it is called in the vernacular.

PRACTICE TIP: It is helpful early in the case to determine which documents were relied upon by the evaluator in reaching his or her conclusion and which documents were merely referred to or looked at and did not support the evaluator's conclusion one way or the other.

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§18.41 (1) Additional Materials

During the course of an evaluation or an updated evaluation done pursuant to Welf & I C §6603(c), the prosecutor may provide additional documents to the evaluator. These could consist of almost anything, including transcripts of the proceedings in the underlying case, transcripts of prior sexually violent predator adjudications, police reports regarding prior uncharged conduct, reports from treatment providers, school records, or anything else that may bear upon the respondent's criminal or psychosexual history.

The respondent's attorney, when aware of an evaluation taking place, may also submit documents to the evaluator. There may be documents favorable to the person being evaluated that do not appear on the list of documents reviewed by the evaluator. These documents could contain new or contrary information to that reviewed by the evaluator. Documents that can prove useful include military records; records of out-of-state convictions or incarcerations, including records of treatment voluntarily sought or obtained; prior evaluations done pursuant to the Sexually Violent Predator Act (SVPA) where the respondent, now in custody on a parole violation, was previously not found to fit the criteria; or court transcripts of sworn testimony contradicting statements contained in the police or probation reports provided to the evaluator.

Despite the assertion to the contrary by some prosecutors, there is no authority that says the respondent's attorney should not or cannot provide documents and research to the state evaluators.

PRACTICE TIP: Counsel can and should request a copy of the respondent's central file (or C-File) from the California Department of Corrections and Rehabilitation (CDCR). Often, records pertaining to the respondent's mental health, treatment or amenability to treatment, and other useful information are contained in a separate medical file (or M-File), which counsel can obtain with a signed release from the client or a subpoena duces tecum (though, the CDCR may take so long to respond to the subpoena that counsel does not obtain the records in time for trial or other court hearings). The CDCR uses a specific release for records that counsel can obtain by request. It may be helpful to obtain a court order for all of a client's institutional records at the outset of the case.

Under the old protocol the DMH required evaluators to consider all contrary or different material that is submitted after the preparation of the initial report and to change the conclusion if the material warrants it. There is no reason DMH evaluators should not continue to do this under 9 Cal Code Regs §4005 since the evaluators now have a great deal more discretion in determining how to evaluate a case.

NOTE: A person being evaluated for an initial commitment from state prison has no right to appointed counsel prior to the filing of the initial petition. *People v Carmony* (2002) 99 CA4th 317, 120 CR2d 896.

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§18.42 (2) Impeachment Materials

While evaluators are able to rely on multiple levels of hearsay when forming their opinions and the prosecution is entitled to rely on documentary evidence (including the reports of evaluators) in establishing the facts and circumstances of the qualifying offenses (including their predatory nature under Welf & I C §6600(a)(3); see *People v Otto* (2001) 26 C4th 200, 109 CR2d 327), evidence of contrary fact is admissible in order to impeach expert opinions based on facts that are not true. Evid C §780(i). "The rationale for permitting impeachment by contradiction is that by showing the falsity of a fact asserted by the expert, his entire testimony is brought into question." *Kennemur v State of Cal.* (1982) 133 CA3d 907, 923, 184 CR 393.

Even if the expert has not been given the contrary documents or the material inconsistent with the assumed or asserted facts, the contents of the documents may be admissible on the theory that they contradict the assumed facts. Whether to surprise the expert or provide the material in advance in an attempt to alter the expert's opinion is a question of tactics in a given case. If the expert is relying on hearsay statements in documents, then in reaching a conclusion, evidence impeaching the hearsay declarant may be admissible. Evid C §1202.

NOTE: Counsel must take care to distinguish impeachment with false facts from simply rebuttal of the inferences drawn from the facts. See *Kennemur v State of Cal., supra*. Facts underlying the inferences drawn by the expert may be contradicted if they are false. However, cases brought under the Sexually Violent Predator Act (SVPA) tend to become "battles of the experts" where the underlying facts are not so much at issue as the inferences drawn from them.

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§18.43 (3) Propensity Evidence

Sexually violent predator cases are "'special proceedings of a civil nature,'" not civil or criminal actions. *People v Yartz* (2005) 37 C4th 529, 36 CR3d 328. As a result, criminal law motions cannot be presumed to apply to Sexually Violent Predator Act (SVPA) proceedings. *Bagration v Superior Court* (2003) 110 CA4th 1677, 1689, 3 CR3d 292. A subtle, but sometimes important, point is that prior sexual misconduct, particularly uncharged acts, may be objectionable and inadmissible in SVPA proceedings. The issues in SVPA commitments are generally limited to whether the person has a qualifying diagnosis and whether, as the result of that diagnosis, the person will reoffend by committing a qualifying sex offense. *People v Superior Court (Cheek)* (2001) 94 CA4th 980, 996, 114 CR2d 760 (limiting discovery to these issues). Evidence Code §352 applies to SVPA cases, and prior bad acts (charged or uncharged) can be excluded when unduly time consuming, confusing, or misleading, or more prejudicial than probative of the issues in the case. The probable cause hearing is the best place to try to prove that the uncharged acts do not go to either the diagnosis offered by the evaluator or to the risk assessment process. Counsel may also request an Evid C §402 hearing on the relevance of the uncharged act to the opinion.

NOTE: While evidence of prior sexual acts may not be admissible for proof of character and a propensity to commit crimes, it can be admissible as the basis for the expert's diagnosis and opinion that the person evaluated suffers from a qualifying mental disorder. Counsel may wish to ask the court to remind the jury continuously for what purpose the evidence is being let in, *e.g.,* as the basis for the expert's opinion (which the jury can choose to accept or reject) and not as proof of propensity or likelihood of reoffending.

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§18.44 (4) Hearsay Evidence

Although experts can rely on all manner of hearsay (as state evaluators frequently do), not all such hearsay is admissible, even to support the opinion. Even if the hearsay material is arguably relevant, it is still subject to an in limine motion pursuant to Evid C §352, as being unduly prejudicial in light of its very limited probative value. The question to ask is whether the information sought to be admitted as something relied on by the evaluator goes to an issue in the case or just to the general "badness" of the respondent. Experts are permitted to give opinions only related to their area of expertise (if related to a subject beyond the common experience) and to discuss hearsay only if directly related to those opinions. Evid C §801.

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c. Psychological Testing

§18.45 (1) Cannot Diagnose Paraphilia

The decision whether to conduct psychological tests is left to the discretion of the evaluator. It is fairly well understood, however, that no psychological test will diagnose a paraphilia. What is more commonly found is that psychological testing will either support or fail to support an inference that an individual has a personality disorder or personality trait consistent with a paraphilic diagnosis, or which increases his or her likelihood to reoffend. However, there is serious contention, even among Department of Mental Health (DMH) evaluators in California, whether a personality disorder is sufficient to support a diagnosed mental disorder within the meaning of the Sexually Violent Predator Act (SVPA). See §18.25.

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§18.46 (2) Does Not Predict Recidivism

Psychological tests, particularly personality tests, may be employed in some cases to support the notion that a person presents a high enough risk of reoffending to warrant commitment under the Sexually Violent Predator Act (SVPA). It has been recognized, however, that psychological testing does not predict recidivism. Megargee, *The Prediction of Violence with Psychological Tests,* in Spielberger, ed., Current Topics in Clinical and Community Psychology, vol 2, p 98 (1970). R. Karl Hanson, Ph.D., and Monique Bussiere, leaders in the field of sex offense/reoffense prediction, found in their groundbreaking meta-analysis of reoffense (considered to be authoritative by the Department of Mental Health (DMH) on the subject of risk factors) that there was very low correlation between any scales on the Minnesota Multiphasic Personality Inventory (MMPI, MMPI-2), a personality test widely used by the mental health profession to assist with identifying personality structure and psychopathology in clients, and sexual recidivism. See Hanson & Bussiere, *Predictors of Sexual Offender Recidivism: A Meta-Analysis,* Department of the Solicitor General of Canada (1996). The Association for the Treatment of Sexual Abusers (ATSA), the largest professional group in the country concerned with civil commitments such as those under the SVPA, recommends that "[n]o psychological test (*e.g.,* Rorschach Inkblot Test, MMPI, MSI) should be employed specifically for this type of risk assessment unless scientific evidence of its validity relative to this type of risk assessment has been established."

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3. Antisocial Personality Disorder (ASPD)

§18.47 a. Personality Disorders Associated With Recidivism

The personality disorders most often associated with theories of recidivism are antisocial personality disorder and psychopathy. A diagnosis of this type is used primarily as a predictor of risk, not as a qualifying diagnosis under the SVPA. See §18.25.

Antisocial personality disorder (ASPD) is a diagnosis included in the DSM (American Psychiatric Association, Diagnostic and Statistical Manual of Mental Disorders: DSM-IV-TR (4th ed, text rev, 2000)). The specific criteria for ASPD are the following:

1. There is a pervasive pattern of disregard for and violation of the rights of others occurring since age 15 years, as indicated by three (or more) of the following:

- Failure to conform to social norms with respect to lawful behaviors, as indicated by repeatedly performing acts that are grounds for arrest;
- Deceitfulness, as indicated by repeated lying, use of aliases, or conning others for personal profit or pleasure;
- Impulsivity or failure to plan ahead;
- Irritability and aggressiveness, as indicated by repeated physical fights or assaults;
- Reckless disregard for safety of self or others;
- Consistent irresponsibility, as indicated by repeated failure to sustain consistent work behavior or honor financial obligations; or
- Lack of remorse, as indicated by being indifferent to or rationalizing having hurt, mistreated, or stolen from another;

2. The individual is at least age 18 years;

3. There is evidence of conduct disorder, with onset before age 15 years; and

4. The occurrence of antisocial behavior is not exclusively during the course of schizophrenia or a manic episode.

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§18.48 b. Prevalence of ASPD

While estimates vary anywhere between 50-80 percent, almost all forensic mental health practitioners agree that there is a high prevalence of antisocial personality disorder (ASPD) among the prison population. Experience indicates that these high rates of occurrence may not be reflected among those who have been convicted of child molestation. Rapists, however, generally tend to be on the antisocial side. To diagnose a person with ASPD, there must be evidence that each of the criteria listed within the DSM-IV-TR is met (American Psychiatric Association, Diagnostic and Statistical Manual of Mental Disorders: DSM-IV-TR (4th ed, text rev, 2000)). In many cases, a diagnosis of ASPD may be subject to attack when there is no clear evidence of a conduct disorder since age 15 (see the ASPD criteria listed in §18.47). The mere fact that the respondent may have reported that he or she had problems with his or her family or got into trouble with the law or school authorities is insufficient. There must be evidence that there was a repetitive and persistent pattern of behavior that was outside of social norms with a disregard for the rights of others.

Use of ASPD as a risk factor is problematic in that the correlation between it and sexual reoffense is fairly low with a Pearson's r of.14. Hanson & Bussiere, *Predicting Relapse: A Meta-Analysis of Sexual Offender Recidivism Studies,* 66(2) J Consulting & Clinical Psychol 348 (Apr. 1998). The low correlation of ASPD with reoffense coupled with its high rate of occurrence in prison populations creates a tendency to over predict reoffense. In addition, a strong intercorrelation is expected between ASPD and prior offenses which are heavily weighted in the various risk assessment instruments. Using ASPD as a risk factor in addition to prior offenses, in effect, amounts to double counting.

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§18.49 4. Personality Disorder—Not Otherwise Specified (NOS)

Even if the evaluator does not diagnose the respondent with antisocial personality disorder (ASPD), he or she may diagnose the respondent with some other personality disorder or Personality Disorder NOS (not otherwise specified) with antisocial traits. Although personality disorders are generally characterized by state evaluators as "chronic and life long," the DSM-IV-TR indicates that personality disorders such as *antisocial* and *borderline* tend to remit with age, particularly by the fourth decade of life. Since the average age of patients committed under the Sexually Violent Predator Act (SVPA) is over 50, this may be significant. American Psychiatric Association, Diagnostic and Statistical Manual of Mental Disorders: DSM-IV-TR (4th ed, text rev, 2000).

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§18.50 5. Psychopathy

Psychopathy is condition that has been recognized for centuries but the term is one that has been widely and loosely applied. In the 1980s, Robert D. Hare, Ph.D. (recognized as the leading expert on psychopathy) developed a diagnostic tool referred to as the Hare Psychopathy Checklist (PCL). The PCL is now in its second edition, called the Psychopathy Checklist—Revised (PCL-R). A detailed examination of the PCL-R is beyond the scope of this chapter, but a basic understanding of what it is and what the implications of its scoring may be are essential.

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§18.51 a. Not the Same as ASPD

According to Robert D. Hare, Ph.D., the distinction between psychopathy and antisocial personality disorder (ASPD) is often blurred "not only in the minds of many clinicians but in the latest edition of DSM-IV." Hare, *Psychopathy and Antisocial Personality Disorder*: *A Case of Diagnostic Confusion*, 13(2) Psychiatric Times (Feb. 1996). Most individuals who meet the criteria for psychopathy also meet the criteria for ASPD, "*but most individuals with ASPD are not psychopaths*." Hare, *supra.* (Original emphasis.)

PRACTICE TIP: The term psychopath, with its severely negative connotations, is likely something that a respondent's attorney does not want paraded in front of a jury. Therefore, effective cross-examination at the probable cause hearing (see *In re Parker* (1998) 60 CA4th 1453, 71 CR2d 167) may establish the foundation for an in limine motion at trial to limit or curtail such testimony. In any event, a thorough examination at the probable cause stage is incumbent in every case, as having the ability to cross-examine the petitioner's experts at the probable cause hearing may preclude the necessity for further discovery of those witnesses' opinions by deposition. *People v Superior Court (Cheek)* (2001) 94 CA4th 980, 994, 114 CR2d 760.

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§18.52 b. Psychopathy Has Not Been Defined in Gradients

Historically, researchers considered psychopathy to be a property that a person has or does not have. The Psychopathy Checklist—Revised (PCL-R) is not a measure of the degree to which someone has psychopathy, but rather a measure of the likelihood that someone has it. Harris, Rice & Quinsey, *Psychopathy as a Taxon: Evidence That Psychopaths Are a Discrete Class,* 62(2) J Consulting & Clinical Psychol 387 (Apr. 1994). An evaluator or attorney who argues that someone is more or less psychopathic, depending on PCL-R scores or other measures of psychopathy, is now finding some measure of support for that position. Edens, *et al.*, *Psychopathic, Not Psychopath: Taxometric Evidence for the Dimensional Structure of Psychopathy*, 115(1) J of Abnormal Psychology, 131 (2006). The uncertainty lies in exactly what this means since, to date, the research has tended to treat psychopathy as a dichotomous variable having a specific cut score. The application of this research to a person below the cut score is improper. American Psychological Association et al., *Standards for Educational and Psychological Testing* (1999).

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§18.53 c. PCL-R Scoring

In order to score the Psychopathy Checklist—Revised (PCL-R), special training is required. The certification process to become a PCL-R evaluator is designed to achieve an inter-rater reliability of +/- 3. For full certification, one must take a workshop given by an authorized trainer and then view a series of video interviews and score within three points of the trainer. If two evaluators of the same subject arrive at scores that deviate by more than three points, the variance may indicate either scoring errors or significant changes in the respondent over time.

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§18.54 d. Age and the PCL-R

Both the original PCL and the Psychopathy Checklist—Revised (PCL-R) Second Edition technical manuals discuss the issue of aging as it's effect on psychopathy. The manuals are restricted for distribution by the publisher, Multi-Health Systems, Inc. An attorney who is not also a psychologist has to obtain access to the manuals through his or her own expert or by means of a subpoena. In the original PCL manual, Robert D. Hare, Ph.D., states, "by the age of 40-45 years[,] psychopathic criminals are at no greater risk for conviction than are other criminals." Dr. Hare found that with male offenders and forensic psychiatric samples pooled, "the mean decrease in PCL-R scores from before to after age 40 was about four points for Total Scores." These findings are consistent with other studies on recidivism, which have found that while persons with a high psychopathy score exhibited more "problems in the community" after age 40, there was a marked decrease in their number of violent crimes. See Hanson, *The Validity of STATIC-99 With Older Sexual Offenders,* Public Safety & Emergency Preparedness Canada (2005-01); and Porter, Birt & Boer, *Investigation of the Criminal and Conditional Release Profiles of Canadian Federal Offenders as a Function of Psychopathy and Age,* 25(6) Law & Hum Behav (Dec. 2001).

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III. RISK ASSESSMENT FOR SEX OFFENDERS

§18.55 A. Actuarial Instruments

Estimating recidivism rates for sex offenders typically involves the use of actuarial instruments, either alone or in combination with consideration of additional factors. The actuarial instruments were developed through studies of sex offender populations in various countries (outside the United States) and various institutions (psychiatric and penal). The instruments basically consist of lists of factors (*e.g.,* number of prior convictions, age, marital status) considered strongly related to recidivism that are weighted and scored by a point system. The overall score places the offender in a risk category for reoffense, generally low, medium, or high. The higher the score, the higher the risk category.

NOTE: These actuarial instruments purportedly predict the percentage of individuals in each risk category who will be reconvicted within a particular time frame, but they cannot predict which individuals will be reconvicted. It is also important to note that the measure is of one of reconviction not reoffense. The reconviction offenses are not necessarily sexually violent predatory offenses as defined by California statute.

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§18.56 B. Instrument of Choice for DMH: STATIC-99

The risk assessment instrument most commonly used at this time is the STATIC-99R originally developed by R. Karl Hanson, Ph.D., of the Solicitor General Canada, and David Thornton, Ph.D., at that time of Her Majesty's Prison Service, England. Hanson & Thornton, *Static 99: Improving Actuarial Risk Assessments for Sex Offenders,* Department of the Solicitor General of Canada (1999-02) (also published as Hanson & Thornton, *Improving Risk Assessments for Sex Offenders: A Comparison of Three Actuarial Scales,* 24(1) Law & Hum Behav 119-136 (Feb. 2000)).

The STATIC-99, a ten-factor predictive scale, was created by combining two other risk assessment instruments, the Rapid Risk Assessment for Sex Offender Recidivism (RRASOR), developed by Dr. Hanson, and the Structured Anchored Clinical Judgment Minimum (SACJ-Min) developed by Dr. Thornton. While both the RRASOR and the SACJ-Min were developed as screening instruments for predicting sexual offense recidivism, the original STATIC-99 was designed with the aim of improving upon the predictive accuracy of each. The STATIC-99R scores each of its ten factors with a single point, with the exception of "prior sexual offenses," which can receive a score of up to three points, depending on the number of prior charges or convictions a person has sustained and "age at release" which can go to -3 for persons over the age of 60.

In 2008, the developers started using new experience tables for the STATIC-99 as reported in the master's thesis of Leslie Helmus. In 2009, these experience tables were modified several times and now consist of four groups for the STATIC-99R and the STATIC-2002R, a slightly more detailed instrument similar to the STATIC-99 and created by the same authors.

The new experience tables associated with the STATIC-99R and STATIC-2002R appear to consist of ad hoc groupings designed to establish tiered base rates. David Thornton, PhD, one of the STATIC-99 authors has suggested that the High Risk/Needs group should generally be the group used for SVP evaluation purposes. This assertion is without empirical basis; a significant percentage of the individuals in the Correctional Services of Canada (CSC), were kept past their Warrant Expiry Date (WED), which was used by state evaluators to differentiate between the High Risk/Needs sample and the CSC sample. Hanson, et al., *Predicting Recidivism Amongst Sexual Offenders: A Multi-site Study of Static-2002*, Law and Human Behavior (published Online June 18, 2009); Abbott, *Applicability of the New Static-99 Experience Tables in Sexually Violent Predator Risk Assessments,* 4(1) *Sexual Offender Treatment* (2009).

PRACTICE TIP: Anyone working with civil commitments under the Sexually Violent Predator Act (SVPA) should become as familiar as possible with the STATIC-99, the STATIC-2002, the STATIC-99R, and the STATIC-2002R as they form the basis for risk assessment in California at this time.

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§18.57 1. Hanson and Bussiere's Meta-Analysis

The STATIC-99 grew out of R. Karl Hanson's work with Monique T. Bussiere on a meta-analysis of sex offender recidivism studies. See Hanson & Bussiere, *Predictors of Sexual Offender Recidivism: A Meta-Analysis,* Department of the Solicitor General of Canada (1996) (also published as Hanson & Bussiere, *Predicting Relapse: A Meta-Analysis of Sexual Offender Recidivism Studies,* 66(2) J Consulting & Clinical Psychol 348-362 (Apr. 1998)). The Meta-Analysis used a statistical method to combine 61 studies of sex offenders whose data had been collected using different criteria, coding rules, methodologies, and sample populations to identify the risk factors (predictors) reliably related to recidivism for *sexual*, *nonsexual violent*, and *general* crimes.

NOTE: The Meta-Analysis did not attempt to identify factors that specifically predict recidivism for *sexually violent offenses,* which is the concern of Sexually Violent Predator Act (SVPA) commitments.

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§18.58 2. Base Rates

In total, the Meta-Analysis looked at data concerning 28,972 sex offenders and determined that the average recidivism rate for sexual offenses was 13.4 percent over a 4-5 year period. This is also what is known as a "base rate," or, the percentage chance of a given occurrence, over a specific period of time, within a defined population.

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§18.59 3. Importance of Base Rates

The concept of base rate is extremely important for attorneys to understand. This is because the base rate of the development population for a given score is the prediction rate applied by the instrument. It is also extremely important to have an expert who can present this concept to the jury in an understandable manner. Concerns regarding the accuracy of the base rate was the reason Hanson gave for developing new experience tables for the STATIC-99 and STATIC-2002. (Presentation at ATSA, October 2008.) Dr. Hanson cited, among other things, the recent research in declining sex offenses, *i.e.*, Finkelhor & Jones, *Why have child maltreatment and child victimization declined?* 4 J of Social Issues 685 (2006).

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§18.60 4. Applicable Population

All actuarial instruments rely on the base rate of the developmental sample for their predictions. If the actuarial instrument was developed from a different population than that to which it is being applied, it may not be very accurate. Normalization of a test or instrument on the subject population is a professional requirement of the American Psychological Association. American Educational Research Association (AERA), American Psychological Association (APA) & National Council on Measurement in Education (NCME), Standards for Educational and Psychological Testing (1999). Particular problems with various instruments may be found in Campbell, Assessing Sex Offenders: Problems and Pitfalls (2007).

There is a question concerning the relevance of the new experience tables for the STATIC-99R and STATIC-2002R to SVP evaluations of currently incarcerated California inmates. While the authors say that the desire for more accurate base rates is an important reason for the new tables, the largest sample from which one of the base rates derives was a high risk group that was from Bridgewater Massachusetts Treatment Center (MTC), treated between 1959 and 1984. Hanson, et al., *Predicting Recidivism Amongst Sexual Offenders: A Multi-site Study of Static-2002*, Law and Human Behavior (published Online June 18, 2009). Also, while purporting to adjust for age, it is notable that the MTC sample has a lower mean age than the CSC or "routine" sample. (Recidivism for certain sexual offenses appears to decline with age; observations based on a lower age group would result in a higher base rate for recidivism) Data from Jesus Padilla, PhD, a researcher at Atascadero State Hospital shows a 5 to 6 percent base rate in untreated SVPs, (subpoenaed data), which is similar to the base rates of sexual reoffending reported by the United States Department of Justice in Langan, Schmitt, and Durose *Recidivism of Sex Offenders Released From Prison in 1994*, Bureau of Justice Statistics, U.S. Department of Justice (Nov. 2003).

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§18.61 5. The Penile Plethysmograph (PPG)

Notably, the factor that showed the highest predictive strength for recidivism in the Meta-Analysis was sexual deviance. Hanson & Bussiere, *Predictors of Sexual Offender Recidivism: A Meta-Analysis,* Department of the Solicitor General of Canada (1996). One way to measure sexual deviance is through testing with the penile plethysmograph (PPG). The PPG has yet to meet *Kelly* standards in California. *People v John W.* (1986) 185 CA3d 801, 806, 229 CR 783, disapproved on other grounds in *People v Stoll* (1989) 49 C3d 1136, 1153 n18, 265 CR 111. There is substantial controversy in the research community over the lack of standardization in the administration of the PPG and some question whether arousal measured by the PPG can actually be translated to recidivism. Nunes et al., *A Comparison of Modified Versions of the STATIC-99 and the Sex Offender Risk Appraisal Guide,* 14(3) Sex Abuse: J Research & Treatment (July 2002). Arguably, Hanson & Bussiere's findings only relate to male-preference child molesters. While the PPG and polygraph are part of the protocol for treatment in the Sex Offender Commitment Program (SOCP) for persons committed under the Sexually Violent Predator Act (SVPA), there is no reason to believe that either predicts recidivism, though each could reflect a measure of change relative to an individual's ability to control response. See Marshall, *Clinical and Research Limitations in the Use of Phallometric Testing with Sexual Offenders*, 1(1) Sexual Offender Treatment (2006). On the use of polygraph evidence in proceedings under the SVPA, see, *e.g., People v Fields* (2009) 175 CA4th 1001, 96 CR3d 668 (any error court may have made in limiting defense counsel's examination of prosecution's experts about polygraph examination report was harmless).

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C. Rapid Risk Assessment for Sex Offender Recidivism (RRASOR)

§18.62 1. May Be Superseded by STATIC-99

Although not recommended for risk assessments of sexually violent predators in California because it has been superseded according to its developer, R. Karl Hanson, Ph.D., by the more accurate STATIC-99, the Rapid Risk Assessment for Sex Offender Recidivism (RRASOR) is nonetheless sometimes employed by evaluators. It is important to know that the STATIC-99 incorporates the RRASOR in its entirety. The STATIC-99 has now been superseded by the STATIC-99R and the STATIC-2002R.

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§18.63 2. Comparison of RRASOR to Clinical Judgment

Clinical judgment is a very poor predictor of sexual recidivism. "In general, the average predictive accuracy of professional judgment to predict sex offense recidivism is only slightly better than chance." Hanson & Thornton, *Static 99: Improving Actuarial Risk Assessments for Sex Offenders,* Department of the Solicitor General of Canada (1999-02). While significantly better than chance, the Rapid Risk Assessment for Sex Offender Recidivism's (RRASOR's) predictive ability is also criticized.

The RRASOR lacks the breadth of the STATIC-99. The chief criticism of the RRASOR is that it does not capture enough variables associated with sexual recidivism. The RRASOR weighs only four factors: (1) the number of prior sex offenses, (2) the offender's current age, (3) the gender of the offender's victims, and (4) the offender's familial relationship to the victims. R. Karl Hanson, Ph.D., the architect of the RRASOR, says it was never developed to be a comprehensive risk assessment tool but only a tool for screening offenders into relative risk levels that can then be adjusted according to other considerations. State evaluators often refer to all of the actuarial instruments as screening tools; however, the term "screening tool" suggests that a more accurate selection process follows the initial screening which is not the case in SVP evaluations.

Although experts argue that existing actuarial instruments do not consider enough factors to predict recidivism, the architects have yet to find a way to get a better prediction from more variables.

NOTE: Despite the fact that Dr. Hanson and many other researchers are quite clear that clinical judgment is clinical judgment regardless of how much knowledge of the research or practice area the clinician has, it is not infrequently that Department of Mental Health (DMH) evaluators attempt to distinguish their "informed" judgment from judgment uninformed by the literature. There is a distinct lack of empirical support for this position. Informed clinical judgment should not be confused with an empirically guided risk assessment protocol, whatever the claim of a witness may be. See Hanson and Morton-Bourgon, *The Accuracy of Recidivism Risk Assessments for Sexual Offenders: A Meta-Analysis,* available at www.publicsafety.gc.ca/res/cor/rep/_fl/crp2007-01-en.pdf, Canadian Department of Public Safety, 2007-01.

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IV. STATISTICS AND PREDICTIONS

§18.64 A. Receiver Operating Characteristic (ROC) Curve

In order to assess the testimony that is being presented in a Sexually Violent Predator Act (SVPA) proceeding, it is necessary to understand a couple of statistical concepts. Statistics come into play when there is testimony about the predictive accuracy of actuarial instruments. One related concept is the receiver operating characteristic (ROC) curve. The ROC curve plots the hits (those individuals accurately identified as recidivists by the instrument) and false alarms at each level of the risk scale, creating a line graph. The area under the ROC curve is generally used as the primary measure of predictive accuracy of an actuarial instrument and is referred to as the area under the curve (AUC). The AUC can range from.50 to 1.0, with 1.0 indicating perfect prediction (no overlap between recidivists and nonrecidivists—in other words, no false predictions) and.50 (or 50 percent) indicating a predictive rate no better than chance. See Hanson & Thornton, *Static 99: Improving Actuarial Risk Assessments for Sex Offenders,* Department of the Solicitor General of Canada 9 (1999-02).

The best way to understand the AUC of an actuarial instrument in terms of the likelihood of reoffense (or its predictive accuracy) is that the percentage given is the probability that a randomly selected recidivist would score higher on the actuarial instrument than a randomly selected nonrecidivist. It is a test for relative selection accuracy. It says nothing about the accuracy of a given prediction (a particular person). A good example of how this works can be seen in Hanson, *The Validity of STATIC-99 With Older Sexual Offenders,* Public Safety & Emergency Preparedness Canada (2005-01). In Table III of this article, the ROC remains relatively stable across age groups despite a dramatic decrease in actual risk; R. Karl Hanson Ph.D. notes that the relative risks tend to remain the same.

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§18.65 B. Pearson's r—What Does It Mean?

Another statistical concept that anyone working with an actuarial instrument needs to have some familiarity with is "Pearson's r." This concept also arises during testimony regarding the predictive accuracy of actuarial instruments. The *r* value represents the degree of correlation between two variables. This is used to compute the amount of variance accounted for by an item or instrument. There is debate among the experts over the significance of this statistic to an instrument's ability to accurately predict recidivism over the long run. This is an area that requires a statistical expert to present the material in court.

NOTE: Juries, for the most part, are not usually very responsive to this kind of testimony.

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§18.66 C. Cohen's d

If statistics are important to a given case, as they frequently are, the attorney should be aware of a change in statistical variables used to discuss actuarial instruments. In Hanson & Morton-Bourgon, *Predictors of Sexual Recidivism: An Updated Meta-Analysis*, Department of the Solicitor General of Canada (2004), Dr. R. Karl Hanson shifts to the use of a statistic called "Cohen's d." This statistic performs a function similar to Pearson's r in that it is related to the amount of variance accounted for by an instrument. The smaller the value, the more overlap there is between two compared items (in other words, the closer the relationship). Tables are available to convert Cohen's d to a Pearson's r value, but roughly, the r value is half of the value of d.

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§18.67 D. Limitations of Actuarial Instruments

R. Karl Hanson, Ph.D., and other authors of risk prediction actuarial tools state that no single risk factor is sufficient to predict whether someone will reoffend. Hanson, Morton & Harris, *Sexual Offender Recidivism Risk: What We Know and What We Need to Know,* 989 Annals NY Acad Sci 154 (June 2003). This proposition seems to be generally accepted by expert witnesses.

Additionally, Dr. Hanson and others caution that actuarial instruments typically measure only static variables (those that cannot change, *e.g.,* the number of prior convictions at the time of assessment, gender, age at offense). Variables, or "dynamic" factors, affect the ability of an instrument to predict the rate of recidivism for a given individual (*e.g.,* the age and health of the respondent now as well as whether he has received sex offender treatment or is clean and sober).

NOTE: The use of only the male pronoun to describe individuals being assessed by the STATIC-99 or other actuarials is deliberate. Dr. Hanson says that the STATIC-99 is not to be used on women (or men under the age of 18).

Lastly, the important question that arises is whether the California population is sufficiently similar to the developmental population to warrant predications of sexual recidivism based on these instruments.

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V. APPLYING THE STATIC-99R

§18.68 A. Developmental Population

The sample sex offender populations studied for the development of the STATIC-99 came from Canada and the United Kingdom. The Canadian data came from studies of (1) child molesters released in 1958-1974 from the Millbrook Correctional Centre, a maximum security provisional correctional facility located in Ontario; (2) sexual offenders treated in 1978-1993 at the maximum security psychiatric facility Institut Philippe-Pinel, located in Montreal; and (3) sex offenders referred for treatment or assessment in 1972-1993 to the maximum security Oak Ridge Division of the Penetanguishene Mental Health Centre, located in Ontario. The UK data came from a 16-year follow-up of 563 sex offenders released from prison in England and Wales in 1979. Not all data of interest was available for all of the populations studied; and where the data was missing, it was approximated by the developers of the STATIC-99. Hanson & Thornton, *Static 99: Improving Actuarial Risk Assessments for Sex Offenders,* Department of the Solicitor General of Canada 6-7 (1999-02). For more about the developmental population base rates, see Hanson, *Age and Sexual Recidivism: A Comparison of Rapists and Child Molesters,* Department of the Solicitor General of Canada (2001-01).

The STATIC-99R applies new experience tables to the old STATIC-99 criteria but with a more significant correction for age. See §18.88. Part of the problem now is how to use the new experience tables when there has been no analysis of the criteria using the new data. In other words, its unclear whether the STATIC-99R variables work on the new populations in the same way the STATIC-99 variables or RRASOR variables worked on the underlying data samples. The evidence that is available suggests they may not. Sjostedt and Langstrom, *Actuarial Assessment of Sex Offender Recidivism Risk: A Cross-Validation of the RRASOR and the Static-99 in Sweden,* 25(6) Law and Human Behavior (December 2001). Additionally there are no clear-cut criteria for including an individual in any of the risk categories defined by the new experience tables. See Abbott, *Applicability of the New Static-99 Experience Tables in Sexually Violent Predator Risk Assessments*, 4(1) Sexual Offender Treatment (2009). Finally, as already noted, California base rates for sexual reoffending seem to be substantially different than what the new experience tables report. See §18.60.

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§18.69 B. The Measure of Recidivism

Recidivism in the sample populations used to develop the STATIC-99 was measured primarily by *reconviction* for a new offense, though the Oak Ridge Division of the Penetanguishene Mental Health Centre used *re-admission* as a standard and, according to the developmental paper, had a population with a higher average score. See Hanson, *Age and Sexual Recidivism: A Comparison of Rapists and Child Molesters,* Department of the Solicitor General of Canada (2001-01). In the new experience tables for the STATIC-99R and STATIC-2002R, the measure varies between "charges" and "convictions." Masters Thesis of Leslie Helmus.

NOTE: "New offenses" considered "sexual," and therefore "recidivistic," include (among more serious offenses) possession of pornographic materials, exposure, soliciting or offering oneself for prostitution, obscene phone calls, and consensual yet public sex.

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§18.70 1. Underestimate Versus Overestimate

Hanson and Thornton stated that the STATIC-99 most likely underestimates the rate of recidivism because sex offenses go unreported and undetected. Thornton certainly took that position when he and Ms. Helmus provided training to California evaluators December 7, 2009. However, it is unknown what, if any, percentage of these unreported and undetected sex offenses would be considered recidivistic under the Sexually Violent Predator Act (SVPA). The SVPA is concerned with a very narrowly defined type of sexual behavior (namely, sexually violent, predatory acts) while the STATIC-99R seems to consider any behavior that can be construed as sexual misbehavior and recidivistic. See Harris et al., *STATIC-99 Coding Rules Revised-2003,* Department of the Solicitor General of Canada (2003); Phenix, et all, Coding Rules for the Static-2002, Department of the Solicitor General of Canada (2009). It may be that the STATIC-99R in fact overestimates the rate of recidivism as contemplated by the SVPA or has little or no predictive value for the purposes of the SVPA because its measures are too broad. This lack of congruence in definitions has led to a great deal of debate.

The proponents of the under-estimation theory assert that there are many undetected, unreported sexual offenses committed and cite various sources in support of their thinking, including Abel, G. et al., *Self-reported sex crimes of nonincarcerated paraphiliacs*, 2(1) J of Interpersonal Violence, 3 (1987). Evaluators frequently ignore the fact that the crimes on which Dr. Abel reports were not "recidivistic" for the purposes of the SVPA. Nor were many of the crimes offenses that would fall within the SVPA. Other survey literature has questionable utility in the context of SVP evaluations, since there is little or no definition through which one can ascertain the nature of the underlying offenses, let alone whether they were recidivistic. Another widely disseminated assertion is that most sex offenses are committed by persons well known to the victim. Arguably, an offense by a person who had an established relationship to the victim is both less likely to be reported and less likely to be a qualifying offense.

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§18.71 2. What Does Recidivism Mean?

In addition to the debate about what the STATIC-99R STATIC-2002R predicts, there is the issue of the definition of recidivism itself. Getting state evaluators to agree what recidivism means for the purpose of courtroom predictions is sometimes difficult. Some evaluators will say that any repeat offense is recidivistic, whereas the Sexually Violent Predator Act (SVPA) seems to be concerned with behavior that reoccurs after a person has been caught and punished. Care must be taken to inform the trier of fact which definition is being used. Misunderstanding terms confuses the entire petition process. For example, the STATIC-99R and STATIC-2002R developers refer to the later discovery of prior acts of an individual after he has been caught and punished for a different act as "pseudo-recidivism." Pseudo-recidivistic acts do **not** increase the score for prior convictions; they are unaccounted for in the instruments. Nonetheless an evaluator may use pseudo-recidivistic acts, to opine that the risk of recidivism for the respondent is higher. Research does not support this conclusion.

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C. Scoring the STATIC-99

§18.72 1. Index Offense

The last sex offense charge or conviction for which an offender was sanctioned is referred to as the index offense. If a person is caught and absconds before punishment, this may change which offense is considered the index offense, but usually will not. The index offense is not counted as a prior conviction when scoring the STATIC-99, only the sex offenses preceding it are. The index offense can be a parole violation, if it was for behavior with a sexual element, or a prison rule violation, if the conduct could have resulted in a new charge. Not counting the index offense is a common methodology employed by developers of risk assessment instruments. A frequent point of contention in a Sexually Violent Predator Act (SVPA) proceeding is whether a parole or prison rules violation is sufficient from an evidentiary point of view to count as a prior offense.

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§18.73 2. Trends Which May Alter Actuarial Predictions

Since the data relied on for the development of the STATIC-99 predates 1994, one fact that needs to be looked at is the trend in sexual offending since then. From 1990 through 2000, there was a decline in the number of substantiated cases of child sexual abuse in the United States. Jones & Finkelhor, *The Decline in Child Sexual Abuse Cases,* Office of Juvenile Justice & Delinquency Prevention, U.S. Department of Justice (Jan. 2001); Finkelhor & Jones, *Explanations for the Decline in Child Sexual Abuse Cases,* Office of Juvenile Justice & Delinquency Prevention, U.S. Department of Justice (Jan. 2004). This observation was based on Child Protective Service records where the standard of proof is much lower than that required for criminal court convictions. The decline in child sexual abuse appears similar to a decline in rape and other violent crimes.

Hanson specifically relied on Finkelhor's work as a basis for concluding in 2008 that the instruments required a base rate correction. A year later, Dr. Hanson cited a growing body of research, both his own and other's, to conclude that the STATIC-99R and STATIC-2002R should supersede their predecessors. The STATIC-2002 had barely been released when the correction was made.

At the present time some of the research community is looking at the statistical issues involved in the various actuarials, questioning whether the actuarials can ever be applied to a particular case. Cooke, D.J. & Michie, C., *Limitations of Diagnostic Precision and Predictive Utility in the Individual Case: A Challenge fort Forensic Practice*. Law and Human Behavior (Online 2009). Even though the concerns that arise when using group predictions for an individual case are not new, see Cohen & Cohen, *Applied Multiple Regression/Correlation Analysis for the Behavioral Sciences* (1983), the problem with using an actuarial prediction that's based on group data that does not contain, *i.e.*, reflect, the individual being evaluated, has not been well recognized in the social sciences.

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§18.74 a. Recent Studies on Sex Offender Recidivism

Although the occurrences of child sexual abuse are not necessarily recidivistic as contemplated by the Sexually Violent Predator Act (SVPA), there is nothing to suggest that sexual offense recidivism is not declining as well. In fact, Langan, Schmitt, and Durose in *Recidivism of Sex Offenders Released From Prison in 1994,* Bureau of Justice Statistics, U.S. Department of Justice (Nov. 2003) report a much lower rate of sex offense recidivism than would be expected based on STATIC-99R predictions unless one was possibly using only the CSC or routine sex offender samples. The Langan report was based on data from about 10,000 sex offenders, a little over a third of whom were from California. Child molesters showed a 5.1-percent rearrest rate after 3 years, and rapists showed a 5.3-percent rearrest rate. Assuming the rearrests were coextensive with the commission of a sex crime, and the recidivism rate projected out to the 4-5 year range of the Meta-Analysis, the base rates for reoffense are still significantly lower than that determined by the Meta-Analysis, though not that much different from the CSC sample. It should be noted that the cutoff date for studies for the Meta-Analysis was December 31, 1995, with much of the data collected well before that. Hanson & Bussiere, *Predictors of Sexual Offender Recidivism*: *A Meta-Analysis,* Department of the Solicitor General of Canada (1996). Recent data from the California Department of Corrections and Rehabilitation would seem to support the Langan study even though the data has been withdrawn by the California Sex Offender Management Board.

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§18.75 b. United Nations Data on Offense Rates

Data from the United Nations Centre for International Crime Prevention, Office for Drug Control and Crime Prevention, *Questionnaire for the Seventh United Nations Survey of Crime Trends and Operations of Criminal Justice Systems, Covering the Period 1998-2000* (visited June 7, 2010); (available at http://www.unodc.org/pdf/crime/seventh_survey/InstrumentE.pdf); and data from the Eighth United Nations Survey of Crime Trends available at http://www.unodc.org/pdf/crime/eighthsurvey/5678svr.pdf show that a comparison of reported rape rates in the United States and Canada for 1998-1999 vary substantially, with Canada having 2.5 to 3 times the rate of the United States. This is significant in all cases involving the STATIC-99R because much of the experience table populations are drawn from Canada. Even assuming that child molestation rates stay constant, the rapists' statistics would tend to skew the prediction rates of the actuarial instruments. Additionally, the UN data, spanning over a decade, shows a marked decline during that period of recorded rapes in both Canada and the United States, which obviously affects the base rate in a similar manner as the decline in child sexual abuse affected Dr. Finkelhor's research. See §18.73.

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D. Alternatives to the STATIC-99

§18.76 1. Additional Actuarial

Although the STATIC-99R and the STATIC-2002R are the most frequently used risk assessment tools by the Department of Mental Health (DMH) evaluators and the prior DMH, Clinical Evaluator Handbook and Standardized Assessment Protocol (2007) recommended their use, 9 Cal Code Regs §4005 leaves the choice of which instrument to use, if any, to the evaluators. Other instruments of choice include the Sex Offender Risk Appraisal Guide (SORAG) (Quinsey et al., 1998), the Minnesota Sex Offender Screening Tool—Revised (MnSOST-R) (Epperson, Kaul & Hesselton, 1999), and the Rapid Risk Assessment for Sexual Offense Recidivism (RRASOR) (Hanson, 1997). Although the DMH has claimed that all of these instruments have had extensive cross-validation, this primarily amounts to a comparison of their receiver operating characteristics (ROCs) (for more discussion of ROCs, see §18.64). Also, although the DMH suggests that these instruments might be used in conjunction with each other, research indicates that this is not true. Seto, *Is More Better? Combining Actuarial Risk Scales to Predict Recidivism Among Adult Sex Offenders,* 17(2) Psychol Assessment 156 (June 2005); Nunes, Firestone & Bradford, *A Comparison of Modified Versions of the STATIC-99 and the Sex Offender Risk Appraisal Guide,* 14(3) Sex Abuse: J Research & Treatment (July 2002).

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§18.77 2. Adjusting the Actuarial

The Department of Mental Health, (DMH) Clinical Evaluator Handbook and Standardized Assessment Protocol (2007) had previously suggested that it is "sometimes appropriate" to adjust an individual's score from the actuarial instrument either up or down, depending on the presence of risk factors for sexual recidivism not considered by the actuarial instrument. DMH, Clinical Evaluator Handbook and Standardized Assessment Protocol (2007). The problem with permitting evaluators to assign additional factors to the risk assessment is that the evaluators essentially revert to relying on clinical judgment (with a predictive accuracy rate little better than chance). See Hanson & Bussiere, *Predictors of Sexual Offender Recidivism: A Meta-Analysis,* Department of the Solicitor General of Canada 14 (1996).

A further concern is that though the additional factors associated with risk selected by the evaluator to "adjust" the prediction may appear, on their face, to be independent of the factors accounted for by the actuarial instrument, without a regression analysis of the additional factors, in conjunction with the factors already accounted for by the instrument, there is no assurance that the strength of the prediction will be increased. What is certain is that, by adding factors without a statistical analysis of their additional predictive powers, any error rate associated with the additional factors is now built into the prediction. While the prediction's accuracy may not be increased, the error rate certainly will be.

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§18.78 a. DMH Static Factors "Outside of Actuarial Instruments"

The Department of Mental Health's (DMH's) Evaluator Handbook provided evaluators with a list of static factors associated with sexual reoffense to refer to when considering whether to adjust an offender's STATIC-99 score. It would appear that many of those additional factors have a high degree of intercorrelation with the factors already measured by the actuarials (in other words, the predictions associated with those factors are already accounted for by the actuarials). Accordingly, the handbook cautions evaluators to make adjustments prudently but there are no guidelines or rules for making adjustments anywhere. DMH, Clinical Evaluator Handbook and Standardized Assessment Protocol (2007).

NOTE: The Evaluator Handbook stated that, in most cases, little or no adjustment to the STATIC-99 is necessary. It did not indicate when adjustments might be necessary, but only when adjustments were "most easily justified." DMH, Evaluator Handbook.

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§18.79 b. DMH Dynamic Factors

The Department of Mental Health (DMH), Clinical Evaluator Handbook and Standardized Assessment Protocol (2007) also lists dynamic factors for adjusting the actuarial instrument's risk assessment score. Dynamic factors are, by definition, factors that change over time. The factors in the handbook were taken, for the most part, from an instrument called the Stable-2000 and Stable 2007. There are significant conceptual and ethical problems associated with offering this list. The Stable-2000 is, as of this writing, still an experimental device and what little data there is on the Stable 2000 or 2007 suggests that it does not work on populations. Hanson, et al., *Assessing the risk of sexual offenders on community supervision: The Dynamic Supervision Project* (2007). The 1999 Standards for Educational and Psychological Testing (SEPT) of the American Psychological Association are applicable to evaluators engaged in doing forensic evaluations pursuant to the Sexually Violent Predator Act (SVPA). Based on those standards, it is essential that assessments be based on an accepted corpus of knowledge. Campbell, Assessing Sex Offenders: Problems and Pitfalls (2007).

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§18.80 (1) Rationale for Dynamic Factors

The Department of Mental Health (DMH) asserts that the factors they have extracted from the Stable-2000 or 2007 have been found to be empirically associated with sexual recidivism. What remains to be tested is whether these factors have significance independent of the actuarial instruments or apart from each other. As Dr. R. Karl Hanson indicated in the Meta-Analysis (Hanson & Bussiere, *Predictors of Sexual Offender Recidivism: A Meta-Analysis,* Department of the Solicitor General of Canada (1996)), the problem is how to combine factors. He also indicates that dynamic factors may merely be proxies for static factors. While the DMH, Clinical Evaluator Handbook and Standardized Assessment Protocol (2007) attributes empirical support for "a number" of the dynamic factors it extracted to Dr. Hanson's Updated Meta-Analysis (Hanson & Morton-Bourgon, *Predictors of Sexual Recidivism: An Updated Meta-Analysis,* Department of the Solicitor General of Canada (2004)), it does not explain how the extracted factors correlate to the risk of recidivism. Consequently, opinion based on this type of evidence is speculative.

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§18.81 (2) How Important Are Dynamic Factors?

Because dynamic factors can change, it is important to look at how the evaluator operationalizes or defines a particular factor for the current evaluation. Is the operational definition consistent with the way in which the term was derived from the research? For example, "poor cooperation with supervision" was a factor associated with the risk of reoffense derived from a study of persons under supervision in the community; as such, it may not be relevant to a population that has not been on release for many years. In other words, poor cooperation with supervision in the penal system or in a hospital setting is not indicative of an offender's potential for cooperation on the outside, nor does it correlate to, or "predict," the offender's risk of reoffending if released with or without supervision in a community setting.

If they work at all, the Stable 2000 and 2007 factors arguably should be used within the constraints of the original coding rules. The fundamental reason for this is that the factors that make up these dynamic risk assessment instruments cannot be generalized outside of the context of supervision in the community. Also, these instruments generally look back only 6 months to 1 year. These concerns are ignored by evaluators, who want to use the factors independent of the overall instruments. See Hanson, eta al., *Assessing the risk of sexual offenders on communitysupervision: The Dynamic Supervision Project* (2007).

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§18.82 (3) Deeper Examination of Dynamic Factors May Be Necessary

There are several problems associated with how the Department of Mental Health (DMH) evaluators apply dynamic risk factors. A number of the factors purportedly bearing on the risk of reoffense (*e.g.,* lack of intimate partners, lack of concern for others, failure to get along with supervisors) describe behavior commonly observed in institutional settings. It is impossible for inmates at Atascadero State Hospital (ASH) or Coalinga State Hospital (CSH) to maintain ongoing sexual relationships with outsiders or to start new relationships from within the institution; relationships created within the institution are clandestine. Likewise, issues related to personal safety arise with the exhibition or disclosure of concern for others where prison gangs substantially affect associations. On the flip side, if an inmate is actively involved in a relationship in the prison or hospital setting, he may be viewed as displaying "narcissistic" or "grandiose" behaviors; too much caring about others is frequently interpreted as behavior associated with a wolf in sheep's clothing, while too little caring is interpreted as "loner" behavior. Since behavior is observed within an institutional setting, frequently, any behavior, no matter what, is frequently interpreted as a manifestation of a diagnosis or factor increasing the individual's risk of reoffense. See Rosenhan, *On Being Sane in Insane Places,* 179 Science 250-258 (1973). While some assessment instruments have developed a specific question-and-answer protocol for scoring dynamic factors (see Hanson & Harris, *The Sex Offender Need Assessment Rating (SONAR): A Method for Measuring Change in Risk Levels,* Department of the Solicitor General of Canada (2000); and Hanson, et al., *Assessing the risk of sexual offenders on community supervision: The Dynamic Supervision Project* (2007)), there has been no research or study conducted to support the validity of the methodology employed by the DMH evaluators when assessing dynamic factors.

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Source: Criminal Law/Scientific Evidence in California Criminal Cases/18 Assessing Evidence Under the Sexually Violent Predator Act/§18.83 c. Protective Factors

§18.83 c. Protective Factors

A protective factor is one that, if present, reduces risk. Very little research has been done with respect to protective factors. The absence of a risk factor is not a protective factor, though some Department of Mental Health (DMH) evaluators seem to think otherwise. From the standpoint of pure logic, the absence of a negative does not make a positive.

PRACTICE TIP: Protective factors are dynamic factors (those factors or circumstances about a respondent that are subject to change and could impact the risk prediction for reoffense). Consequently, an attorney for the respondent may not wish to attack dynamic factors, per se, as insignificant, irrelevant, or unproven but choose, instead, to concentrate on the DMH's use of dynamic risk factors and application of clinical judgment. Sometimes there are considerations such as health conditions or other extraordinary circumstances that should override any risk assessment instrument.

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§18.84 (1) Life Expectancy

Having less than a 15-year life expectancy is not a true protective factor. What it means is that the upper level of prediction on the STATIC-99 cannot be reached because of the advanced age or medical condition of the respondent. This is a common factor with the state hospital populations, where the average age is over 50 and many inmates suffer from various medical conditions. Having an elderly or infirm client supports an argument that the person falls outside of the predictive ability of the STATIC-99R entirely or that only the 5-year risk estimates should apply.

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§18.85 (2) Offense Free

One of the few protective factors that has been identified is "being offense free" in the community for a significant period of time. See the table for adjusting risk rates in Harris et al., *STATIC-99 Coding Rules Revised-2003,* Department of the Solicitor General of Canada, App A (2003). However, evaluators may suggest that a person could have committed undetected offenses. A motion in limine should be made in every case to prevent evaluators from speculating about offenses for which there is no evidence. Some evaluators, when specifically asked about evidence of other offenses or the lack thereof, will respond with a statement to the effect, "Well, that is all we know of." Such statements suggest special, private knowledge on the part of the evaluator and invite jury speculation. This may be improper.

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§18.86 (3) Unrelated Exceptional Cases

While testifying about protective factors, Department of Mental Health (DMH) evaluators will frequently relay anecdotal information or make statements regarding exceptional cases that may have made the media or otherwise come to the attention of the evaluator. Caution should be used when this type of evidence is presented as it may result in an unfair comparison of the respondent to a high-profile figure. Once again, a motion in limine at the outset of trial is the best remedy for this kind of biased, emotion-provoking testimony. If the prosecutor elicits testimony comparing the respondent's case to another without laying the proper foundation, this may amount to prosecutorial error. It is not relevant to ask an evaluator about the details or outcome of any other case in which an expert may have testified. *People v Buffington* (2007) 152 CA4th 446, 448, 62 CR3d 223.

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d. Case-Specific Factors

§18.87 (1) Evaluator Handbook Recommendations

The Department of Mental Health (DMH) suggests in its Clinical Evaluator Handbook and Standardized Assessment Protocol (2007) that in addition to following a protocol, which permits adjusting the STATIC-99 for additional static and dynamic factors, evaluators consider case-specific factors when evaluating the risk of reoffense. The handbook suggests that self-described urges to reoffend, multiple offenses for which there was no arrest or conviction, neurological disorders, or deviant sexual preferences such as sexual sadism may lead to an increased risk of reoffense. Health concerns, advanced age, sex offender treatment, and community supervision may decrease an individual's risk of reoffending.

Again, the DMH essentially is asking evaluators to rely on clinical judgment (whose predictive accuracy is generally accepted within the field of risk assessment as little better than chance) when performing risk assessments. There does not appear to be any empirical evidence supporting DMH's identified risk factors. There is usually insufficient diagnostic data available on an individual to support a finding that a neurological disorder leads to increased impulsivity. Dr. R. Karl Hanson has already weighted prior offenses according to their predictive value in the actuarial instruments he developed, and neither sexual sadism nor any diagnosis of paraphilia has been addressed in the research as a risk factor. See Hanson & Bussiere, *Predictors of Sexual Offender Recidivism*: *A Meta-Analysis,* Department of the Solicitor General of Canada (1996).

When assessing case-specific factors, evaluators may make what amounts to moral judgments based on concerns that a person has gone unpunished for sexual offenses or is a sexual deviant, which is exactly what an actuarial is designed to avoid. A fundamental reason for using a scientifically based and tested methodology instead of clinical judgment, "common" sense, or "obvious" assumption is to protect the result from being infected by personal bias.

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§18.88 (2) Age as an Independent Factor

Although the Department of Mental Health (DMH) indicates that age may be a "case specific" factor that might be taken into account by evaluators, in recent years there has been sufficient research to suggest that age is an independent variable effecting risk. The first such study that is directly related to Sexually Violent Predator Act (SVPA) petitions is the Hanson 2001 Age Study (Hanson, *Age and Sexual Recidivism: A Comparison of Rapists and Child Molesters,* Department of the Solicitor General of Canada (2001-01)). The data from this study was further analyzed by Barbaree, Blanchard, and Langston in *The Development of Sexual Aggression Through the Life Span: The Effect of Age on Sexual Arousal and Recidivism Among Sex Offenders,* 989 Annals NY Acad Sci 59-71 (2003).

The findings that age produced an effect on sexual recidivism, while not necessarily new, did produce controversy. See Doren, *To What Extent Does Aging Negate Historically-Assessed Recidivism Risk?,* 3(2) Sex Offender L Rep 17, 26-27 (2002); Saari & Saari, *Actuarial Risk Assessment With Elderly Sex Offenders: Should It Be Abandoned?,* 3(5) Sex Offender L Rep 68, 73-76 (2002); Doren, *The Risk of "Elderly" Sex Offenders: A Response to Saari and Saari,* 3(5) Sex Offender L Rep 69, 76-77 (2002).

In 2006, Thornton's *Age and Sexual Recidivism: A Variable Connection,* Sexual Abuse: A Journal of Research and Treatment, was published suggesting that there is a particularly persistent group of sex offenders who defied the age barrier, but it noted that even in this select group, recidivism declined to below 5 percent for those over 60 years of age. Fazel et al., in *Risk Factors for Criminal Recidivism in Older Sexual Offenders,* 18(2) Sex Abuse: J Research & Treatment 159-167 (Apr. 2006), support the thesis that recidivism declines with age, but also suggests that the risk factors may change as well. Harris and Rice, in *Adjusting Actuarial Violence Risk Assessments Based on Aging or the Passage of Time,* 34(3) Crim Just & Behav 297-313 (2007), suggest that age at first offense may be a better predictor than age at release, but there is still a low rate of recidivism past age 60.

With the release of the STATIC-99R and STATIC-2002R, Hanson has suggested a hazard ratio of 98 percent with advancing age. That means that risk is calculated for the present year by taking 98 percent of the preceding year's risk. Howard Barbaree, on the other hand, in a presentation to DMH evaluators March 10, 2010 at Seaside California, indicated that the true hazard ratio is 96 percent. It is no longer a question whether age is a factor; the only question is how much of a factor it is.

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Source: Criminal Law/Scientific Evidence in California Criminal Cases/18 Assessing Evidence Under the Sexually Violent Predator Act/§18.89 (a) Hanson Age and Validity Study for STATIC-99 [Deleted]

§18.89 (a) Hanson Age and Validity Study for STATIC-99 [Deleted]

The discussion in this section has been deleted.

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Source: Criminal Law/Scientific Evidence in California Criminal Cases/18 Assessing Evidence Under the Sexually Violent Predator Act/§18.90 (b) Age and the Static-2002 [Deleted]

§18.90 (b) Age and the Static-2002 [Deleted]

The discussion in this section has been deleted.

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VI. TREATMENT

§18.91 A. Voluntary Treatment and Supervision

Evaluators must consider a person's amenability to voluntary treatment out in the community when determining the risk of reoffense as well as whether a person meets criteria for commitment under the Sexually Violent Predator Act (SVPA). The Department of Mental Health, Clinical Evaluator Handbook and Standardized Assessment Protocol (2007) said:

The purpose of the report is to determine whether an individual meets the statutory SVP criteria at the time of the evaluation. The purpose of the report is not to prescribe a course of action absent a finding that the person meets SVP criteria.

The evaluator should be convinced or have a high degree of confidence that a person's expressed desire to seek supervision and treatment in the community without commitment under the SVPA is "meaningful, sincere, and sufficiently significant." This language would seem to imply that it is not within the scope of the evaluator's duties to pass judgment on the type or quality of treatment that is being sought, only on whether the desire to seek treatment is serious and credible. It is doubtful if a court would limit the opinion of an evaluator to this degree. Frequently, without objection and without a lot of knowledge about specific programs, evaluators offer opinions concerning the nature and quality of treatment proposed by a respondent. Those opinions often favor the completion of the Sex Offender Commitment Program Phases at Coalinga State Hospital without identifying what exactly in that particular program is going to reduce risk.

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§18.92 B. Effectiveness of a Given Treatment Type

In light of the fact that an 8-year follow-up on relapse prevention treatment in California showed little or no effect (see Marques et al., *Effects of a Relapse Prevention Program on Sexual Recidivism: Final Results From California's Sex Offender Treatment and Evaluation Project (SOTEP),* 17(1) Sex Abuse: J Research & Treatment 79-105 (2005), it may be that clinicians are not in a very good position to offer opinions about which treatment works and which does not. The SOTEP 2005 study does suggest that those who "met treatment goals" did better with regard to recidivism than those who did not, but the figures are questionable. There is some research to support the notion that outpatient treatment is more effective than inpatient treatment. Kokish, *Sex Offender Treatment: Does It Work? Is It Worth It?,* California Coalition on Sexual Offending (2001) (visited June 7, 2010); for the online version of this article, go to http://www.ccoso.org/newsletter/worthit.html. In the courtroom, it might be appropriate to exclude testimony concerning the efficacy of a particular treatment as speculative and beyond the scope of the evaluation. As of this writing it appears that Coalinga State Hospital is attempting to move away from the Cognitive Behavioral/Relapse Prevention model that has been the treatment-type for the entire SVP program toward what is called the Good Lives model of treatment. How this will affect assessments is unknown at this time.

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§18.93 C. Chemical and Physical Castration

There are many reasons why castration is not necessarily a silver bullet for release. Even if the option was available, most patients would probably decline. See *In re Qawi* (2004) 32 C4th 1, 7 CR3d 780. Arguably, evidence that a patient has received such treatment goes not only to the patient's desire to get out, but also to a commitment not to reoffend.

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§18.94 1. Effects of Castration

A good recent survey of available literature on the effects of castration was discussed in Weinberger et al., *The Impact of Surgical Castration on Sexual Recidivism Risk Among Sexually Violent Predatory Offenders,* 33(1) J Am Acad Psychiatry & L 16-36 (2005) (Castration Impact Study). Although the conclusion of the authors does not support castration as an effective tool in reducing recidivism, the study supplies some good table summaries of the effects of castration that have been admitted into evidence as demonstrative of the material relied on by experts. This study is certainly required reading for any attorney with castration issues in a sexually violent predator (SVP) case.

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§18.95 a. Criticism of Castration Impact Study

At the same time that the Castration Impact Study was released, Berlin's *Commentary: The Impact of Surgical Castration on Sexual Recidivism Risk Among Civilly Committed Sexual Offenders,* 33(1) J Am Acad Psychiatry & L 37-41 (2005) (Commentary on Castration Impact Study) was published. Fred S. Berlin, M.D., Ph.D., one of the leading researchers in the world, perceived bias in the Castration Impact Study. Dr. Berlin's article is a good place to start with impeachment of an evaluator who claims that castration does not effectively reduce recidivism.

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§18.96 b. Unclear Legal Implications

The Castration Impact Study authors suggest that evaluators must assess the risk that respondents might access exogenous testosterone upon release. There are experts who will testify that testosterone replacement therapy does not work that way. When dealing with this expert issue, it is important to keep in mind that expert testimony in this area is extremely speculative. The question of whether the patient would even seek testosterone replacement therapy is compounded by the issue of whether it would do him any good even if he did. The court of appeal in *People v Fields* (2009) 175 CA4th 1001, 96 CR3d 668, certainly did not consider castration a legal basis for a person's release.

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2. Antiandrogen Treatment

§18.97 a. Use of Hormonal Inhibitors to Control Recidivism

Chemical castration, or the use of antiandrogens, such as Lupron or Depo-Provera, involves giving males hormonal inhibitors that reduce or block serum testosterone. Such therapy has been suggested as an effective method for controlling recidivism among paraphilics. Bender, *New Prescription for Paraphilia?,* 15(4) Psychiatric Times (Apr. 1998). While antiandrogens may lower sex drive, they can have drastic side effects and have been virtually abandoned as a means of effective treatment in the Sex Offender Commitment Program (SOCP) (offered at the state hospitals for those committed under the Sexually Violent Predator Act (SVPA)). The issue of this type of treatment may still come up in SVPA cases, but very rarely.

Various antidepressants, which are referred to as SSRI's and include brand names such as Zolof, Paxil, and Prozac, may also serve to inhibit sexual response. Gitlin, *Psychotropic Medication and Their Effects on Sexual Function: Diagnosis, Biology and Treatment Approaches*, 55 J. Clin. Psychial 406 (1994); Greenburg & Bradford, *Treatment of the Paraphilia Disorders: a Review of the Role of the Selective Serotonin Reuptake Inhibitors*, 9 J. Res. Treat., 349 (1997); Greenburg, Bradford, Curry & O'Rourke, *A Comparison of Treatment of Paraphilias with Three Serotonin Reuptake Inhibitors: a Retrospective Study*. 24 Am Acad. Psychiat. Law, 525 (1996); Kafka, *Sertraline Pharmacotherapy for Paraphilias and Paraphilia Related Disorders. An Open Trial*, 6 Ann. Clin. Psychiat. 189 (1994). This research is potentially significant to cases in which the respondent is being treated for a depressive condition.

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§18.98 b. State Still Providing Some Antiandrogen Treatment

The Atascadero State Hospital (ASH) still provides ongoing antiandrogen treatment for a small portion of the sexually violent predator (SVP) population there. The ASH's SVP population is being transferred to Coalinga State Hospital, and presumably, treatments will be continued there. The most important issue for attorneys to keep in mind is that despite irreversible side effects of antiandrogens, the libido can still return if a patient discontinues the therapy while in the community.

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§18.99 3. Bilateral Orchiectomy

Bilateral orchiectomy is a fancy medical term for physical castration. The reduction in sexual recidivism via castration was the basis for looking at the effectiveness of antiandrogen treatment to begin with. Bradford, *The Neurobiology, Neuropharmacology, and Pharmacological Treatment of the Paraphilias and Compulsive Sexual Behaviour,* 46(1) Canadian J Psychiatry 26-34 (Feb. 2001). Normally, a court will not allow testimony concerning future plans for such treatment, and assisting a client to have such a procedure performed while in the Sex Offender Commitment Program (SOCP) is difficult. Arguably this is voluntary treatment within the meaning of *People v Grassini* (2003) 113 CA4th 765, 6 CR3d 662, and should be allowed.

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§18.100 4. Official State Policy

The official position of the Department of Mental Health (DMH) with regard to castration is that it is a "key to the door." As such, the notion of castration as a means to release from custody is inherently coercive. The DMH takes the official position that castration, by itself, does not sufficiently reduce the risk of reoffense to make a sex offender safe in the community. There are staff doctors with the DMH who disagree with this official policy. When castration is an option for the client, the defense attorney will need to have a special evaluation done to determine the client's ability to select this alternative. The court will then have to order respondent transported to the facility conducting the surgical procedure.

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§18.101 5. Recidivism Rates of Castrated Persons

The highest offense rate reported in samples examined by the Castration Impact Study (see §18.94) was 10 percent on a sample of 20 where two of the offenders had received testosterone in the community years after castration. Harris et al., *STATIC-99 Coding Rules Revised-2003,* Department of the Solicitor General of Canada (2003), report that, in general, "the post-operative recidivism rates are low, but not zero (2%-5%)." These numbers can be impressive to a jury.

Fred S. Berlin, M.D., Ph.D., notes that castration coupled with participation in treatment has been an effective combination for the release of several individuals from state hospitals. Berlin, *Commentary: The Impact of Surgical Castration on Sexual Recidivism Risk Among Civilly Committed Sexual Offenders,* 33(1) J Am Acad Psychiatry & L 37-41 (2005). See §18.95.

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Source: Criminal Law/Scientific Evidence in California Criminal Cases/Table of Statutes, Regulations, Rules, and Rulings

Table of Statutes, Regulations, Rules, and Rulings

CALIFORNIA

Constitution

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