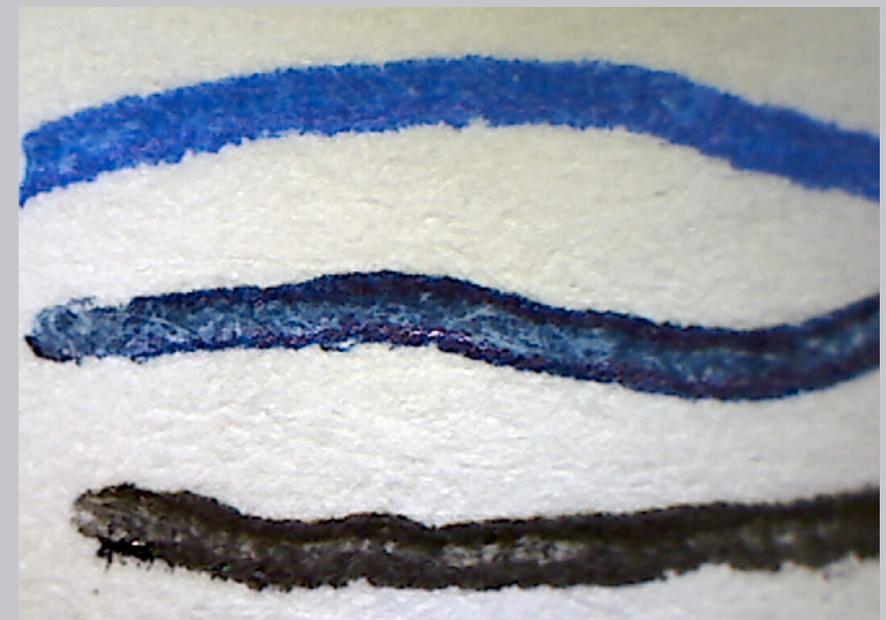
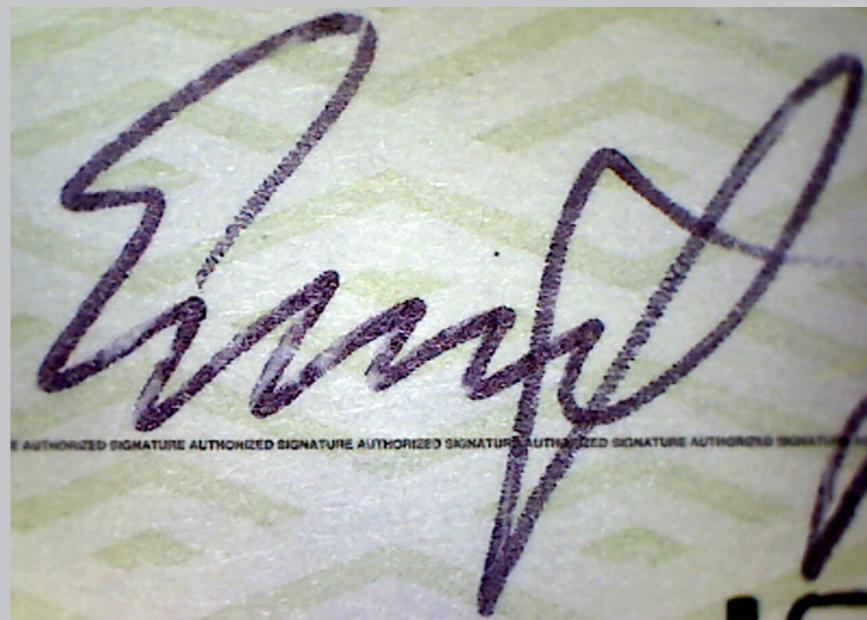
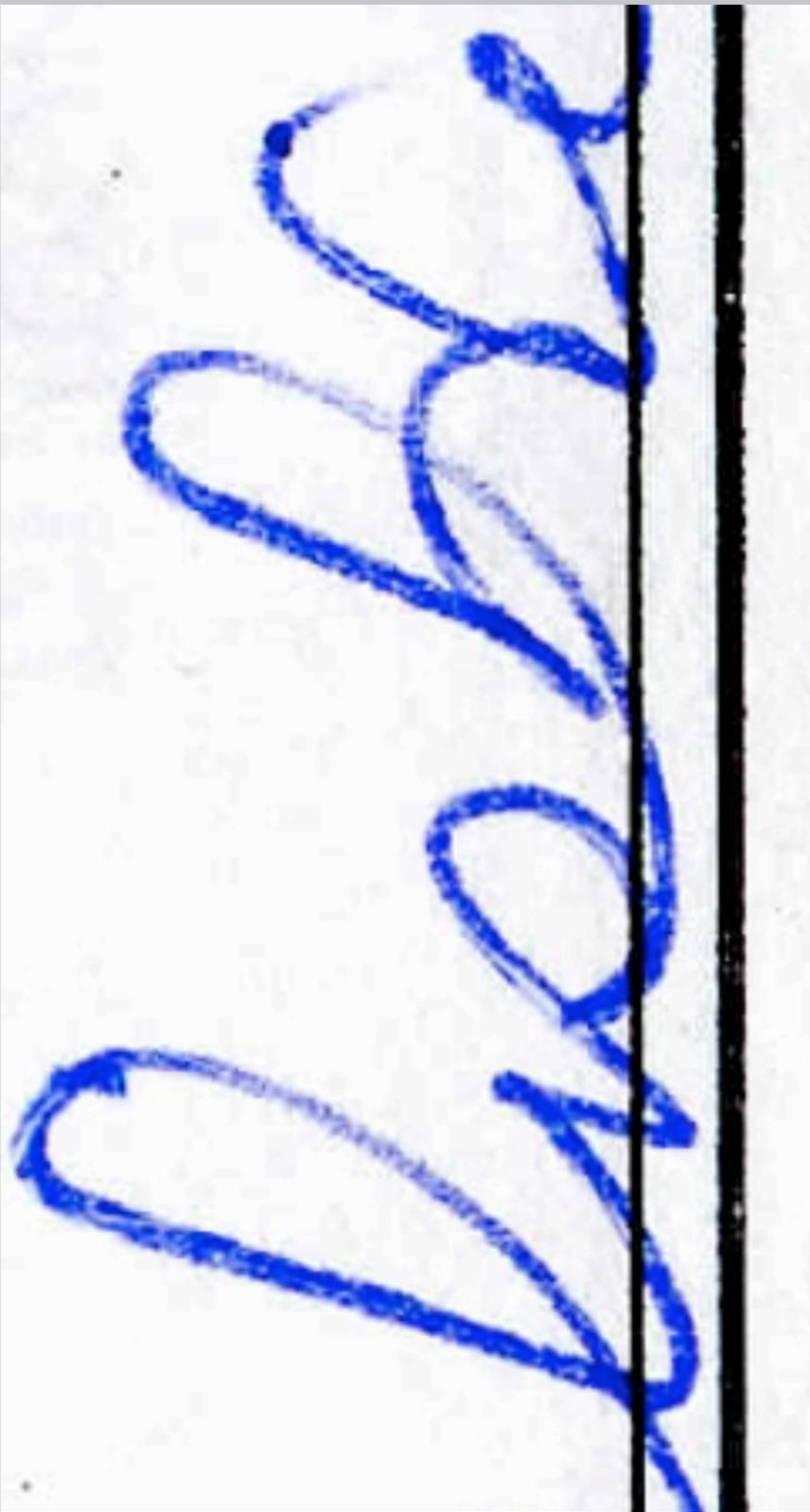


How to Examine Handwriting

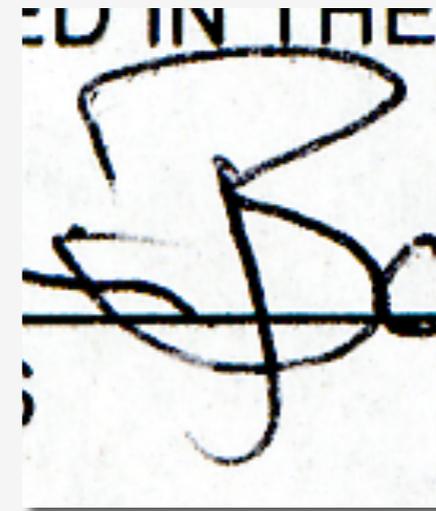
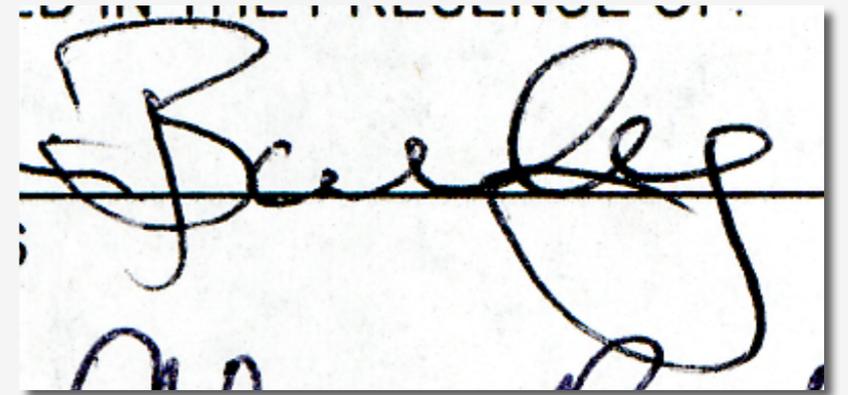


Emily J. Will, D-BFDE

Bankruptcy & Foreclosure Bootcamp - Las Vegas, NV - February 19, 2011

Topics

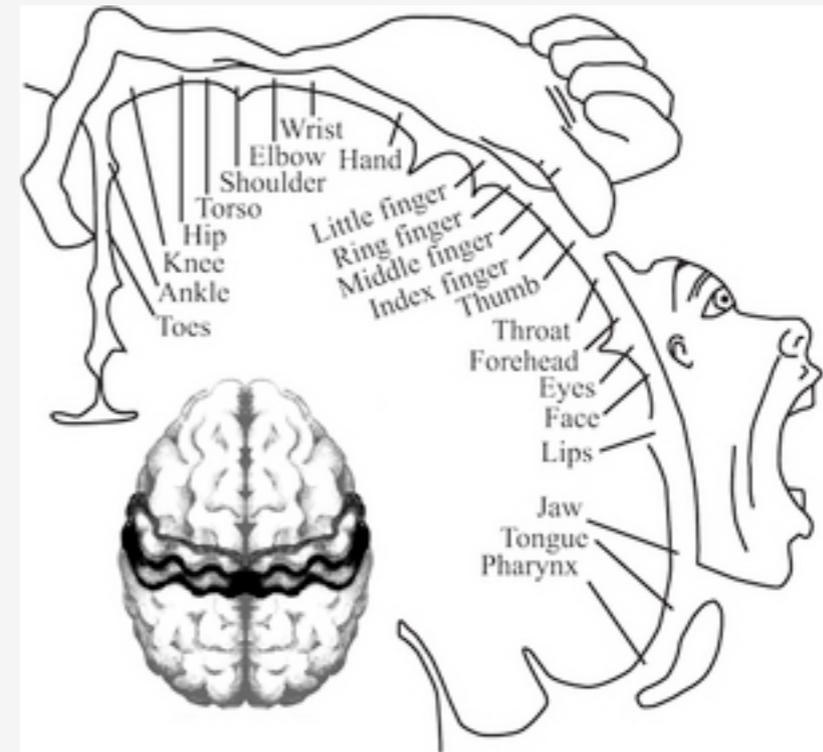
- What makes Handwriting identifiable?
- Natural Variation
- Indicators of Genuine Handwriting
- Indicators of Simulated Handwriting
- Disguise in Handwriting
- Robo-signing
- Methods of Simulation (Forgery)
- Original vs. Non-Original Documents
- Manufactured Documents



You can recognize the writing of friends/relatives.
Some people's writing seems more legible, consistent, or skillful than others.

How we learn to write....

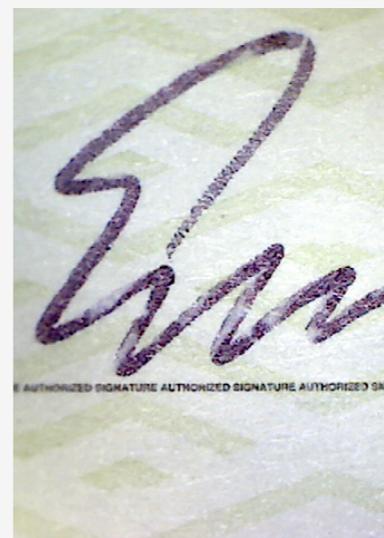
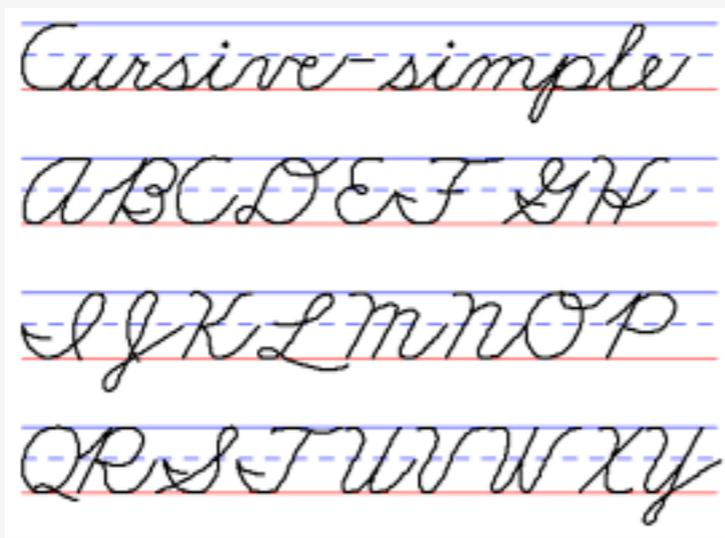
- HW is a complex, learned motor activity.
- HW occurs at extremities, but originates in the brain.
- HW is one of the last skills to develop - after walking, speech



The “pattern” for HW is stored in the brain.
Theoretically, you could write with any part of your body.

Humans are not machines....

- You learn to follow a “copybook” pattern, but not exactly.
- You may experiment with styles of handwriting
- Eventually, normal handwriting becomes “automatic.”

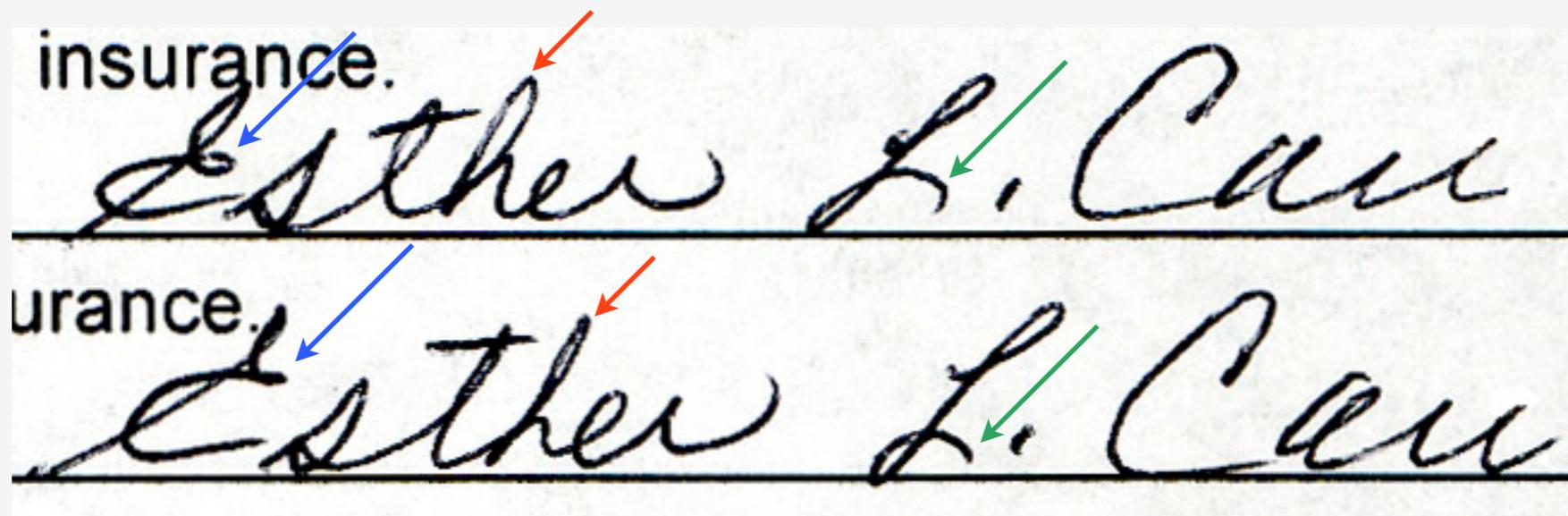


No two people write exactly alike.

An individual does not write exactly the same with each repetition.

Natural Variation is part of Human Behavior

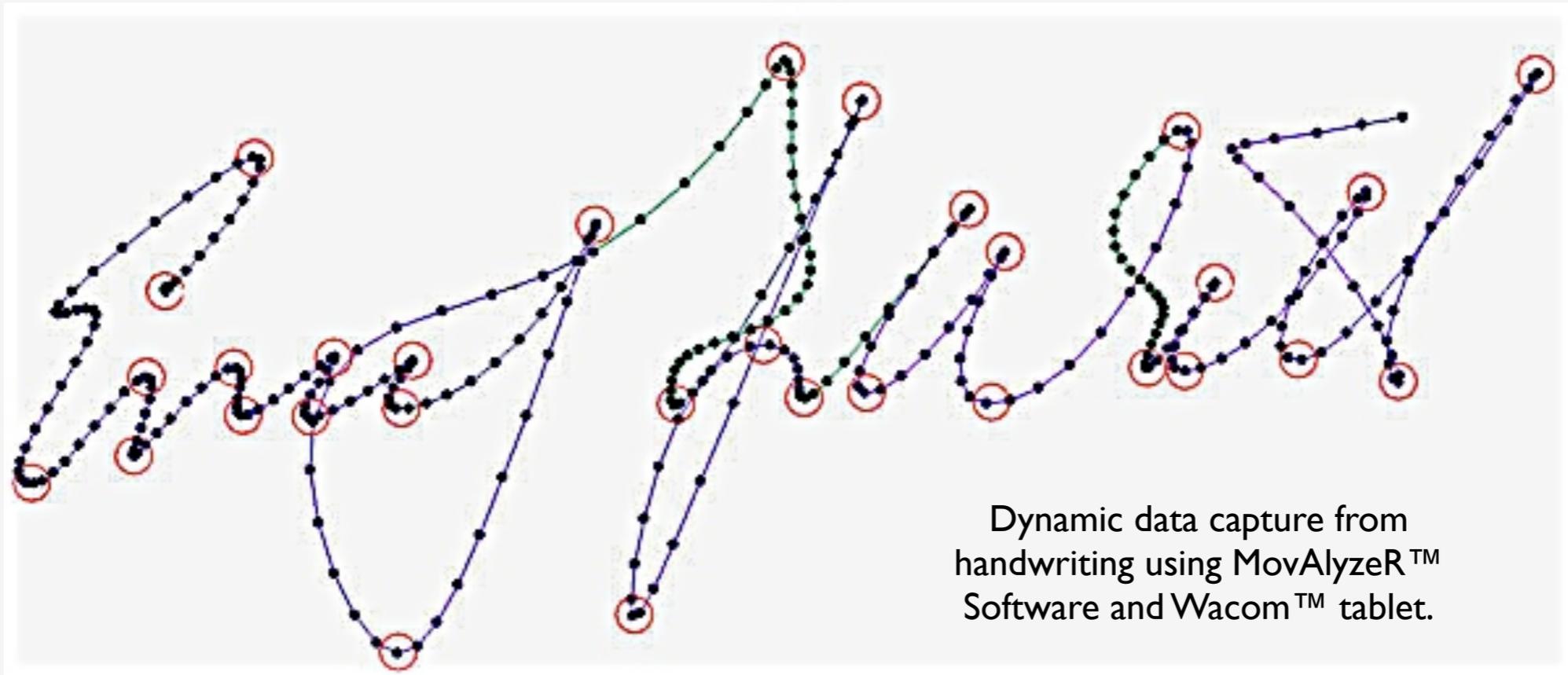
- You have a mental picture of how handwriting should look.
- You can not exactly duplicate that mental image with the pen.
- Each writing/signature varies from all others.



Even twins do not write exactly alike.

Look at your cancelled checks - no two signatures are duplicates.

Natural Variation is part of Human Behavior



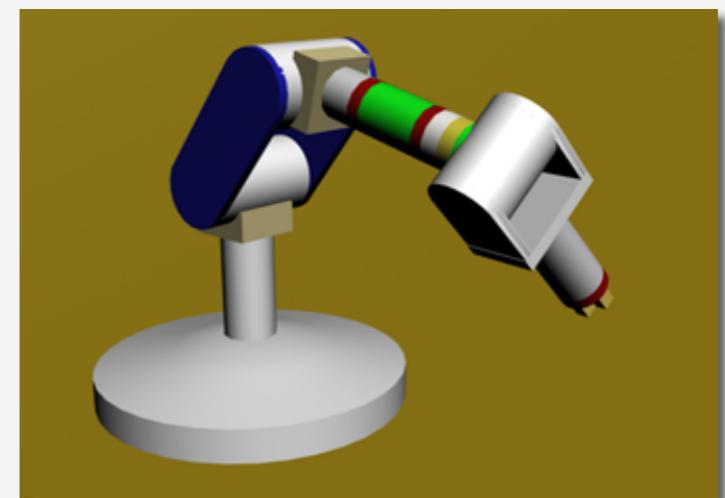
Dots farther apart indicate faster pen speed.

To duplicate this signature, dot timing and placement would have to be duplicated.

6 Degrees of Freedom lead to Variation

* images and info from Wikipedia

- Move up and down (heave)
- Move left and right (sway)
- Move forward and back (surge)
- Tilt forward and back (pitch - shoulder, elbow, wrist)
- Turn left and right (yaw - shoulder, wrist)
- Tilt side to side (roll - shoulder, wrist)



Note: The Autopen is a Robot

Human arms and fingers have “Degrees of Freedom”
Unlike Robots, our degrees of freedom are not rigidly controlled.

Natural Variation = Key to Examining HW

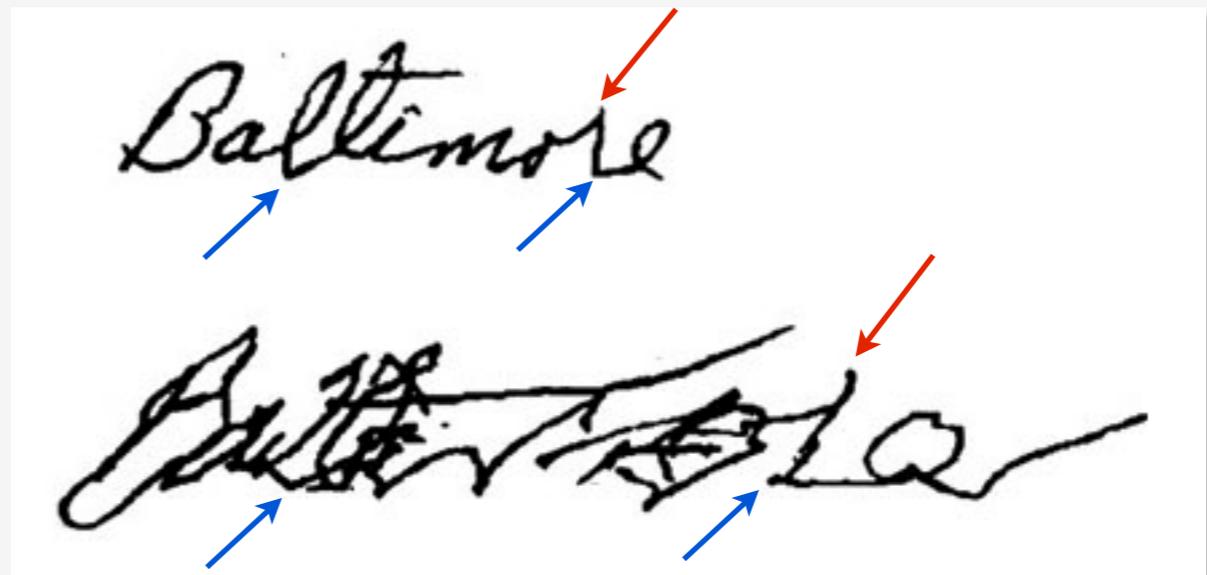
- What is the RANGE of variation of the writer?
- Does the questioned writing fit within that range of variation?
- Are there true differences? Or are there just variations?



There are **MANY** factors that can induce variations.
There can also be “differences” that are explainable.

Some Factors that can Influence Handwriting

- Age
- Health
- Drugs, Alcohol
- Writing Instrument
- Writing Surface
- Writing Position
- Mental State

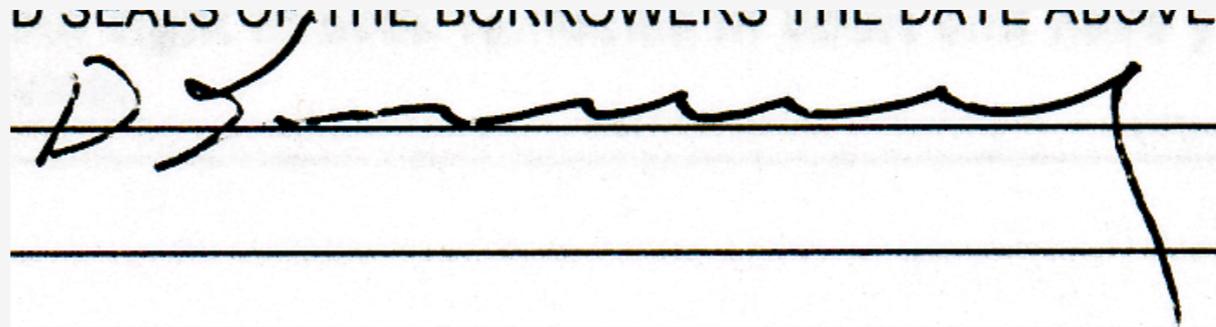


More is known about some of these influences than others. There is research into the cause and effect relationship of these factors.

Identification of a Writer

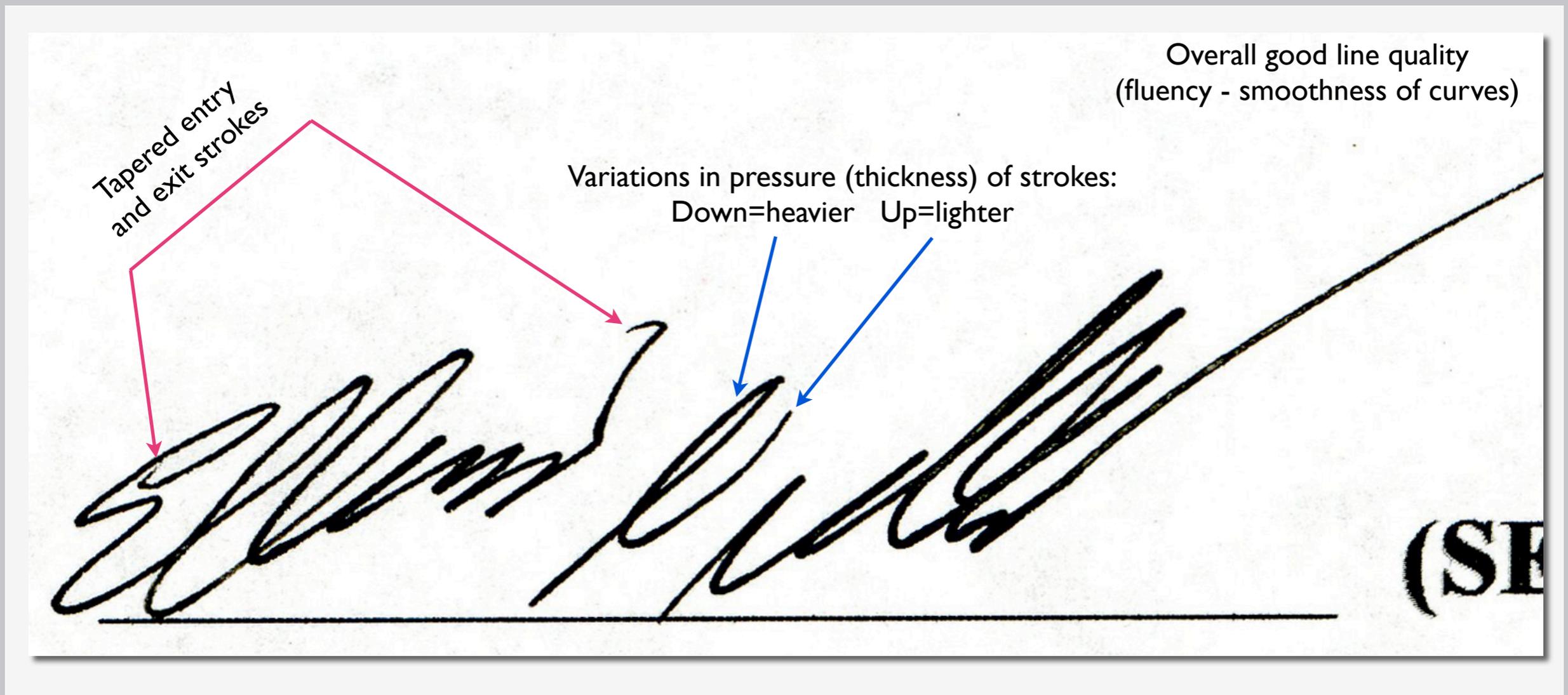
- Writing is sufficiently complex.
- Writing has inconspicuous individualizing features.
- No significant, unexplainable differences.
- Random match unlikely.
- Consider the universe of possible writers.

Simplistic signature -
not difficult to simulate



Signatures that are too simplistic are easy to simulate.
If anyone could simulate it, the identification value of the signature is lost.

Indicators of Genuine Signatures



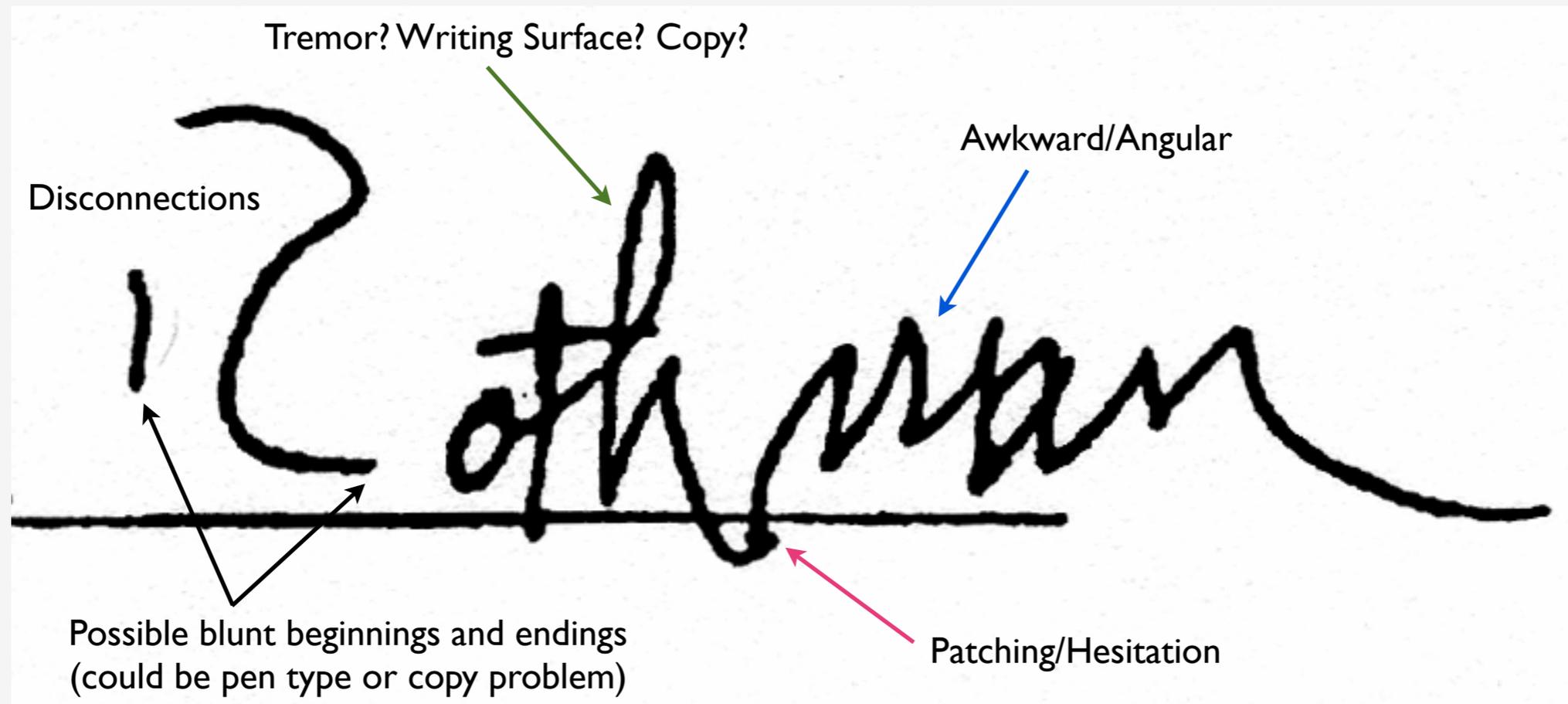
No unusual pen lifts, hesitation, patching, tremor.
These problems are often associated with simulated writing.

Comparison with Known Signatures



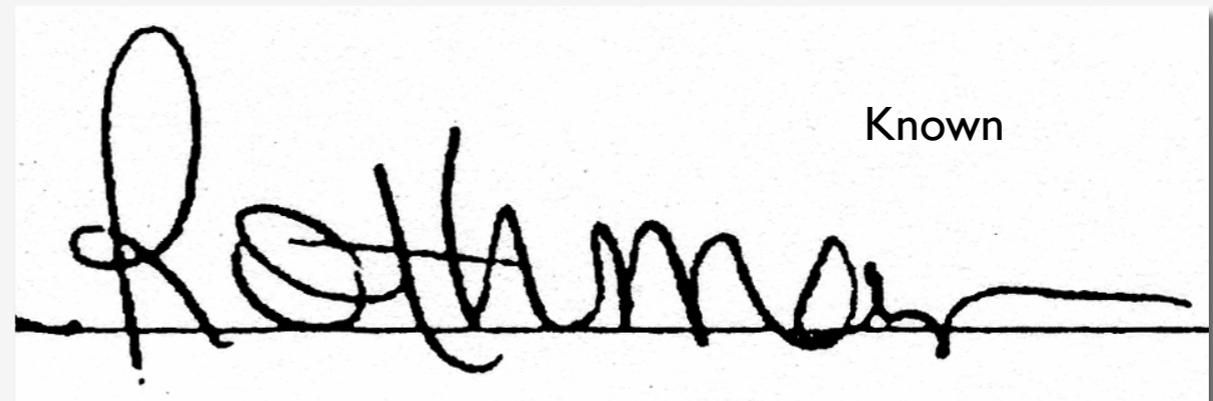
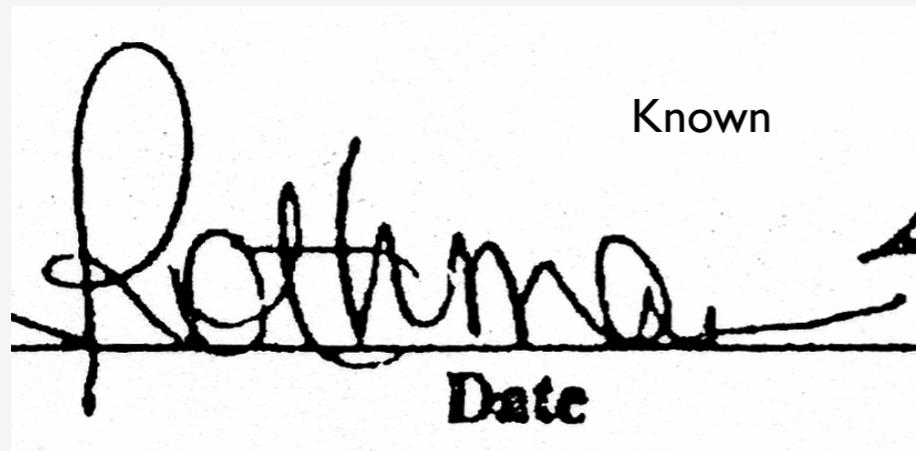
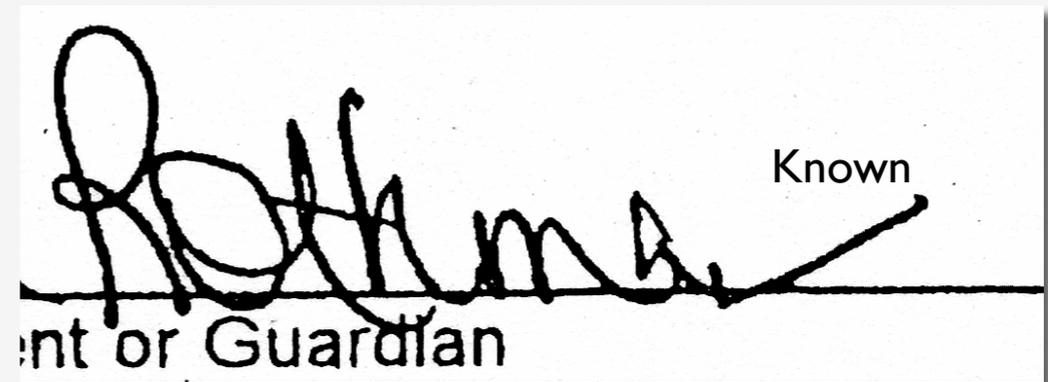
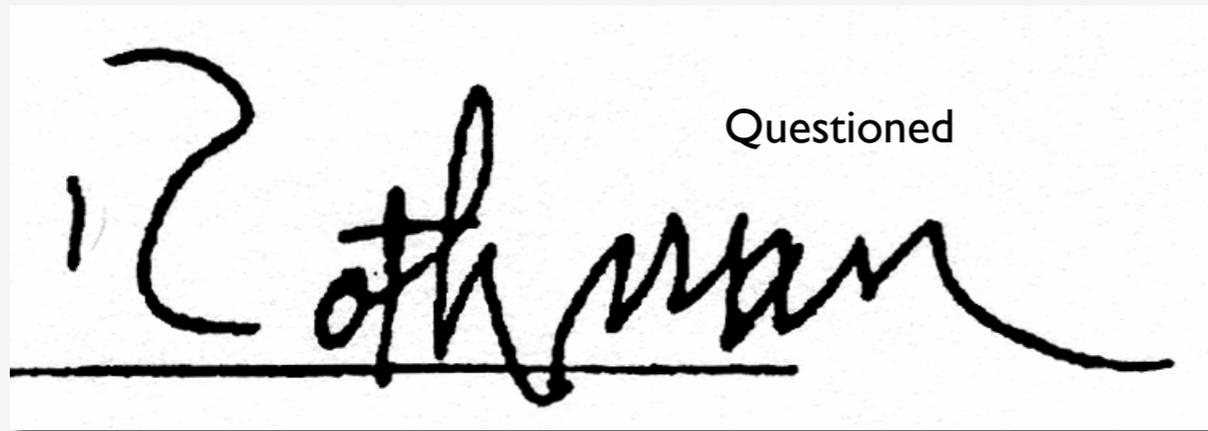
The Q signature was within the range of variation of the Ks.
No indicators of simulation or significant differences were present.

Indicators of Possible Simulation



None of these problems matter if they are also present in the Ks.
If there are “differences” are they explainable? Beware of non-originals.

Comparison with Known Signatures



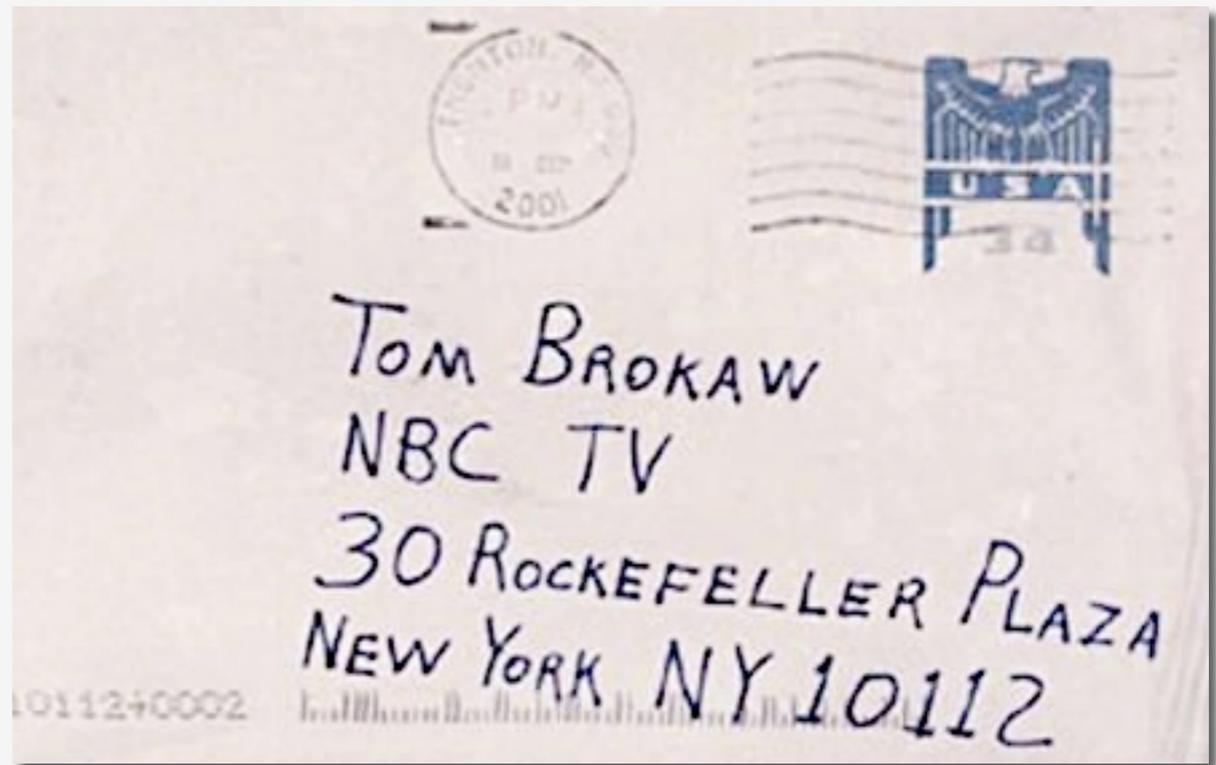
Opinion - Q is NOT Genuine

The Q signature was outside the range of variation of the Ks.
Unusual factors could be ruled out as causing the problems in the Q.

Disguised Writing

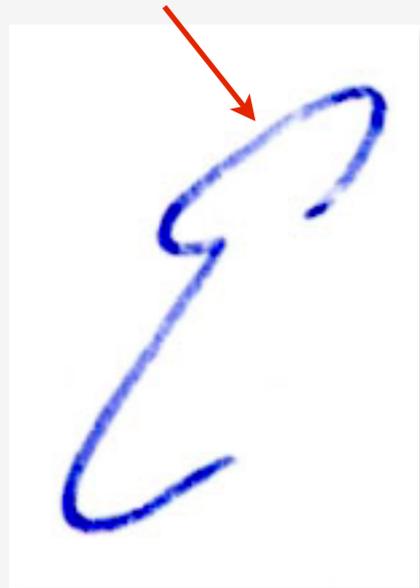
- People have the ability to change their handwriting.
- To avoid detection, they can attempt a disguised writing.
- Most handwriting disguise is not sophisticated, but may be effective.

Anthrax Letters -
2001



Disconnected, block print writing is an effective disguise.
Fortunately, block printing is not usually acceptable as a signature.

Some Typical Methods of Disguise



Natural writing



Change of Slant



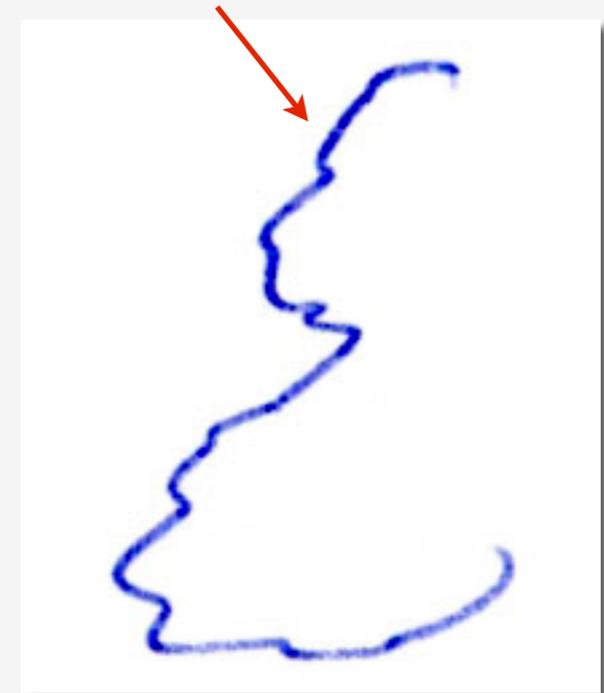
Change of Style



Change of Size



Non-dominant hand



Grotesque letter form

Lack of comparison material is the problem in evaluating disguise. Inconspicuous similarities with natural writing and internal conflict are indicators.

Disguised Writing

- Most people can not invoke many methods of disguise at once.
- Most people can not sustain a disguise.
- Consider the situation - does disguise make sense?

Would someone
disguise a signature
on a Will?



Would Mortgage documents contain disguised signatures?
Always possible as a specific case, but not a likely scenario overall....

Robo-signing

- Humans signing massive numbers of documents without conducting the review implied by those signatures.

“He has signed off on as many as 10,000 foreclosures in a month, according to court documents. That's barely a minute per case, assuming he works a normal eight-hour day.”

'Robo-signer' played quiet role in huge number of foreclosures

By Brady Dennis
Washington Post Staff Writer
Thursday, September 23, 2010

Signature 10,000 is not likely to look like Signature 1.
The human motor system seeks to simplify and act “efficiently.”

Robo-signing

- Some signatures took as little as one second to write.

“It only took him a second to sign each foreclosure document. That's how good Tam Doan got at his job in Bank of America's pre-sale foreclosure department in Southern California...”

Tam Doan, Robo-Signer For Bank Of America: 'I Had No Idea What I Was Signing'

By [Tami Luhby](#), senior writer, CNN Money.com
October 28, 2010

Speed leads to carelessness, omissions, illegibility.

These signatures may not compare well to normally written signatures.

Robo-signing



Faster signatures tend to be more connected.

Some letters are missing or poorly formed.

Methods of Simulating Signatures

- Simple simulation - no model - maybe no person.....
- Freehand simulation - copied from a model
- Tracing - directly or indirectly from a model
 - Backlit tracing - on a light table or against a window
 - Carbon tracing
 - Indentation tracing
- Manufactured Document

Tracing may leave evidence.

Slowness, awkwardness, bits of carbon line or indentation showing.

*** ORIGINAL DOCUMENTS ***

ORIGINAL = Signature of the relevant party is written in ink

Non-Original documents can be unreliable:

1. Details of the writing may be lost (e.g. pressure, pen lifts, stroke direction, entry and exit strokes)
2. Details of possible tracing are lost
3. The document could have been mechanically produced by
 - a. cut-and-paste
 - b. scan-and-print
 - c. overlay-and-copy

Non-original documents can not be “authenticated.”

A signature may be a copy of a genuine signature, but how did it get there?

How to Detect Original Writing

The key is to know the physical properties of the devices and materials (pen, printer, paper, human) and what occurs naturally due to those properties.

- Ballpoint
- Gel
- Roller
- Fiber Tip
- Ink Jet
- Laser
- Autopen

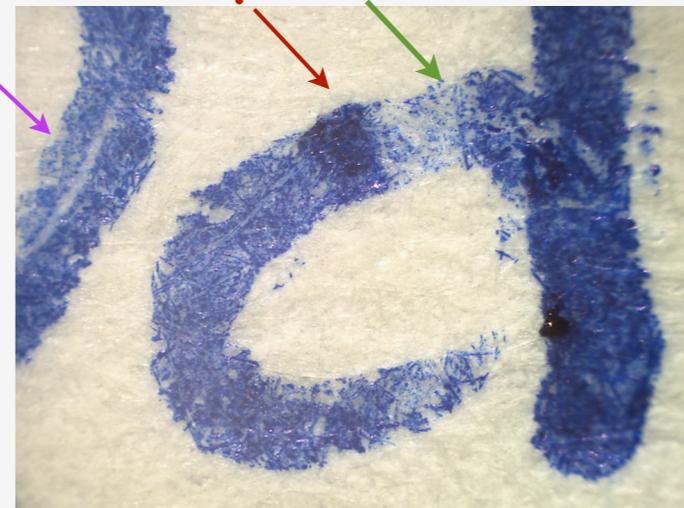


The type of ink and delivery method cause “artifacts.”

These cause and effect relationships direct the examination.

Ballpoint Pen

- Ink is oily/pasty, and coats the paper fibers - but unevenly.
- Ink looks “glossy.”
- There may be “gooping,” skips, striations in the ink line.
- Requires more pressure to write than fluid ink pens (water flows more freely than paste), and may show more indentations. (next slide)

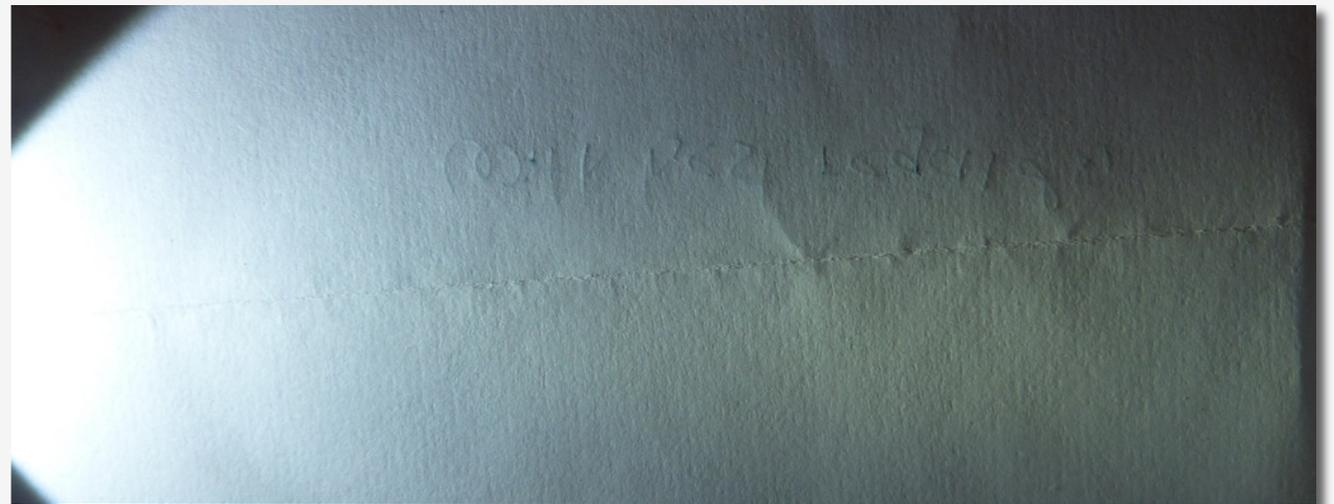


Introduced to the American public in 1945.

Typically found using black, blue, red or green ink.

Indentations

- **Indentations** (furrows) in the paper may be seen with **side lighting** from front and/or back of the paper or **felt** with the fingertips on the back.
- Autopen may create a furrow. Ink Jet and Laser do not.
- Use a **flashlight** held at a low, grazing angle to look for the **3D appearance** of furrows on front and back of the document.

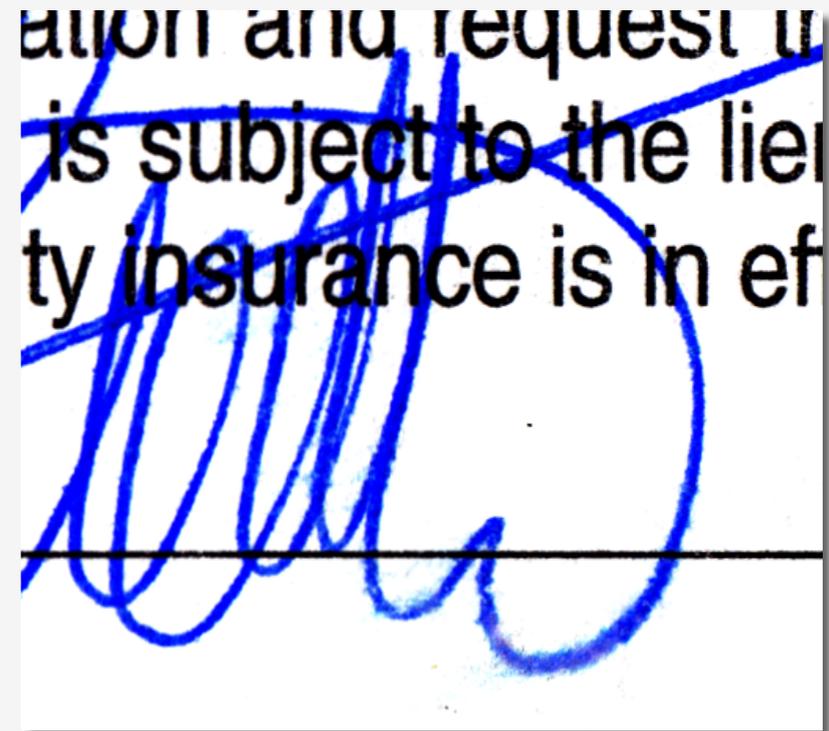


All original pen writings do **NOT** create furrows.

Failure to see a furrow does not mean that the writing is not original.

Rollerball Pen

- Combines **fluid ink** (fountain pen) with ball delivery (ballpoint pen).
- Fluid ink- more likely to **smudge and bleed** into the paper. Ink saturates the paper - may bleed to adjacent fibers - possible ink **flow-back** at the end of a stroke.
- **No** skipping or gooping.
- Indentations possible

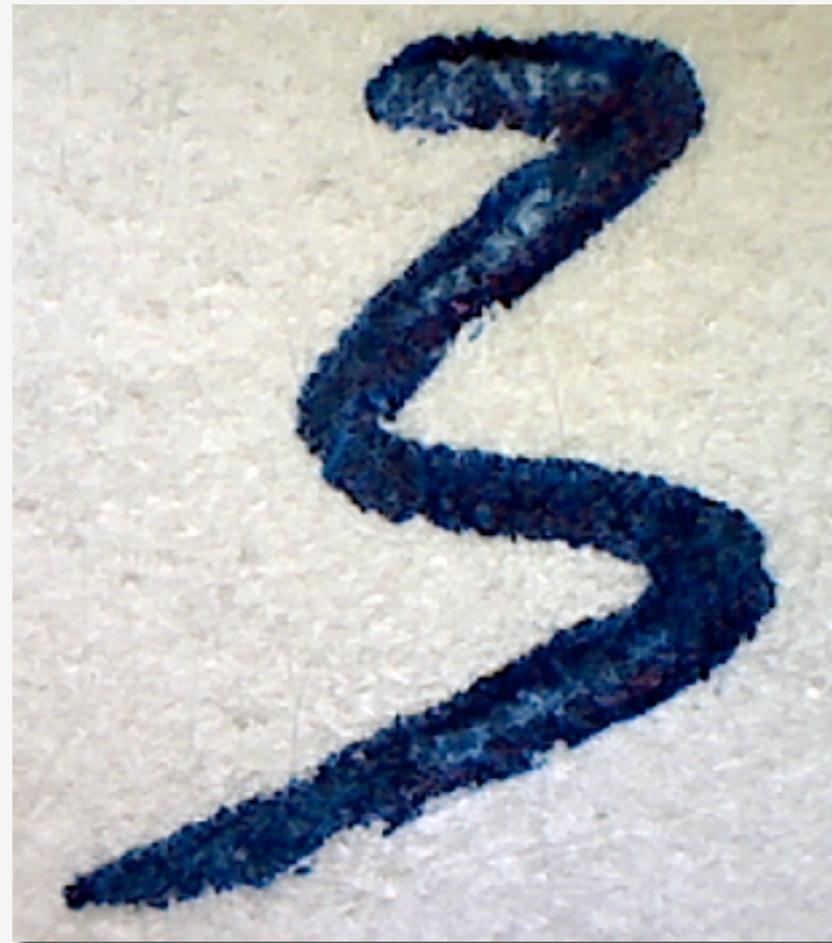
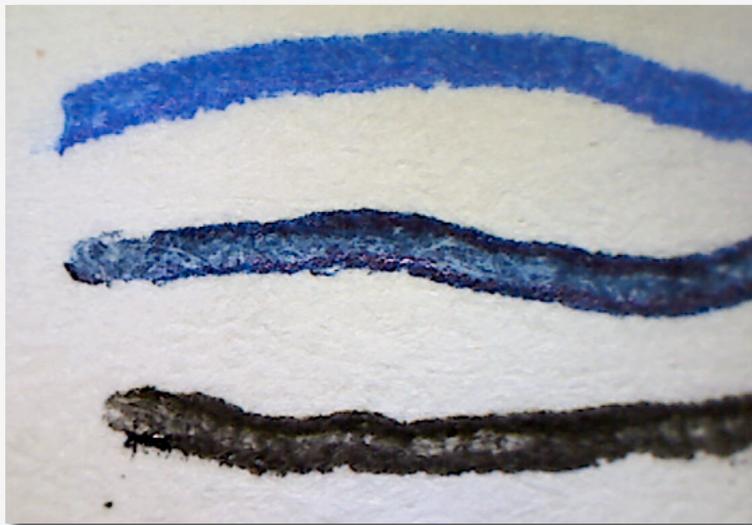


Introduced to the American public in late 1960s.

Broader range of ink colors than Ballpoint.

Gel Pen

- Ink is **semi-fluid** (pigment suspended in a water-based gel) and soaks into the paper.
- Ink line often has light middle - **dark edges** - like train tracks.
- Indentations possible

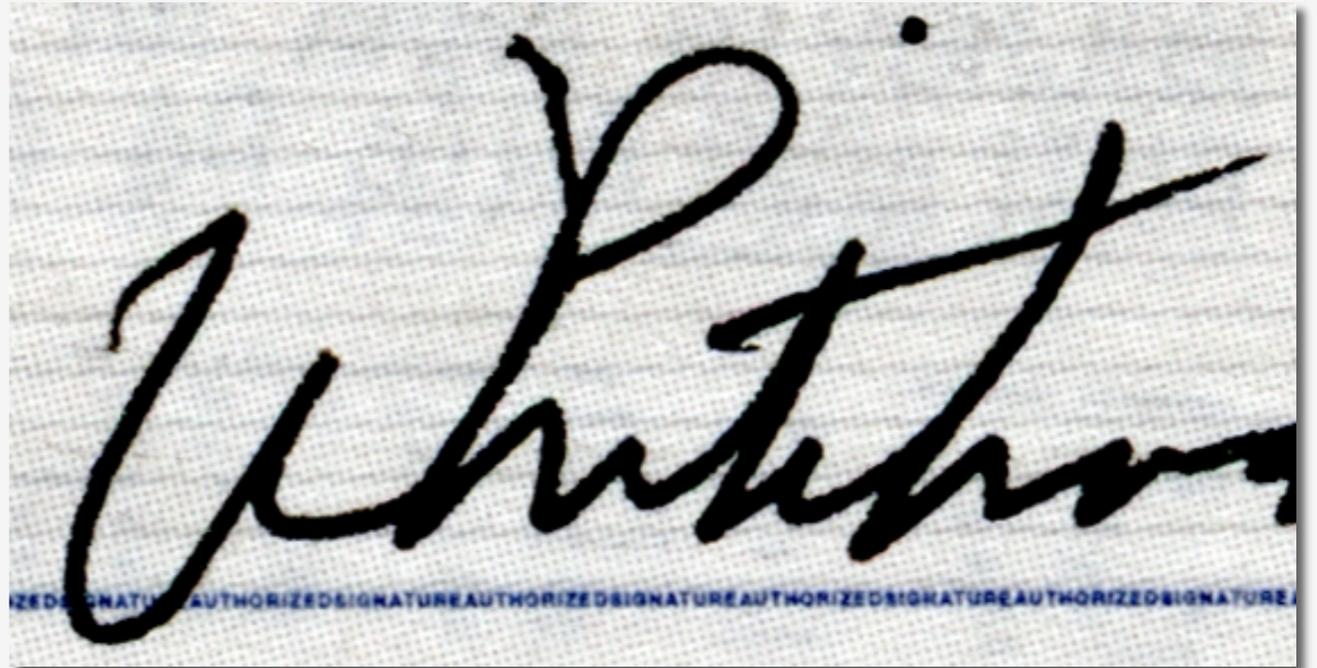


Introduced to the American public in 1984.

Broader range of ink colors than Ballpoint.

Fiber Tip

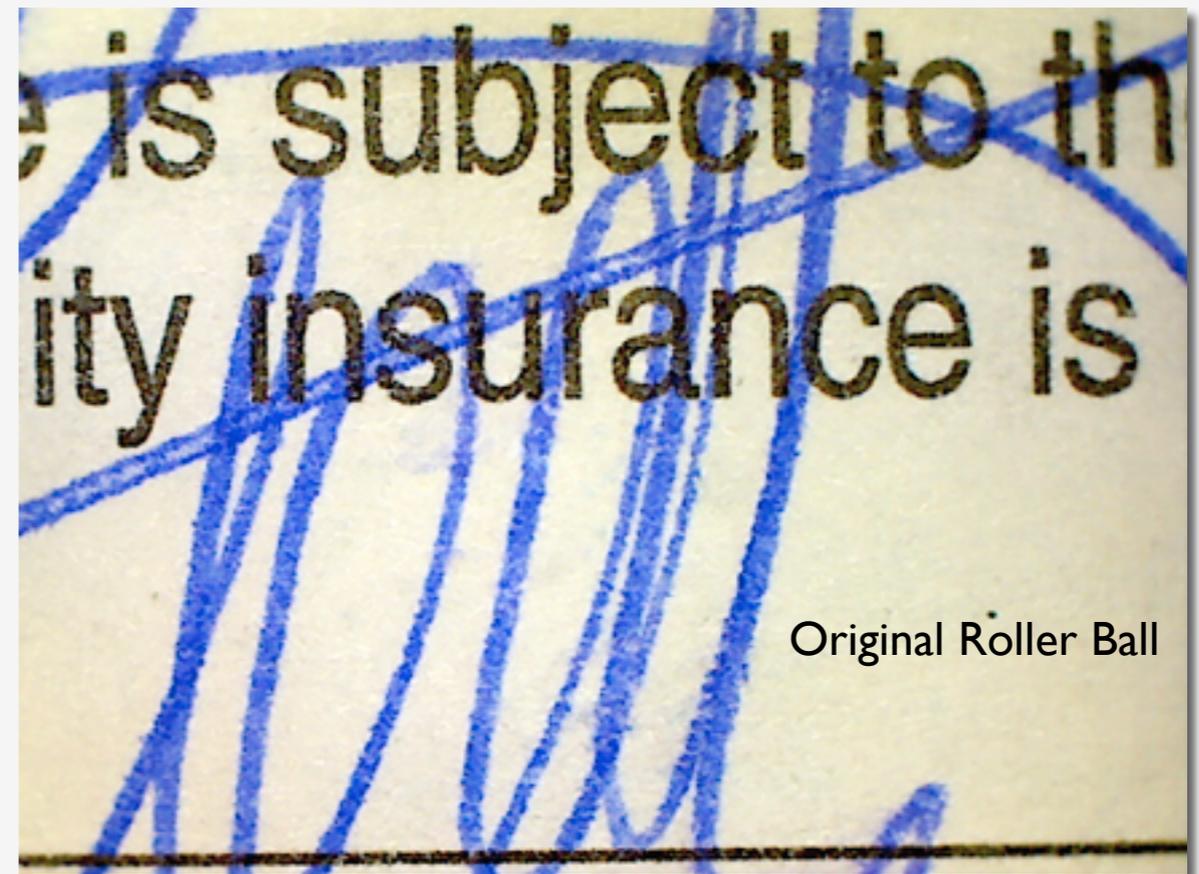
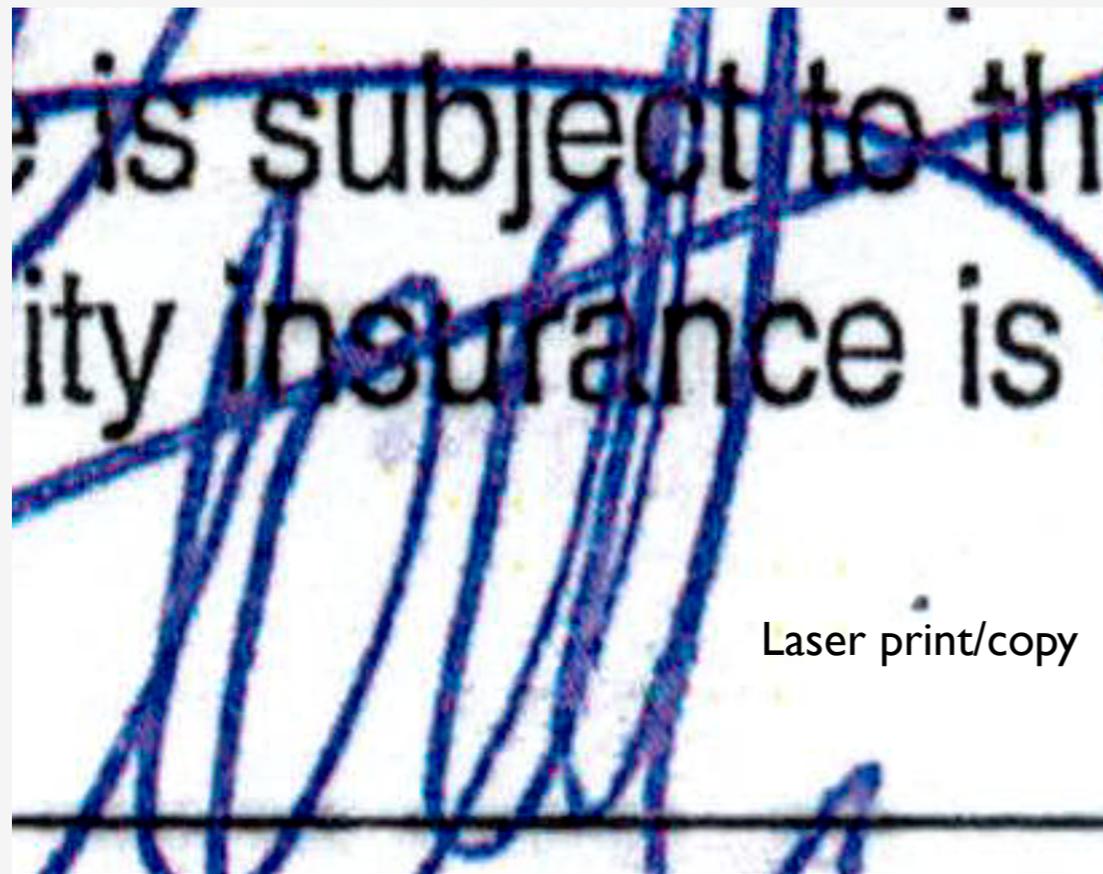
- Ink line may be wider and looks “flat.”
- Ink is fluid and soaks into or through the paper.
- Indentations may be visible.
- Harder to detect hesitations, patching, flaws in the writing.
- Possible uninked center in the ink line.



Introduced in the mid 1960s.

Ink may bleed through to the back of the paper.

Evaluating Copies/Printouts vs. Originals

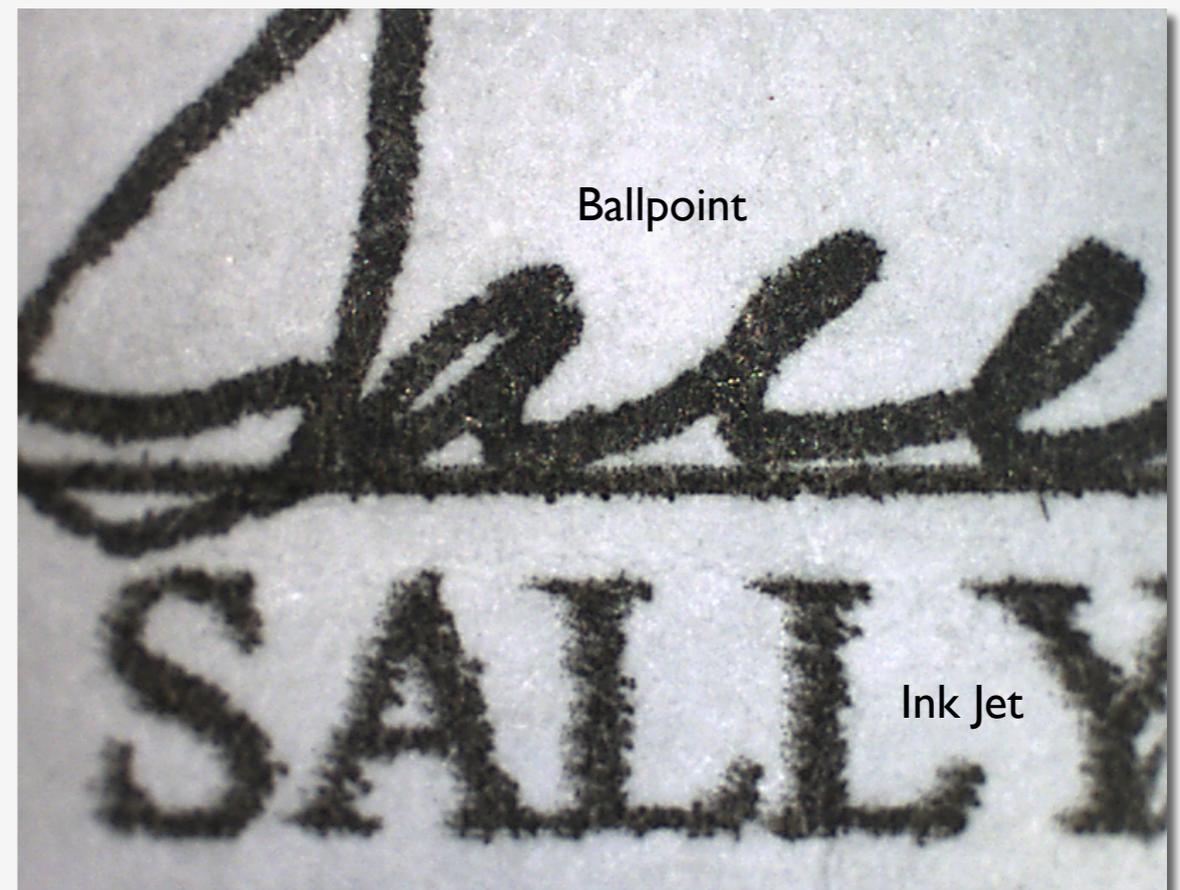


Laser: The “writing line” and printed matter are composed of black or colored “dots” rather than a continuous color of ink.

A 7X magnifier should be sufficient to see these features.
Color printer/copiers mix 4 colors of dots (CMYK) to produce all colors.

Evaluating Copies/Printouts vs. Originals

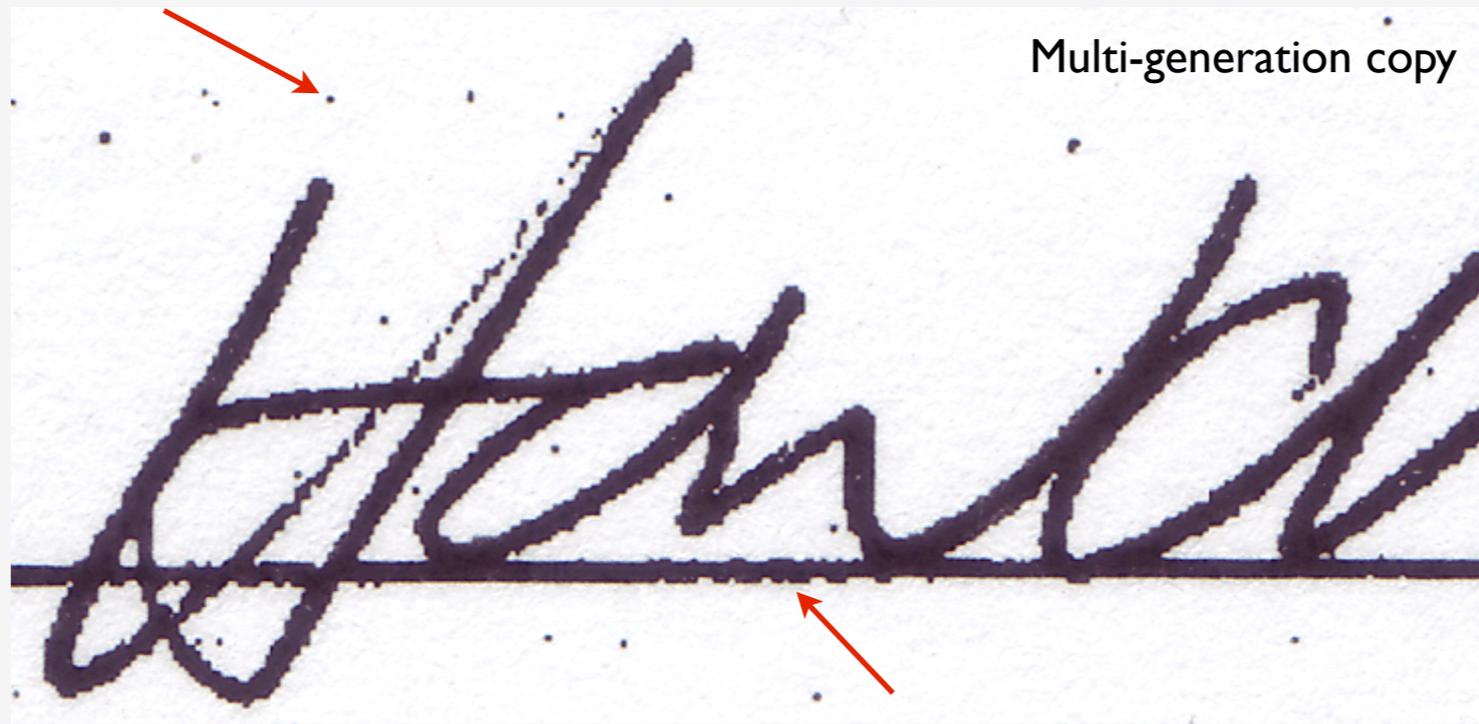
Consider the appearance of the supposed ink line as compared to the machine printed text/lines. They should be different.



The appearance of the ink and signature line are different.
This will require at least 7X magnification for good observations.

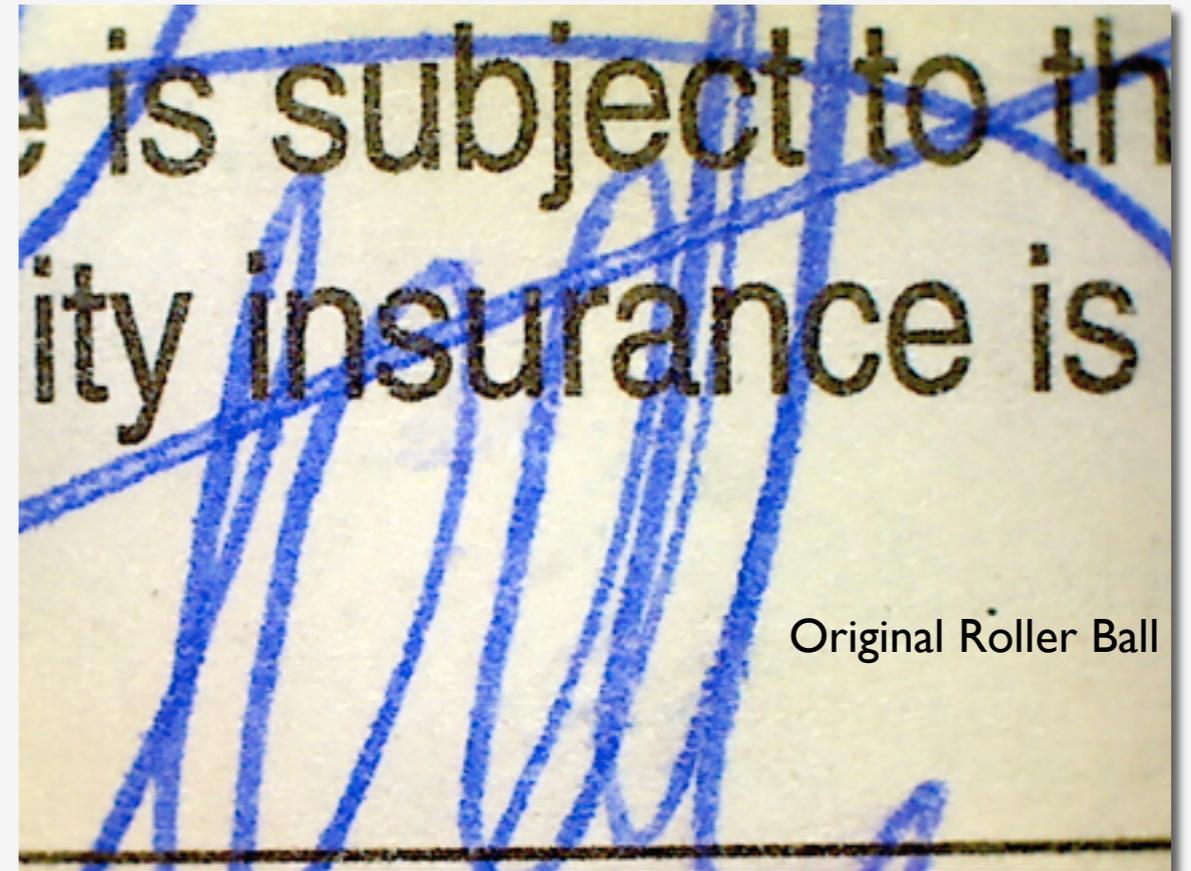
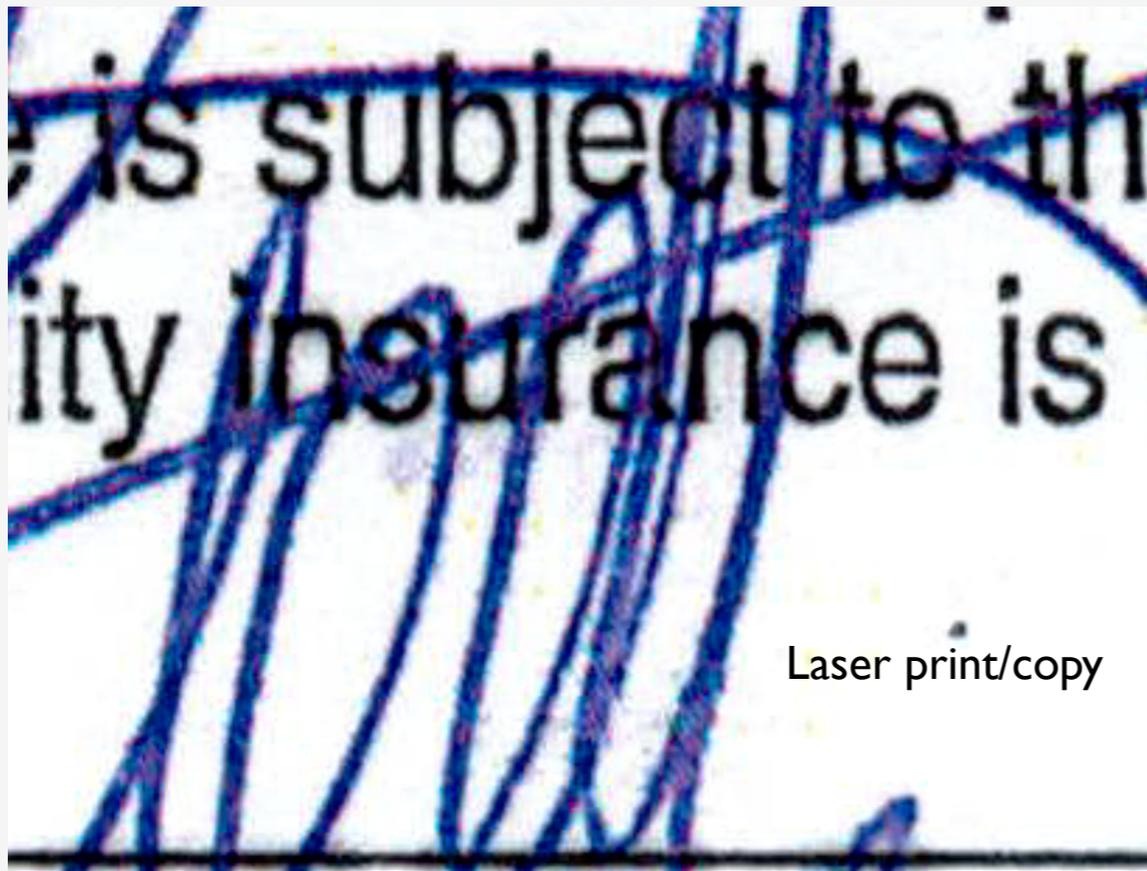
Evaluating Copies/Printouts vs. Originals

Everything is “flat” - no 3rd dimension of impression into the paper (not always visible even on originals), and the “handwriting” and printed line have the same characteristics.



The printed signature line is ragged.
Stray toner dots surround the writing.

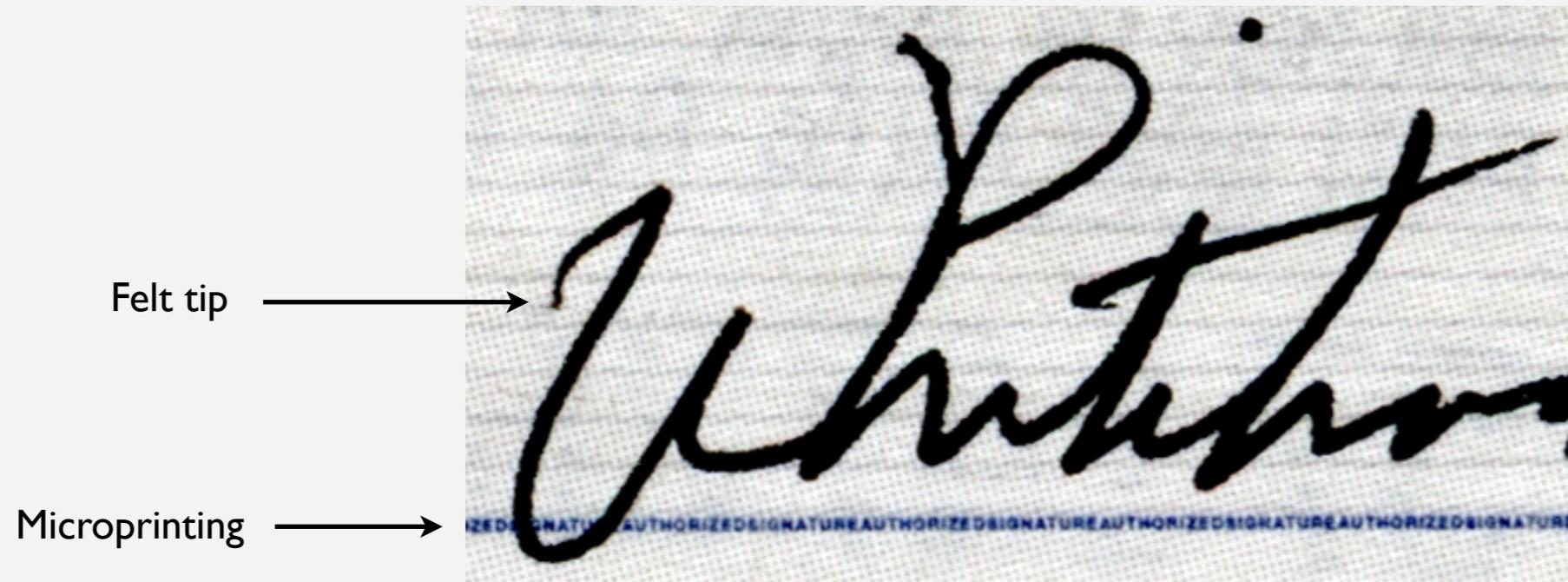
Evaluating Copies/Printouts vs. Originals



Signatures, or other handwriting, should never be duplicates of each other. If they are really duplicates, then one or both must be mechanically produced.

Overlay documents on a light table to check for duplication.
Scan documents into Photoshop and use "Layers" for the Hi-tech method.

Fiber Tip



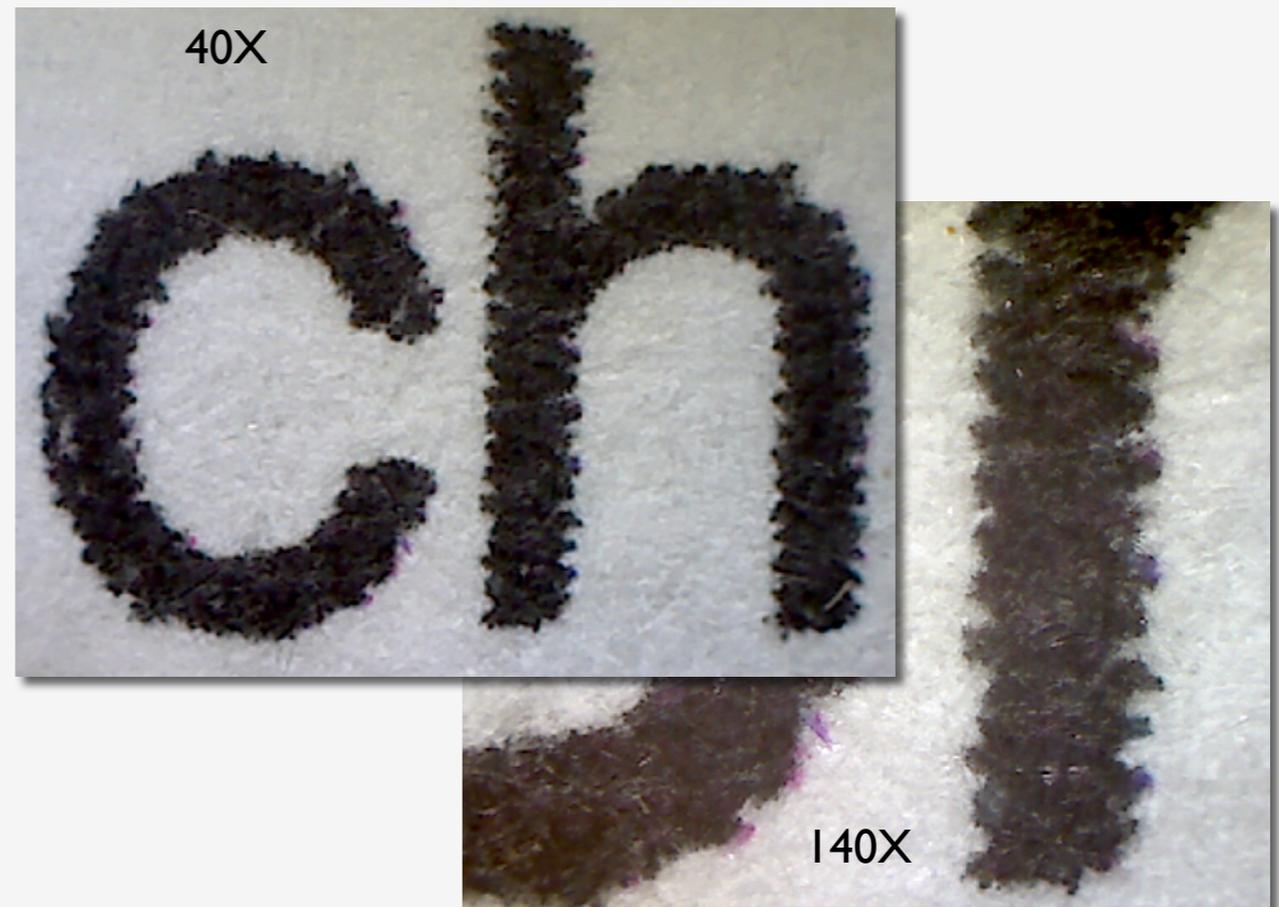
- Microprinting and other difficult-to-reproduce security features are indicators that the base document is “original.”

Microprinting is designed to be “uncopyable”

Security features include security threads, planchettes, color-shifting inks.

Ink Jet Printing

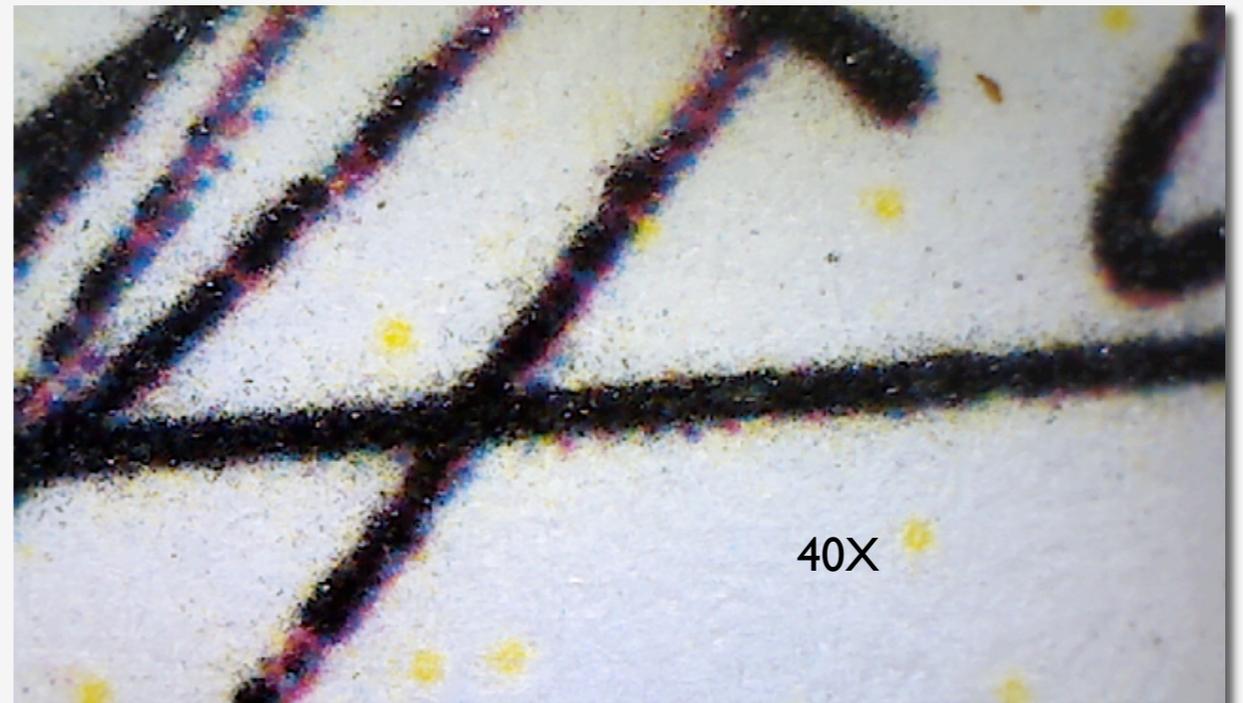
- Sprays various sizes and densities of drops of ink onto paper - controlled by software
- There may be “wicking” of ink at the edges where the ink jet heads do not shut off precisely. This can show the direction that the print head traveled on that particular pass across the paper.



The wicking at the edges are an indicator of Ink Jet printing.
This print head printed when moving in both directions.

Laser Copying and Printing

- Dry toner particles are electrostatically positioned and **heat-fused**.
- There may be toner scatter around the printing. The writing line is composed of dots that may have a “**glossy**” heat-fused appearance.
- There is little or no distinction between laser copy and laser print.



First commercially introduced from 1975 to 1981.

Larger yellow dots in the background are part of a copier security code system.

Cautions and Limitations

40X
Rough Paper



40X
Smooth Paper



140X
Rough Paper



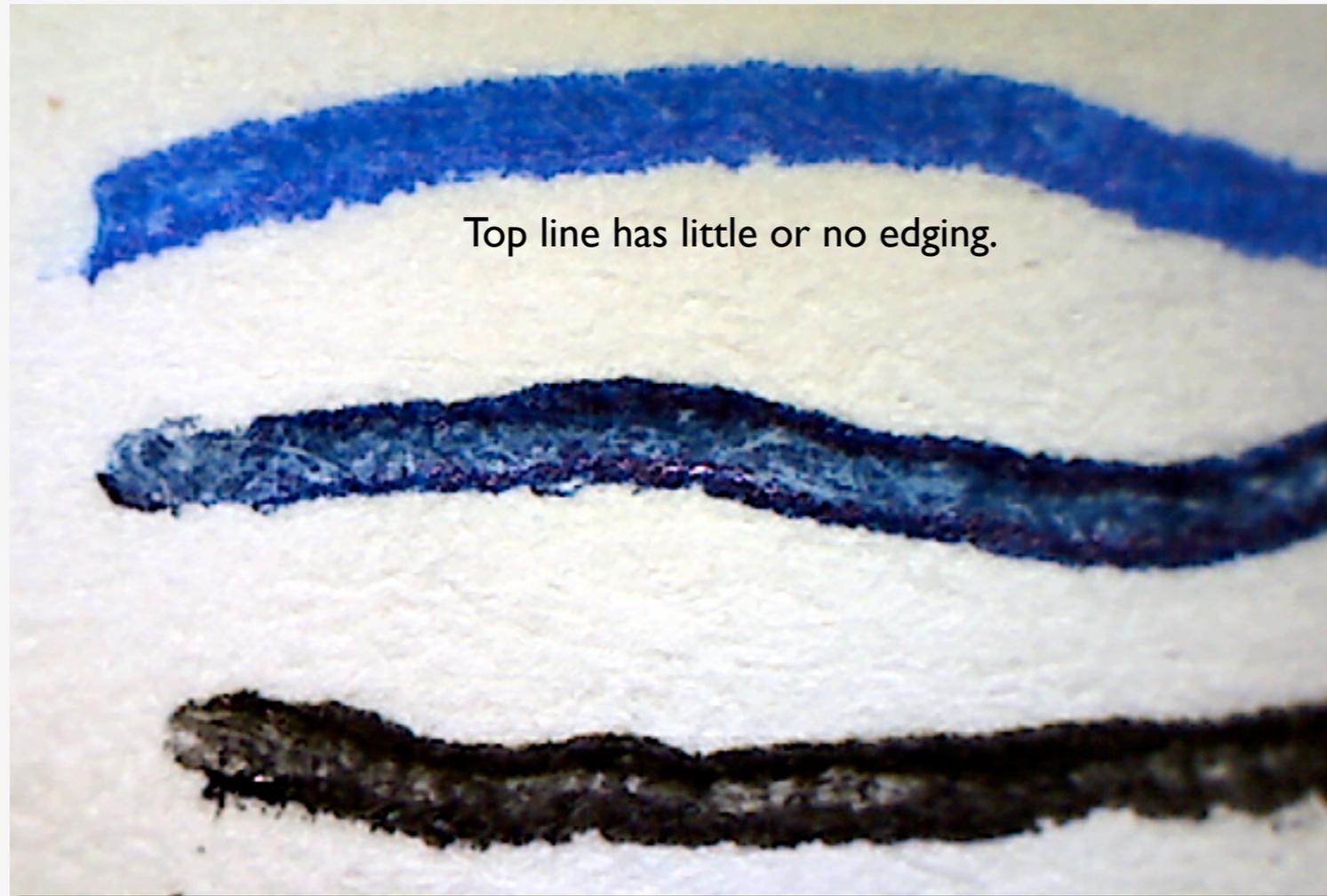
140X
Smooth Paper



Same pen - Different paper.

The substrate (writing surface) influences the appearance of the writing line.

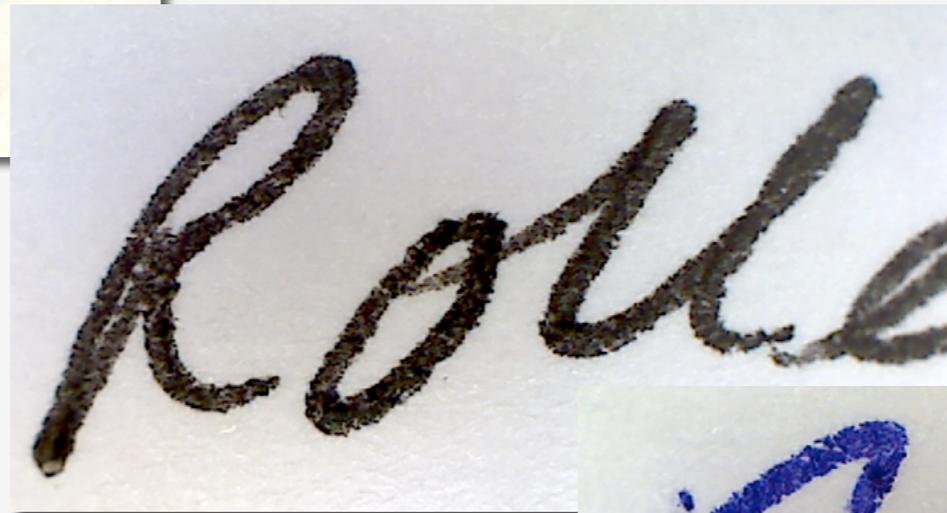
Cautions and Limitations



All gel pens are not created equally.

Manufacturers are always updating - parameters change.
It is acceptable - even advisable - to be inconclusive in some instances.

Cautions and Limitations



Roller ball is especially difficult to identify. It can have features that overlap with gel and ball point.

But - you can determine that these are scans of original writing.
If you remember your 7X magnifier and flashlight.

Summary - Original? Non-Original?



Top Row: Ballpoint - Gel - Rollerball - Fiber Tip
Bottom Row: Laser Print - Ink Jet Print - multigeneration copy

Manufactured Documents

- Modern office Equipment is a blessing and a curse.
 - Scanners
 - Laser/Inkjet color copiers/printers
 - Higher resolution faxes
 - E-fax
 - Rubber Stamps
 - Autopen
- Photoshop type software makes it EASY.

Only if you have a handwritten original can you be sure how a signature got onto the page.

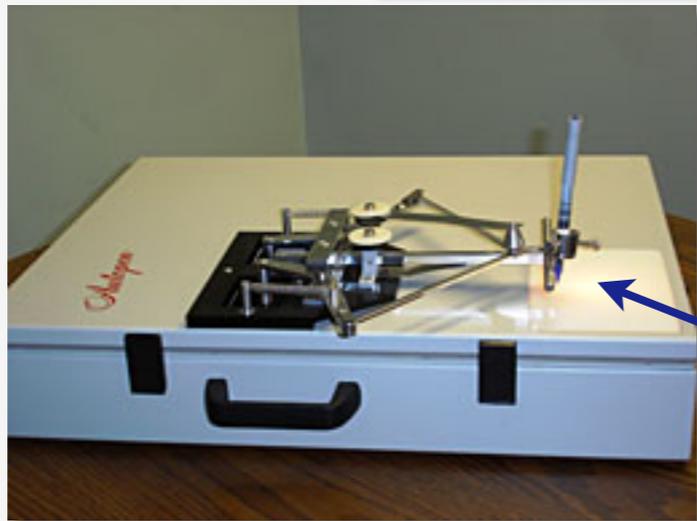
Manufacturing Documents

- **SCREENCAST: How to Create Fake Documents**

This video demonstrates the manufacture of documents.

The Autopen

- SignatureMachine.com and Realsig.com



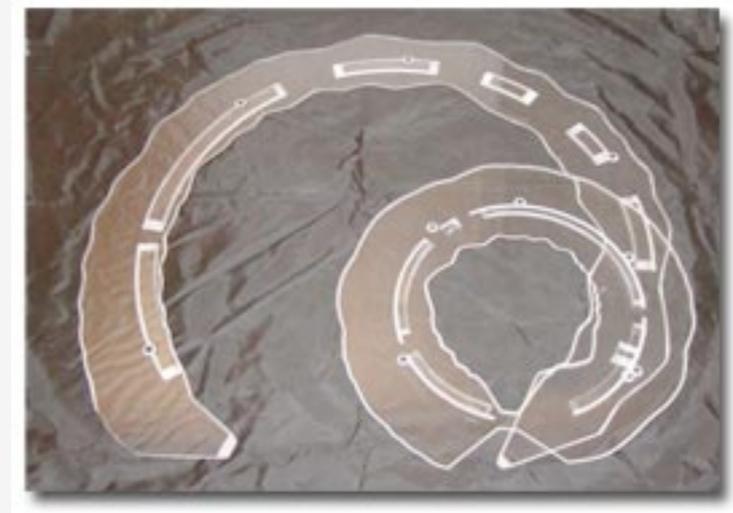
Any pen can be used.

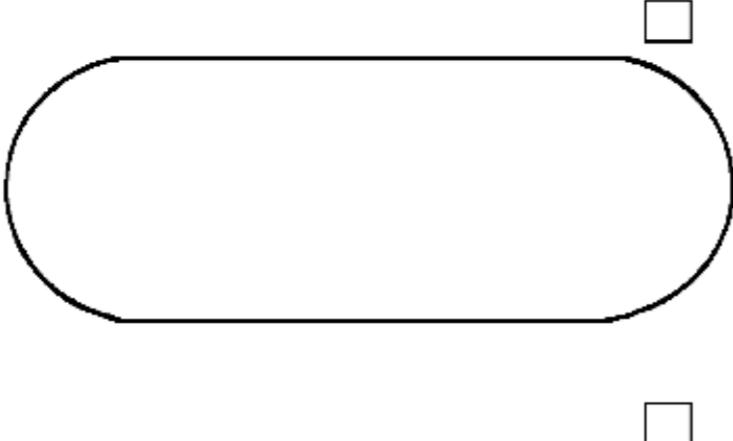
Autopens are used for mass signing by celebrities/politicians.

Also used for advertising - to deliver a more “personal” message.

The Autopen Matrix

- A plastic or metal matrix must be ordered from the company.
- The matrix must be ordered using a standard from, and there are security procedures involved.





TIPS FOR A BETTER SIGNATURE REPRODUCTION

/ Try to use the same pen for the samples as will be used on your Autopen. We suggest you use your favorite pen.

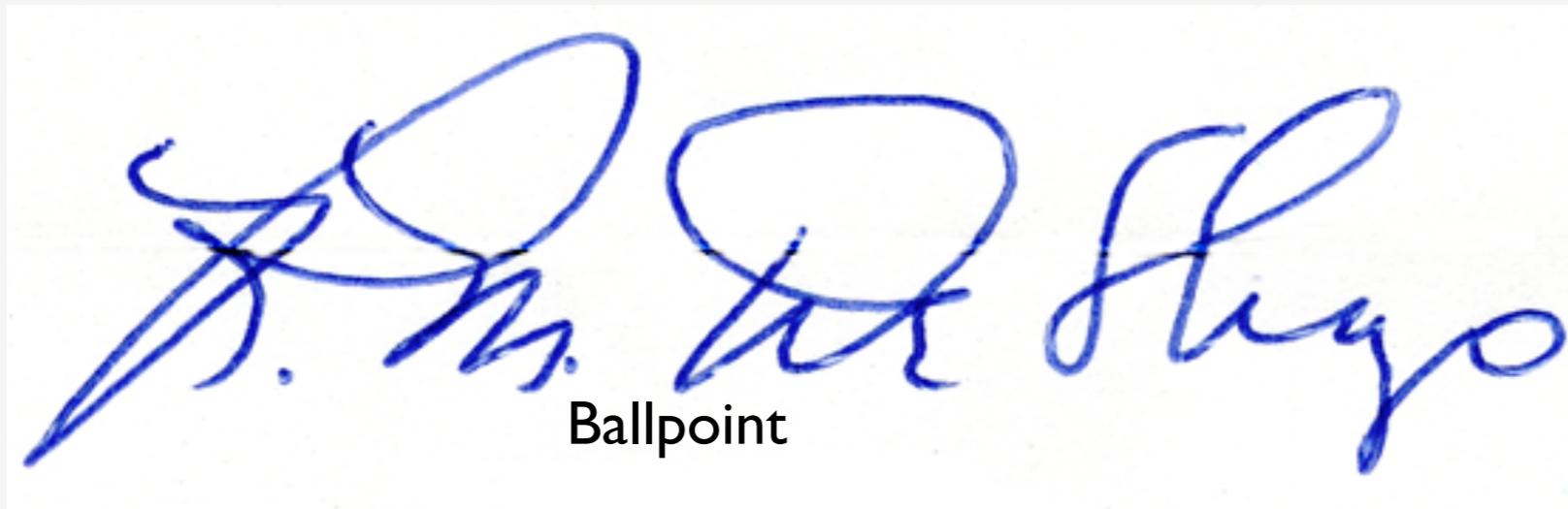
/ Do not use period, dots, dashes, or extra marks unless absolutely necessary or it is a part of your signature.

/ Occasionally, a feature of a person's signature becomes his/her "icon". If this is the case, please include this information along with any other special instructions.

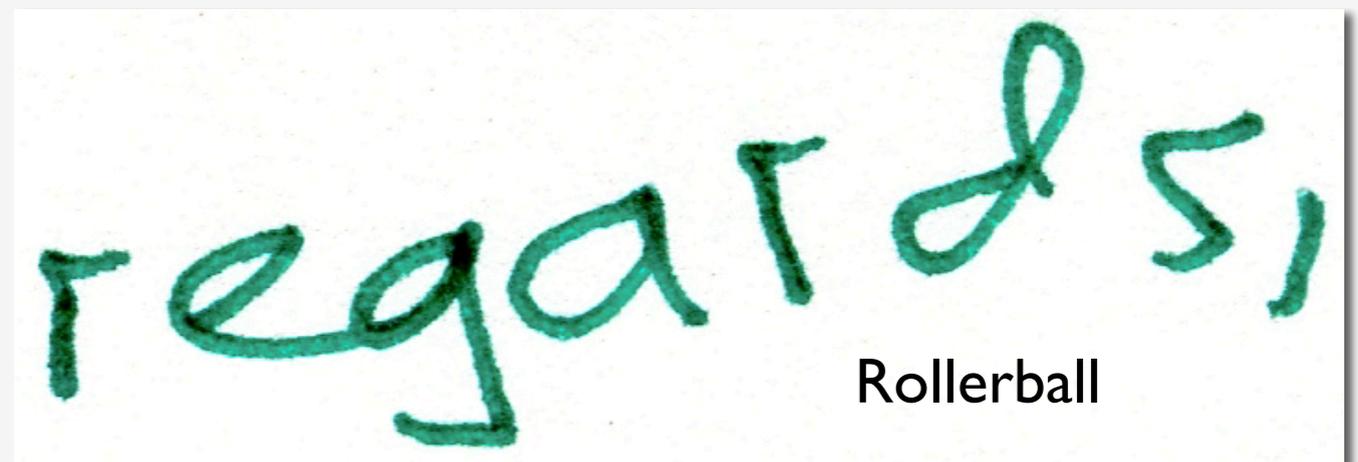
The cost of each matrix is \$150-175.

Changing matrices is an easy procedure.

The Autopen Signature Appearance



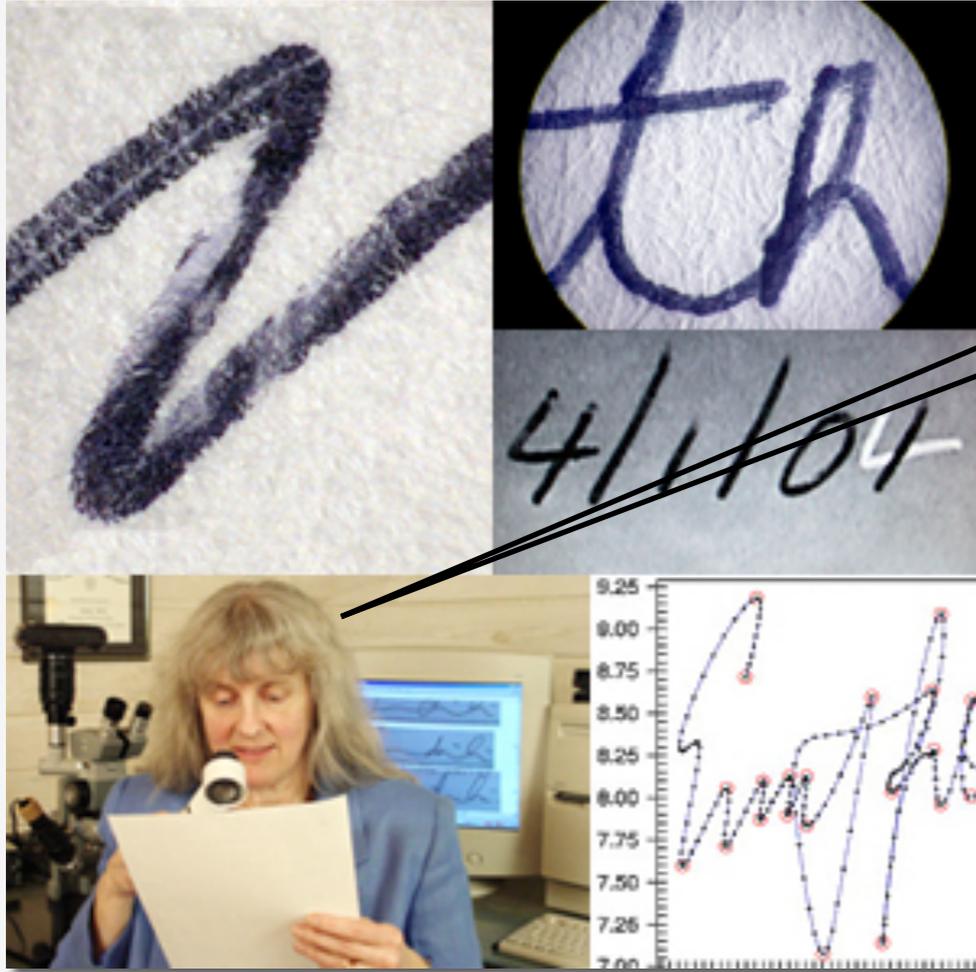
- Ink line may be ragged.
- Blunt starts and finishes.
- Pressure is even.



The speed at which the Autopen is set can influence the result.

All signatures from the same matrix will be VERY similar.

Contact Information



“Respect documents -
Demand originals!”

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Raleigh, NC 27658
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ewill@Qdewill.com
877-699-7414

Thank you for your attention!