

$$F = G \frac{m_1 m_2}{d^2}$$

Forensic Science Document Analysis Part 2

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$$\frac{df}{dt} = \lim_{h \rightarrow 0} \frac{f(t+h) - f(t)}{h}$$

$$\frac{\partial^2 u}{\partial t^2} = c^2 \frac{\partial^2 u}{\partial x^2}$$

$$F - E + V = 2$$

$$\phi(x) = \frac{1}{\sigma \sqrt{2\pi}} e^{-\frac{(x-\mu)^2}{2\sigma^2}}$$

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12
Characteristics
of
Handwriting
Slant

Left, right, or
variable?

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12

Characteristics of Handwriting Line Habits

Is the text on the
line, above the
line, or below the
line?

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12 Characteristics of
Handwriting
Fancy Curls or Loops

- Are there fancy loops?
- Any other distinguishing features?

right right right right

12 Characteristics of Handwriting Places of Crosses on T's & Dots on I's

- Are t's crossed?
 - t's crossed in middle, toward top, or toward bottom
- Are i's dotted?
 - Dotted toward left, toward right, or centered

Handwriting Examination

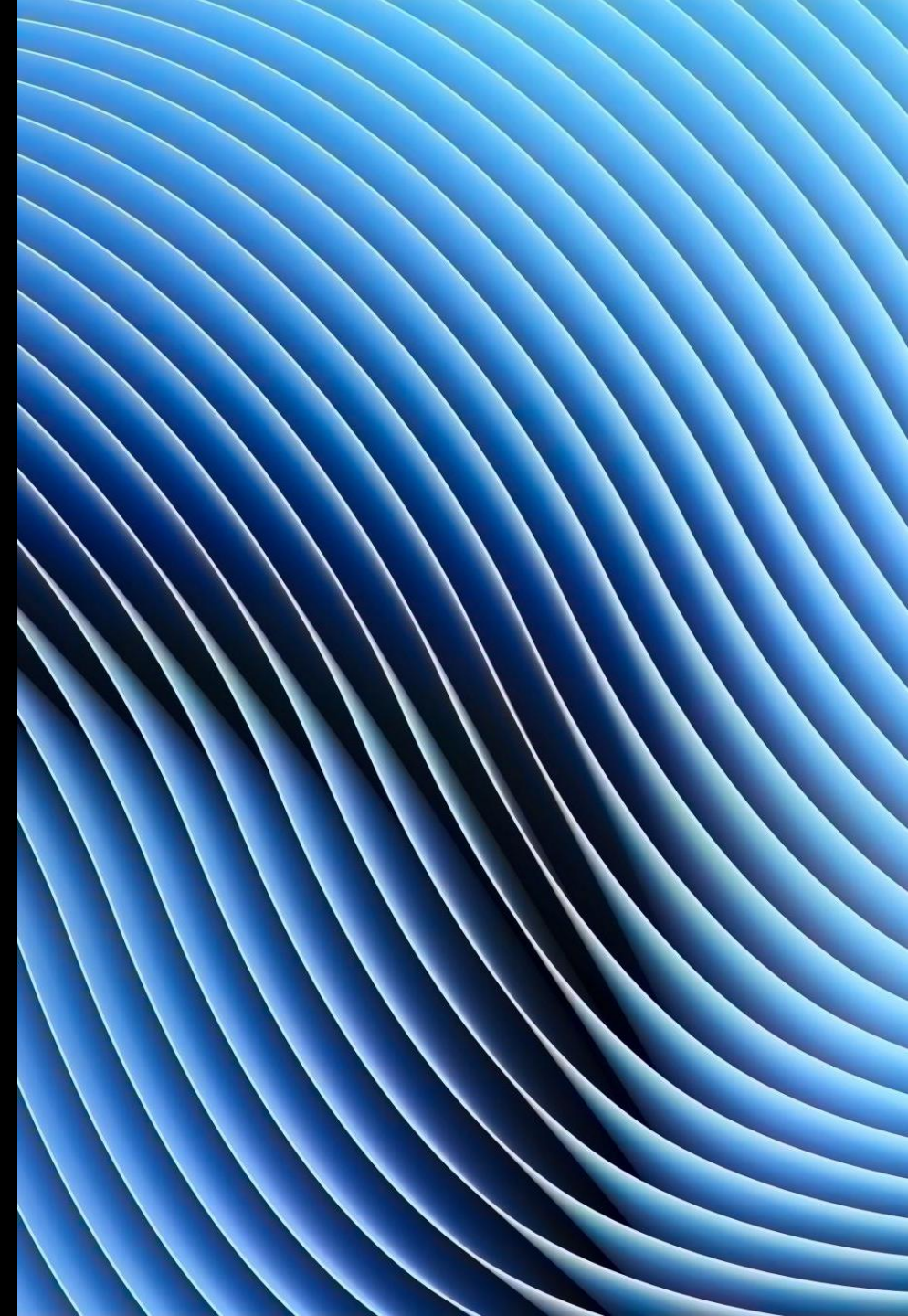
Two writings came from one person if:

- their similarities are unique and
- no unexplainable difference(s) are found

Examine the questionable document for detectable traits and record them

Obtain a known sample of the suspect's writing (*an exemplar*)

Compare and draw conclusions about the authorship of the questionable document



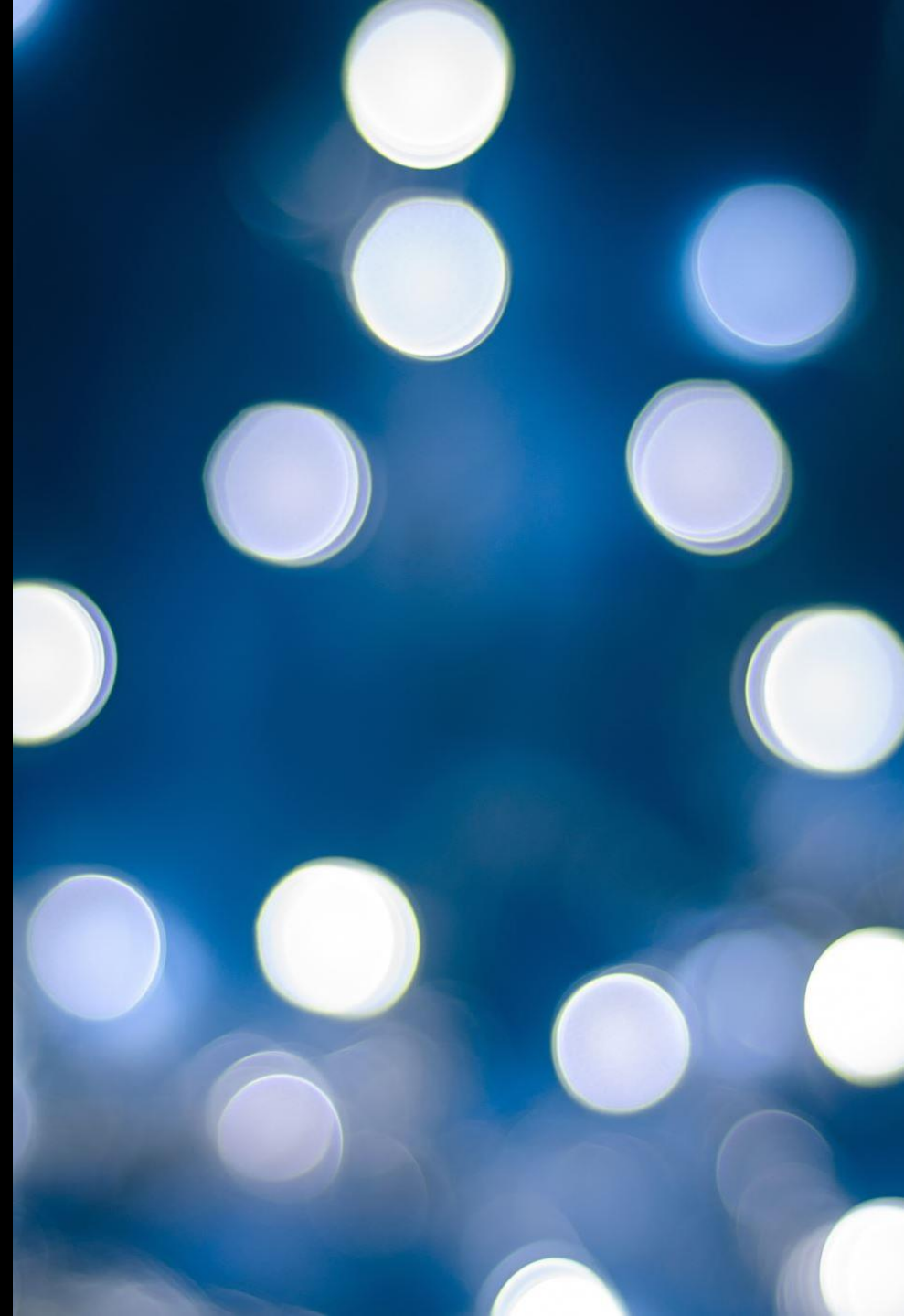
Technology Used in Handwriting Analysis

Biometric Signature Pads

- “Learns” to recognize how a person signs
- Evaluates speed, pressure, and rhythm of the signature
- Recognizes forgeries by the detection of even slight differences

Computerized Analysis

- Compares handwriting samples objectively
- Compared with samples stored in databases



Handwriting Analysis

Evidence in the Courtroom

- Expert explains how comparisons were made
- Cross-examination by defense attorney may follow
- Must be able to justify and defense usually has their own expert witness to try to refute

Shortcomings in Analysis

- Are the base documents real or fake?
- Did mood, age, fatigue impact the handwriting?
- Did experts miss details any details?



Forgery and Fraudulence (Fraud)

Forgery- making, altering, or falsifying a person's signature or any other aspect of a document with the intent to deceive another

- Forged documents include:
 - checks
 - employment records
 - legal agreements
 - licenses
 - wills

Fraudulence—forgery for material gain

Check Forgery

- Check forgery can include:
 - ordering another's checks from a deposit slip
 - altering a check
 - intercepting another's check, altering, and cashing it
 - creating a check from scratch



Preventing Check Forgery

- Chemically sensitive paper
- Large font size requires more ink and makes alterations more difficult
- High resolution borders that are difficult to copy
- Multiple color patterns on paper
- Embed fibers that glow under different light
- Use chemical wash detection systems that change color when a check is altered



Counterfeiting

Counterfeiting- When false documents or other items are copied for the purpose of deception

- A criminal activity existing since antiquity

Items commonly forged today include:

- Currency
- Traveler's checks
- Food stamps
- Certain bonds
- Postage stamps

Currency

Security features are added to paper currency that scanning cannot reproduce

Regular printer paper contains starch.

Paper currency contains rag fiber instead of starch.

People usually first suspect money as fake because its texture does not feel right



Verifying Authentic Currency

New security
features:

1. Portrait stands out and appears raised off the paper
2. Contains clear red and blue fibers woven throughout the bill
3. Has clear, distinct border edges
4. Treasury seal is shown with clear, sharp saw-tooth points
5. Watermark appears on the right side of the bill in the light
6. The security thread is evident—a thin embedded vertical strip with the denomination of the bill printed in it
7. There is minute printing on the security threads, as well as around the portrait
8. When the bill is tilted, the number in the lower right-hand corner makes a color shift from copper to green



Hidden numbers
and letters

Written above
Hamilton's name



Thank You For
Your Attention!
Questions and Comments