Handwriting Analysis, Forgery, and Counterfeiting

JAHS Forensic Science
By the end of this chapter you will be able to:

- Describe 12 types of handwriting characteristics that can be analyzed in a document
- Demonstrate an example of each of the 3 types of handwriting traits
- Identify the major goal of a forensic handwriting analysis
- Distinguish between the terms *forgery* and *fraudulence*
- Identify several ways that businesses prevent check forgery
- Describe 4 features of paper currency that are used to detect counterfeit bills
Introduction

- **Document Analysis** – the examination and comparison of questioned documents with known material.

- **Questioned Document** – a signature, handwriting, printing, or other written mark whose source or authenticity is in dispute or uncertain.
Questioned Documents

Examples

- Checks
- Certificates
- Wills
- Passports
- Licenses

- Money
- Letters
- Contracts
- Suicide notes
- Receipts
Careers in Document Analysis

- **Document Expert** – specially trained person who scientifically analyzes handwriting and other features in a document
  - Examines written notes and compares various traits.

- **Graphologist** – person who studies the personality of the writer based on samples.
  - Not a scientific analysis
  - Can indicate writer's personality type
Job of a Document Expert

- Examine and compare questioned documents with known material

Field investigations include:
- Handwriting
- Computer printouts
- Commercial printing
- Paper and ink
- Threatening, ransom, or suicide notes

Analysis helps identify a document’s author
Scotland Yard, the FBI, and the Secret Service use handwriting analysis

- Determines a match between known material (known as an exemplar) and a questioned document.
- To be admissible in court, scientifically accepted guidelines must be followed.
Everyone's handwriting exhibits natural variation based on several factors:

- Type of writing instrument (pen, pencil, marker, etc.)
- Mood
- Age
- How hurried we are

Despite variation, each person has a unique handwriting style

- Writing subconsciously, characters are formed from habit
The traits are functions of formatting or of letter or line form.

<table>
<thead>
<tr>
<th>Specific trait</th>
<th>Line quality</th>
<th>Spacing</th>
<th>Size consistency</th>
<th>Continuous writing</th>
<th>Connecting letters</th>
<th>Lettering complete</th>
</tr>
</thead>
<tbody>
<tr>
<td>Description</td>
<td>The letters flow or are erratic and shaky.</td>
<td>The letters are equally spaced or crowded.</td>
<td>The ratio of height to width is consistent or inconsistent.</td>
<td>The writing is continuous or the writer lifts the pen.</td>
<td>Capitals and lowercase letters are connected and continuous or are not connected and continuous.</td>
<td>The letter begins and ends on the page or part of the letter is missing.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Specific trait</th>
<th>Cursive and printed letters</th>
<th>Pen pressure</th>
<th>Slant</th>
<th>Line habits</th>
<th>Fancy curls or loops</th>
<th>Placement of crosses on t’s and dots on i’s</th>
</tr>
</thead>
<tbody>
<tr>
<td>Description</td>
<td>Letters are cursive, printed, or both.</td>
<td>Pressure is equal or not when applied to upward and downward strokes.</td>
<td>If there is a slant, it is left, right, or variable.</td>
<td>Text is on, below, or above the line.</td>
<td>There are or are not fancy curls.</td>
<td>These are correct or misplaced.</td>
</tr>
</tbody>
</table>
Handwriting Examination

Two writings came from one person if:
- their similarities are unique and
- no unexplainable difference(s) are found

1. Examine the questionable document for detectable traits and record them.
2. Obtain a known sample of the suspect’s writing (an exemplar).
3. Compare and draw conclusions about the authorship of the questionable document.
Exemplars

Exemplar best examples:
- Letters
- Diaries
- Greeting cards
- Personal notes

It’s helpful if the exemplar contains some of the same words/phrases as the document in question.

Forgeries are documents made, adapted, or falsified with the intention of deceiving someone.
Obtaining an Exemplar

- To minimize conscious writing for exemplars:
  - Don’t show the suspect the document in question
  - Don’t give the suspect instructions on punctuation or spelling
  - Pen and paper should be similar to questioned 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

- **Infrared Spectroscopy**
  - Can determine ink type
Handwriting

- Evidence in the Courtroom
  - Expert explains how comparisons were made
  - Cross-examination by defense attorney may follow

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

- Americans write 70 billion checks per year – approximately $27 million illegitimate checks are cashed each day.

- 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
- Embed fibers that glow under different light
- Use chemical wash detection systems that change color when a check is altered
Forgery of a piece of writing such as a historic letter or manuscript is literary forgery.

Best forgeries aim to duplicate the materials found in the original:

- old paper
- chemically treated materials to fake an older look
- inks mixed from substances that would have been used at the time
- watermarks that add the appearance of age
- tools and styles that would have been popular at the time
When false documents or other items are copied for the purpose of deception, it is called **counterfeiting**.

Items commonly forged today include:

- Currency
- Traveler’s checks
- Food stamps
- Certain bonds
- Postage stamps
Counterfeit 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.
  - Number one reason people suspect fakes is because it doesn’t feel right.
  - Counterfeit detection pens contain iodine, which reacts with starch in paper fibers.
Currency is always being redesigned to make it more difficult to counterfeit.

New bills:

- $20 - October 9, 2003
- $50 - September 28, 2004
- $10 - March 2, 2006
- $5 - Early 2008
- $100 - October 8, 2013
HOW TO SPOT A COUNTERFEIT BILL

1. Security Thread
2. Watermark
3. Color-Shifting Ink

- Portrait
- Serial Number
- Federal Reserve Indicator
- Concentric Fine Lines
- Microprinting
- Check Face and Plate Number
- Back Plate Number
Authentic vs. Counterfeit

The tiny, intricate lines and details on paper money do not always print well in counterfeit bills.
Verifying Authentic Currency

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
Security Features

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.

9. New $100 bills contain a holographic security ribbon.

10. Bell in the inkwell - color shifts from green to copper, so it appears to disappear.
Examples of Security Features

- Hidden numbers and letters
- Written above Hamilton’s name
Handwriting analysis compares questioned documents with exemplars to establish authorship.

Aspects of a person’s handwriting style can be analyzed to ascertain authenticity.

Many new features of paper currency help prevent counterfeiting.

Technological advances have enhanced chances of detecting forged documents.