



A Study of Handwriting & Specimen Signature Forensics

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Abstract:

This Study makes an attempt to Handwriting & Specimen Signature Forensics through Handwriting Analysis & Signature Examination. The Paper also attempts to study briefly on the science of handwriting analysis and its history. Frauds have also taken place through Handwriting & signature forgery so a attempt is made to explain technology used for detecting forgery through Handwriting Analysis Forensics. It will also enable reader to understand Signature Examination & its Method, Types of Forgery through handwriting & Signature and its impact. An attempt is also made to study the Key Indicators of Forged Signature.

Introduction:

Forensic The word forensic comes from the Latin word *forēnsis*, meaning "of or before the forum." Means – Relating to, used in, or appropriate for courts of law or for public discussion or argumentation. Relating to the use of science or technology in the investigation and establishment of facts or evidence in a court of law. Handwriting Forensics is a standard forensics practice to assess the identity of a person from written documents. Like Fingerprints every person's handwriting is unique and personalized. Because handwriting is difficult to disguise and forge, **Handwriting analysis** is a good tool for including or excluding a person's when determining a match between known material, known as exemplar, and a questioned document. The goal of forensic handwriting analysis is to answer questions about a suspicious document and determine authorship using a variety of scientific methods. Methods are based on the principle of identification in that "two writings are the product of one person if the similarities are unique and there are no fundamental unexplainable differences." Document

experts often compare handwriting characteristics of a questionable document to those of a known sample or exemplar to try to determine if the same person wrote the document. These analyses can also help detect forgeries.

Signatures serve as means of identification and are typically used in the course of business to authorize financial transactions or even establish the legality of important documents. Sometimes, the addition of a signature can increase the value of an item, such is the case of celebrity memorabilia. As such, the high value items attached to such signatures make them likely targets of forgery as compared to handwriting. **Signature Examination** may be applied to cases involving alleged fraud, forgery and cheating, insurance claims, authentication of wills, etc. The authenticity of signatures on business documents such as contracts or agreements often forms the point of contention between two parties in a civil dispute. In such cases, a forensic handwriting expert will compare the signatures on the questioned documents with

specimens to determine if the said person could have signed those documents.

Objectives:

The Major Objectives of the case study are:

1. To Understand the Concept of Handwriting Forensics.
2. To Study the Technology used in Handwriting Analysis.
3. To Understand the Concept of Signature Examination.
4. To Get Well Acquainted with Handwriting & Signature Forgery & also the types of Signature Forgery.
5. To Study the Indicators of Forged Signature in Handwriting Forensics.

Methodology:

The data for this research paper were collected from professionals who are actively engaged in the field of forensics. Some data was also obtained through internet. This research paper is based on Forensics which means appropriate for courts of law.

The Science of Handwriting Analysis:

The science of handwriting analysis is based on the premise that no two individuals can produce exactly the same writing and that an individual cannot exactly reproduce his own handwriting, otherwise known as variation. Variations are natural deviations that occur in a person's handwriting.

The Process:

Handwriting analysis involves a comprehensive comparative analysis between a questioned document and known handwriting of a suspected writer. Specific habits, characteristics, and individualities of both the questioned document and the known specimen are examined for similarities and differences.

1. **Analysis** - The first step is to analyze the known writing sample and the unknown writing sample for distinctive

characteristics. The examiner looks for unique qualities such as letters and word spacing, letter and word slant, size and proportionality of letters, unusual formations of letters, flourishes, and other individual attributes.

2. **Comparison** - The next step is to differentiate elements from the known sample to those of the unknown sample. The examiner considers spelling, grammar, punctuation, and phraseology as well.
3. **Evaluation** - The final step is to evaluate the similarities in the known and unknown samples. While differences are a good indication of a non-match, no single similar characteristic, no matter how unique, can determine a match. Therefore, all likenesses must be considered. The examiner must make a judgment in each case by evaluating the totality of the documents.

Forensic document examiners consider different features related to the motion and pressure of the hand, as well as the shape of the different characters and the spatial relationship among them. While examiners rely on standard protocols, documents are generally processed manually. This requires a significant amount of time and may lead to a subjective analysis which is difficult to replicate. Automated forensics tools to perform handwriting analysis from scanned documents are desirable to help examiners extract information in a more objective and replicable way.

Professionals also have ways of determining whether a person has tried to disguise his or her handwriting or to copy someone else's handwriting, known as a conscious writing effort. Many things can be done to minimize this conscious writing effort, such as the following:

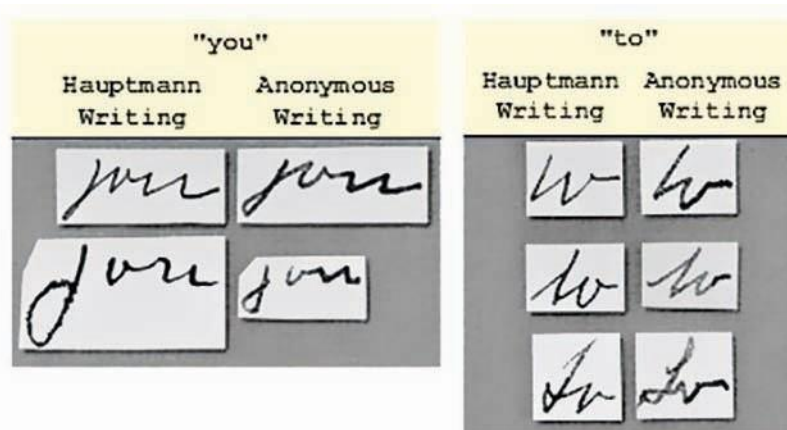
- 1) A suspect should not be shown the questioned document;

- 2) A suspect should not be given any instructions about punctuation or spelling; and
- 3) The pen and paper should be similar to that of the questioned document.

History of Handwriting Analysis:

Forensic handwriting analysis wasn't actually used or introduced in criminal investigations until the beginning of the 20th century. Most notably, the kidnapping of Charles Lindbergh's baby in the 1930s marked the beginning of handwriting

analysis in forensic investigations. In the 1930s, handwriting analysis played an important forensic role during the trial of Bruno Richard Hauptmann for the kidnapping and murder of the son of world famous aviator Charles Lindbergh. Handwriting analysis of the many ransom notes, along with known handwriting samples and other evidence, led to Hauptmann's conviction and execution (Figure below).



Comparative handwriting samples from Hauptmann used in the Lindbergh kidnapping case

Technology Used in Handwriting Analysis:

Initial comparisons of documents are done with the naked eye, a handheld lens, or a microscope. However, even more



advanced technology available today can assist the examiner with more technical aspects of the writing and document. Specialized equipment can reveal minor details about how a document was changed.

For example, examination using an infrared spectroscope can determine if more than one kind of ink was used on the document. This is because of the way that different inks may absorb or reflect different wavelengths of light such as infrared

Biometric Signature Pads:

The biometric pad, a new research tool, has been designed for identity authentication. The computerized pad recognizes your signature based on the speed, pressure, and rhythm of signing your name (Figure below). Forgeries can be recognized by slight differences that are detected by the pad.

Biometric Signature Pad

Computerized Analysis:

Computerized analysis of handwriting samples has the advantage of

being faster and more objective than analysis by an individual. For example, if the pen pressure is being reviewed, an examiner looking at the sample uses his or her subjective opinion. However, if the handwriting is first scanned into a computer, the pen pressure can be objectively analyzed by the shading in the pixels. The Forensic Information System for Handwriting (FISH) is a computerized handwriting database used and maintained by the Secret Service. Investigators scan in handwritten documents for a comparative analysis. Once the sample is scanned, it can be compared to other existing handwriting in the Database. This system has verified that no two writers pen their words exactly the same, nor do they have the same combination of handwriting characteristics.

Signature Examination:

Today, signatures have assumed great importance and everybody, regardless of the social level in which he lives, must sign his name daily or many times a day. Under these conditions, the question often arises whether a disputed signature is genuine or not. In many cases a document expert will be asked to determine whether a suspected signature is genuine or forged.

Method of Examination:

First of all, the document examiner must be able to work with the original documents and not from photographic reproductions of the disputed signature or of the comparison signatures. It is well known that the reproduction of documents by photography, or photocopy, is not absolutely accurate, especially in the structure of the stroke because it is sometimes even difficult to determine on such a reproduction if we have an ink written or pencil written signature. It is also difficult, maybe even impossible, to determine from a photographic reproduction if the disputed signature is an original or a carbon copy.

The expert must first examine the disputed signature itself. This examination

must be conducted from the general to the details: an initial study with the naked eye must show if the dimensions of the signature and its disposition on the document agrees with the available place or with the kind of document, for example. The general examination must be followed by a complete study with a magnifying glass or with the microscope at different magnification and under different kinds of lighting. The best instrument for this work is the stereoscopic microscope with magnification of about 5 to 30 times. The signature will be examined by normal incident light, by oblique or side light, and by transmitted light. In many cases, it will be useful to use colored filters to extinguish more or less the color of the ink, to make possible the search for pencil strokes under the ink. Study with an infrared image converter may be necessary and useful too.

Comparison signatures are very important, and it is necessary to assemble the most complete comparison material possible. The expert must not hesitate to ask for comparison signatures of the same period as the forged or disputed or for comparison signatures older than the disputed one. When possible, the comparison signatures should be written with pencil if the suspected writing is with pencil, with ink if ink written, and so on. In many cases it is important too for the expert to have available signatures subsequent to the date of the disputed in order to determine whether perhaps a change exists in the comparison signatures written before and after the date of the disputed. It is useful for the comparison signature to figure on documents of the same kind as the questioned document, and the expert must suggest to the judge, or the lawyer who ask for the examination, the places where it will be logically possible to find some more comparison material.

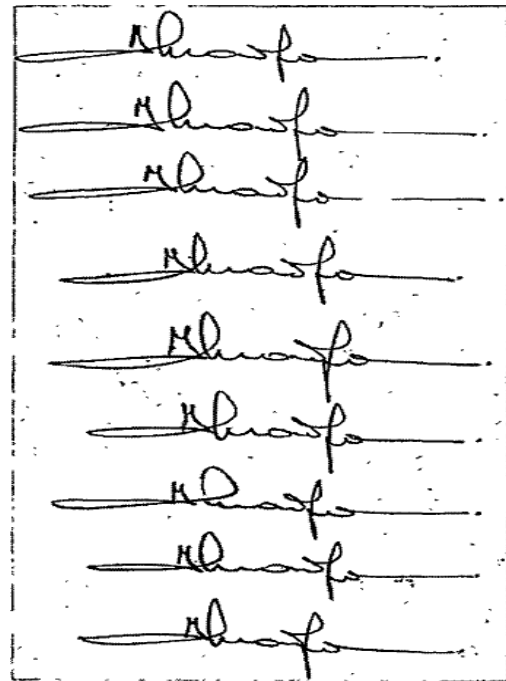
In cases where it is impossible to find any material for the comparison, but when the person is still alive, the expert

must ask the person in question to write a number of comparison signatures, under the same conditions as the disputed signature. That person must sign documents of the same kind and the same size as the questioned document and with a similar or the same instrument. As example, it is possible to ask the person to write 10 signatures on ten documents taking care that this person has only one signature before him and removing each signature from view when it is finished. In some cases, it is necessary and very useful to repeat these steps again a few days or a few weeks later, or it is useful too to ask the person to write signatures with another instrument than the one used for the 10 documents

When it is necessary to ask for many comparison signatures, it is prudent to describe the operations exactly, and it is very useful when possible to control the requested signatures with at least one spontaneously written signature in order to be able to judge their representativeness. Concerning the comparison material it is very important that the signatures are acknowledged or sworn to by the person, to avoid a dispute.

Afterwards, the expert must proceed with a systematic study of the comparison signatures so that he can become completely familiar with these signatures. He can in this way see if the person has or has not a constant way of signing, or if, on the contrary, there exists variations and what importance these variations have. Naturally, there always exists a certain number of variations between one signature and another, even if the signatures have been written immediately one after the other (figure below). This study of the genuine signatures is very important, and it will be necessary to note the observed elements and the extreme variations in dimensions, proportions, details, etc. We must also note the external conditions which can perhaps explain this or that variation. It will be important, too, to see if a variation is a

function of some external conditions-one person will always precede his signature with the abbreviation "Dr." in certain cases and never in others. The influence of the available space, etc., must also be determined.



The Comparison:

After having made the examination and the study of the disputed, and after having made the examination and comparison of all the comparison signatures, the expert is allowed to compare the disputed signature with the genuine ones. It must be clear here that the preliminary examination of the disputed or contested signature must have lead to the chief verifications. Often, before seeing a genuine signature, it is possible to make a determination about the questioned signature. If the expert observed proof of forgery (pencil or carbon under the ink strokes, poor quality of the stroke, tremor, rewriting, retouching, etc.) he can seriously doubt the genuineness of the signature, even explain the modus operandi of the forger. But, if the disputed signature is written quickly without abnormal details, it will be quite impossible to reach an opinion about its quality, and it will be necessary to

compare the questioned signature with the genuine ones.

While the preliminary examination of the disputed signature has revealed marks of forgery, it is not necessary to proceed to a complete comparison, because there necessarily appears similarities in the forms and details. The comparison involves the peculiarities of the dynamics of the signatures which generally differ completely between the forged one and the genuine. It will be important, too, to compare the dimensions of the disputed signature to the dimensions of the genuine signatures, to see if it is not possible to find the model which was used.

The comparison of a disputed signature with genuine signatures is also difficult and does not lead to an explicit conclusion when the questioned signatures are only composed of a simple succession of common movements, without peculiarities and without personality. In other cases, the expert encounters signatures of persons who write very little or very badly, or who can just sign; these signatures are generally without constant elements and are very variable in their makeup. It is very difficult to determine objectively if the observed differences depend upon a real difference in the writers or if they result from a very important but normal variation of signatures of one person. The preliminary and complete study of the disputed signature alone allow one to determine whether or not the disputed signature falls within the limits of variations of the genuine signatures.

Handwriting & Signature Forgery:

Handwriting forgery is the process used by criminals to fraudulently make, alter, or write a person's signature so that in most circumstances it appears identical with the genuine signature with the intent of profiting from the innocent party. Authentic signatures are included on such papers as checks, employment records, legal

agreements, licenses, titles, wills, and any other type of personal or business transaction or agreement. Even slight handwriting alterations are considered as much a crime as the complete fabrication of a signature when the intent is to deceive.

Types Of Signature Forgery:

There are four main types of Forgery:

- 1) The first is **blind forgery**, in which the forger has no idea what the signature to be forged looks like. This is the easiest type of forgery to detect because it is usually not close to the appearance of a genuine signature.
- 2) The second (and probably most common) type of forgery is **simulation**, in which the forger has a sample of the signature to be forged. The quality of a simulation depends on how much the forger practices before attempting the actual forgery, the ability of the forger, and the forger's attention to detail in simulating the signature.
- 3) The third type of forgery is a **tracing**. A tracing can be done by holding the model document and the questioned document up to light and using a pen to trace the lines of the model signature onto the questioned document. A tracing can also be done by using a blunt stylus on the questioned document to create an impression of the model signature in the paper. This impression is then filled in with a pen to create the appearance of the model signature.
- 4) The fourth type of forgery is an **optical transfer**, in which a genuine signature is transferred onto a document by use of a photocopier, scanner, facsimile machine, or photography. With this type of forgery, an examiner cannot positively identify a signature as genuine without having the Original for comparison.

The act of handwriting forgery annually takes many millions of cash and property from victims, primarily in the form of fraudulent cheque, [credit card](#) purchases, invoices, identification papers, and

passports. Within the field of forensic science, investigative experts use scientific handwriting analysis to examine the legitimacy of signatures and legal identifications.

Key Indicators Of Forged Signature In Handwriting Forensics:

1. Blunt Starts and Stops:

The Starting Stroke comes before a letter, generally when we desire to start writing a word. If we are learning something new and desire to acquire knowledge first and think before we act, we can incorporate the starting stroke. So when a forger tries to copy a signature he may get a starting stroke i.e. a Blunt Start. A natural end of a signature will trail off with the momentum of the pen. In a forged copy, there could be a sharp stopping point or an ink blot indicating a blunt pause at the end of the letter.

2. Pen Lifts and Hesitations:

This principle is similar to that of the blunt stops at the end of the signature. Forgers that are uncertain about their craft may not have the smooth motion and immediate precision requires. The result of this is a signature where they hesitate mid-way to consider the next letter or the correct flow. Handwriting forensics experts can tell when a pen has stopped in the middle of the signature.

3. Tremors:

The appearance of tremors in the creation of a signature is another tell-tale sign of one that is not quite authentic. Confidence in a signature, from repeated use and familiarity, leads to a fluid line. A lack of confidence leads to visible bumps and shakes in the trail of ink from the unsteady movement of the pen. These may not be clear to the naked eye, but trained handwriting forensics analysts can pick them under the microscope.

4. Speed and Pressure:

The trail of ink on a signature can tell examiners a lot about the way it is written. A thick, uniform line of ink suggests a hand that has tried to be very slow and precise to create the write shapes. This is not typical of a reliable hand dashing off a quick signature to end a form. A real article should have tapering lines indicating changes in pressure and natural motion. Too much pressure is a sign of a forgery.

5. Patching:

The final trait that examiners will look out for in handwriting forensics is patching. This simply means any attempt to correct the signature to make it look right. The majority of us don't give our signature a second thought on completion. This is because we know they are genuine, even if the first letter was a bit off. A forger will think differently and go back to letters that seem to be wrong or aren't legible enough. These fixes' are often so obvious to analysts that it would have been better for the forger to do nothing.

Conclusion:

In Conclusion Handwriting Forensics is a Standard practice to detect handwriting & Signature forgery. Although there are some Limitations in handwriting analysis One limitation is that the quality of the standards obtained often determines the quality of a comparison analysis, and good standards may be difficult to obtain. Forgery takes place through suspicious handwriting and signature technologies used in handwriting analysis can be used to detect them.

Similarly Signature Examination can be used to detect forged signatures on documents, insurance claims, wills etc. An Expert can apply method of Signature Examination for detection of forged signature. Being an expert in analysis he can detect through indicators forged signatures. There exists different ways to imitate a signature, each of which have their own

more or less typical peculiarities and which an expert must know completely. Even when all the favorable conditions are reunited, it will not be possible in some cases to reach a conclusion, because the degree of accuracy of the conclusion depends on the kind and nature of the questioned signature and of the genuine ones.

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