

Sources of Error in Forensic Handwriting Evaluation

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ABSTRACT: Failure to follow certain basic principles underlying forensic handwriting evaluations is very likely to result in erroneous conclusions. While there are many potential sources of error, including methodological and psychological ones, this paper addresses just three specific ones that appear to have become more frequent in recent experience: (1) failure to give proper weight to differences; (2) failure to consider crucial writing movement characteristics; and (3) using self-serving exemplars. Illustrations show actual case examples.

KEYWORDS: questioned documents, handwriting examination, sources of error

Forensic handwriting analysis rests on some basic principles that are spelled out in the standard texts. These principles can be presumed to be a part of every document examiner's methodology and would therefore not seem to need repetition in a paper calling particular attention to them. Contrary to this assumption, however, it has been this writer's experience that the fundamental rules are sometimes not followed even by experienced examiners and, based on actual cases, the incidence of error caused by failure to adhere to basics appear to be on the increase.

Handwriting examination is generally considered, by friends and critics alike, to be more subjective than the other crime laboratory specialties in that it relies more on experienced judgment than on quantifiable data. If we accept this premise, it would follow that it should be all the more important to adhere to agreed-on principles so as to preserve the greatest degree of objectivity and, thereby, accuracy.

Three particular problem areas seem to cause most of the errors in handwriting cases, whether they involve signatures, handwritten texts, or handprinting. They are (1) failure to properly evaluate differences; (2) failure to detect significant movement characteristics; and (3) the use of self-serving exemplars.

It is, of course, also true that errors can be caused by a number of other factors, such as inadequate exemplars, photocopies, and so on. There are also the more abstract causes of error, including poor training, bias resulting from a variety of influences, negligence or even deliberate fraud. These human factors will not be considered here, and the reader is referred to lists by Osborn [1] and Howard [2].

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Failure to Properly Evaluate Differences

This category could also be called failure to conclude non-identity or failure to eliminate. It appears to be the greatest source of difficulty for some examiners, judging by the frequency of erroneous conclusions falling under this heading.

The reluctance to eliminate is reflected in the commonly used report language, "the suspect could not be identified." This language is indirect and avoids making clear whether the examiner means that the suspect is eliminated, or that he cannot decide if the suspect should be eliminated (an inconclusive finding), or whether it means that no one in the laboratory could decide. The use of the word "identify" also implies that it is the examiner's task to identify a suspect individual, which is a potential source of bias, rather than to determine whether or not the suspect is the writer.

The principle of elimination is as simple as basic scientific method: no matter how much evidence exists for a theory, it must be rejected if even a single significant contradiction is encountered. In the words of Wilson R. Harrison:

"The rule is simple—whatever features two specimens may have in common, they cannot be said to be of common authorship if they display but a single consistent dissimilarity in any feature which is fundamental to the structure of the handwriting, and whose presence is not capable of reasonable explanation." [3]

Albert S. Osborn uses different words to make the same point:

"If even a few qualities are distinctly foreign to the genuine writing, or are violations of fixed habits in the genuine writing, and cannot be explained in any reasonable manner, then the conclusion must be that the writing is not genuine." [4]

Or, to quote Ordway Hilton:

"Repeated small differences establish clearly that two specimens are the work of two individuals despite a great number of general similarities." [5]

Despite this fundamental principle thus formulated by the authorities, some examiners follow another and rather widely accepted rule of thumb stating that one can only eliminate a suspect if either (1) one has identified some other person as the writer, or (2) the suspect does not have the writing skill to have produced the questioned writing. That this rule has gained currency among examiners in law enforcement in understandable because criminal investigations often involve limited samples that may also be disguised. Added to these limiting factors is the problem that criminal cases nearly always rely on dictated exemplars written after the fact.

These limitations are real, but the examiner who has become accustomed to them must not become so skeptical of the reliability of the exemplars that he loses sight of the basic principle and

forgets that it applies to all handwriting problems, whether criminal or civil. The problem here is that the examiner may acquire a mindset that restricts eliminations to certain specified situations and thereby significantly increases the risk of error. Even stating an inconclusive finding when elimination is the correct answer is itself an error. It is important to remember that an opinion of non-identity is not a statement that the suspect could not possibly have written the questioned sample, as some examiners appear to believe. A statement of non-identity is the exact counterpart of one of identity, and it is basically a statement of probability. In other words, it is the examiner's best judgment of the evidence, based on the clarity of the available material, on the basic principles of handwriting evaluation, and on the examiner's experience. In cases where the evidence is not clear enough for a definite answer, a lower degree of certitude is indicated, such as "probably not" or "very probably not."

One possible explanation for the errors made by not properly eliminating a writer is that the examiner simply missed the differences present and therefore concluded the suspect was the writer. In other words, the examiner failed to make correct observations. Another is that the examiner actually noted the differences but set them aside as not significant because he judged them to be variations in one person's writing or disguise. On this subject Wilson R. Harrison has remarked as follows:

"Practically all the well-publicised errors made by former generations of 'handwriting experts' have arisen through consistent differences, which should on the evidence have indicated different authorship, being brushed aside as due either to disguise or variation without sufficient evidence, simply because their presence has conflicted with a preconceived idea about authorship." [6]

Harrison refers to this phenomenon as belonging in the past, but in this writer's experience the problem is, regrettably, still very much with us. As to the attribution of differences to mere variation, the difficulty obviously lies in the decision of whether a different is significant or not. The answer to this problem is rather straightforward: the difference is significant if it occurs in spontaneous writing, has some individual character and is, preferably, repeated. Not all differences need be repeated, as a dissimilarity appearing only once may be quite fundamental in nature, for example one that involves an odd stroke direction or a distinctive letter construction. In any case, the important point is that the cumulative effect of the differences is decisive.

There is also the other test for significance to help make the decision, namely whether the differences in the questioned sample fall outside or inside the range of variations in the known.

This type of error seems most prone to occur in cases where both questioned and known writing are at the same time fluently written and similar in style and form features. The error is most likely to happen in cases where the questioned and known samples belong to the same class of writing, such as national writing styles that are foreign to the examiner's eye, or the nowadays commonly encountered category of "young women's style." Every experienced examiner knows these classes of writing where many individuals are found to write surprisingly alike and provide pitfalls for the unwary. Figure 1 illustrates a signature problem in this category (see NOTE).

Some examiners apparently become overwhelmed by strong similarities to the point where they set aside differences that actu-

NOTE: All the cases of error illustrated in this paper involved opinions by experienced document examiners.

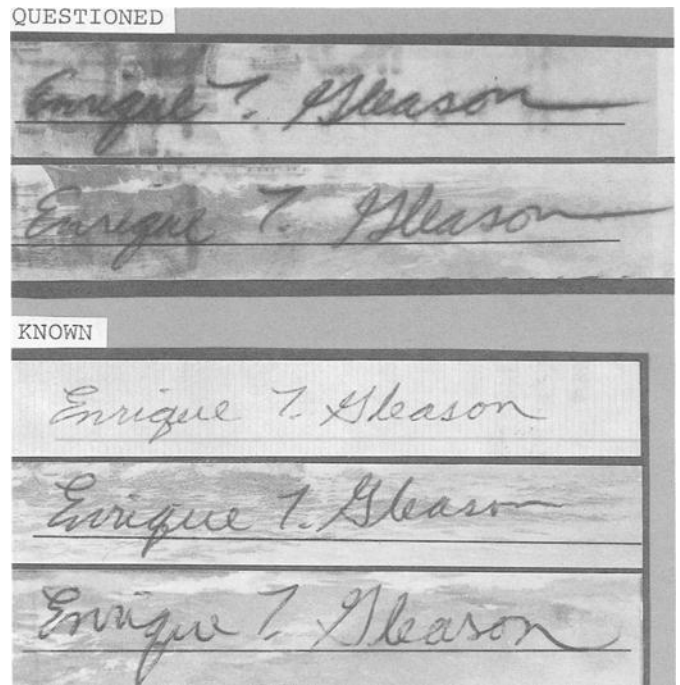


FIG. 1—The defendant in the case, Enrique Gleason, was identified by the prosecution's expert as the person who had written a series of checks on a closed account, of which two samples are shown (Questioned). Although the questioned specimens are fluently written as well as similar in style and form, they show a cluster of specific, repeated differences from the pre-existing samples (Known), showing that he is not the writer of the questioned. These differences are principally the top of the "E," the peak of "r," the loop of "q," the width of "u," the connection of "G," and the height ratio of "l" and "e." The three known samples shown are representative of a larger collection. (The slight blurring of the questioned specimens is from prior fingerprint processing).

ally meet the test of the basic elimination rule and then conclude identity on the basis of a rule that could be formulated as "too close to be different writers." Professional, trained document examiners should not allow such mistakes to occur because they are really the province of laypersons, dilettantes and untrained "experts" who do not understand basic principles. Granted that it may seem illogical and against common sense that a great many similarities would exist between two samples that were in fact written by different individuals. But such is the nature of handwriting and of the scientific method, and the process of reaching a correct answer requires both rigorous mental discipline and the courage to apply the rules objectively. Figure 2 shows another case of non-identity mistaken for one of identity.

In summarizing the basic principles of handwriting examination, it is well to recall that the process is not just a matter of comparing forms but a more complex process consisting of analysis, comparison and evaluation. This three-part process is defined by R.A. Huber and A. M. Headrick as follows:

"Analysis or Property Selection. The unknown item must be reduced to a matter of properties or characteristics or identification value, which may be directly observable, measurable, or otherwise perceptible aspects.

Comparison. The properties or characteristics of the

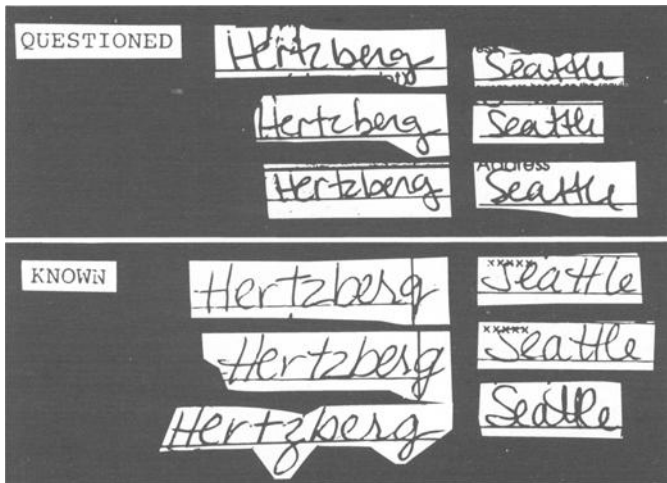


FIG. 2—The questioned samples in this case (of terminated employment) had been identified by the government expert as written by the author of the known samples, all of which are request samples. Despite the strong resemblance in style features, significant differences are clearly present, for example in the form details of the printed and cursive “r,” in the proportions of the “S,” and in the construction of the “tl” combination; additional differences were present in other areas. (The error was subsequently corrected by a review in the first examiner’s laboratory.)

unknown determined through analysis must now be compared with the familiar or recorded properties or characteristics of the known items.

Evaluation. Similarities and dissimilarities in properties or characteristics will each have a certain value for identification purposes determined by its likelihood of occurrence. The weight or significance of each must therefore be considered.” [7]

A failure to reach a conclusion of non-identity when one is justified by the evidence at hand may involve a failure in either the analysis or the evaluation stage. In the analytical part the examiner must decide on the basic qualities of the questioned and known samples, such as whether either shows evidence of disguise or simulation. A failure in the evaluation stage is typically the failure to assign proper weight to differences.

Failure to Detect Significant Movement Characteristics

The second type of problem concerns the thoroughness that the examiner applies to the analytical portion of a handwriting examination. If this analysis does not go deep enough, there is a very real risk of missing small but important movement characteristics. The fundamental rule involved here is well known: forensic handwriting comparison is not just an analysis of forms but, more importantly, a consideration of the writing movements behind those forms [8].

These essential movement characteristics may consist of minute hesitation points or penlifts or delicate retouchings that constitute primary signs of simulation. There is a particular risk of missing such details in cases where the questioned writing, typically a signature, is for the most part fluently executed. If the stereo microscope is not routinely used to scrutinize doubtful areas for small defects the risk of error in the conclusion is increased. Figure

3 illustrates an example of such an error caused by failure to spot a crucial movement feature.

Another type of basic movement feature that is sometimes overlooked is the unconventional stroke direction associated with some left-handed writings. The most common of these are the well-known right-to-left crossings on “t,” printed “A,” “H,” etc.. Less common are clockwise movements in ovals like “o” and zero; even more unusual are characters drawn from the bottom upward, or printed capitals drawn from right to left. There are also numerous variations of patterns formed by this type of unconventional stroke. Some writers, for example, will forgo the common leftward t-crossing and instead use a variety of odd constructions, although these are typically limited to handprinting rather than detectable in cursive writing.

These odd and reverse movements are not exclusively found in left-handed writing, as they may occur in otherwise normal handwriting done by either hand. Examples are constructions of numerals or printed characters, such as whether the figure “8” is drawn with the lower element in the clockwise or counter-clockwise direction. Other examples are the many variations in the direction and sequence of the strokes making up the printed letter “E.” Figure 4 illustrates a case involving the capital “E” in the less common configuration.

These movement characteristics are most readily detected in pencil writing by the lay of the graphite against the edges of the surface paper fibers with the use of relatively low magnification. They are also detectable in ball-pen writing by ink failure at the start of lines, by the presence of “gooping” and by the direction of streaks in curved strokes. Other writing instruments leave less noticeable clues to stroke direction, and there are consequently many instances when stroke direction cannot be established. None-

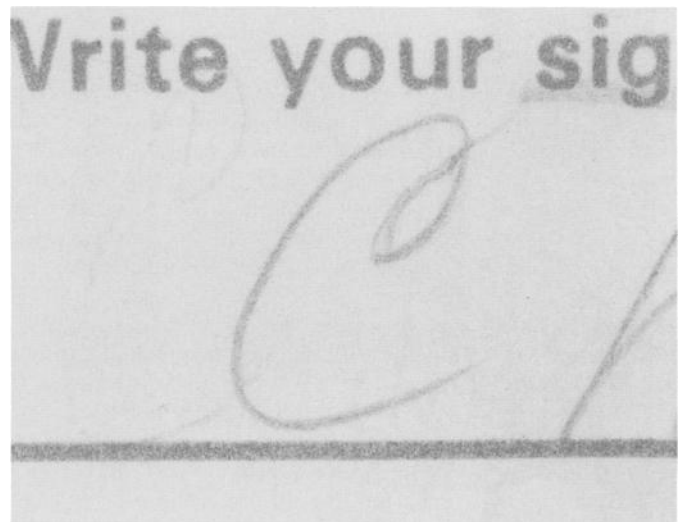


FIG. 3—The “C” is the first letter of a disputed signature in an aptitude test, enlarged to show details of the defective execution at the top. The beginning eyelet has multiple symptoms of simulation: an extra, tremulous stroke added to the left side; a hesitation and abrupt pressure increase at the bottom; and the small protruding spur at the top added separately and drawn in the wrong direction (upward). Note also the outline of an erased, previously written “C” done with greater fluency to the left of the existing letter. Despite these defects, which included two previous erasures in the last name, the examiner employed by the test taker gave an inconclusive opinion on the signature.

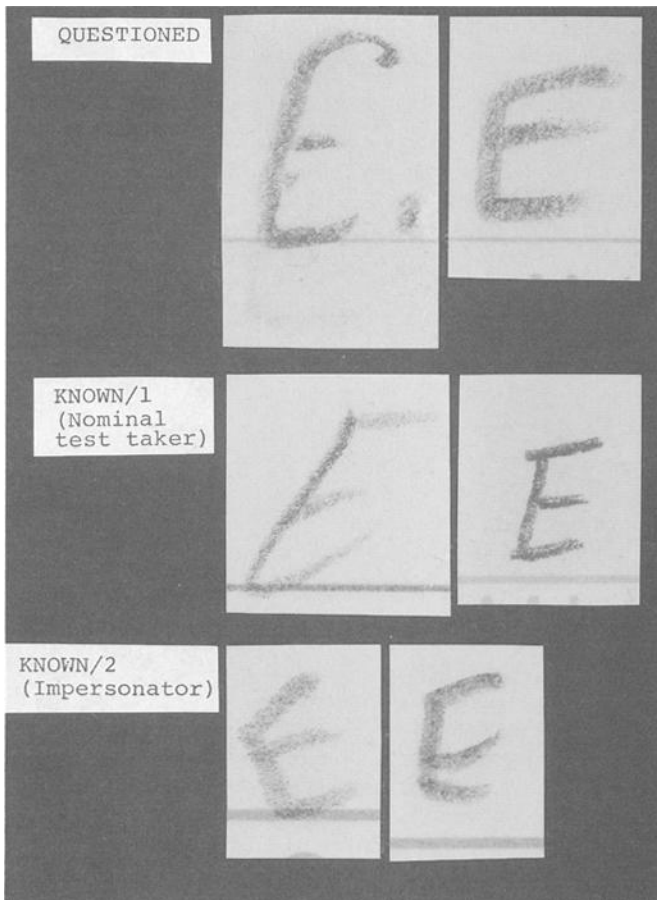


FIG. 4—The questioned “E”s are enlargements of the middle initial of a signature and of a handprinted entry, respectively, on a disputed test answer sheet. They are fundamentally different from the known samples by the supposed test taker in construction, being made up of a C-shape and a middle bar instead of the conventional four-stroke construction consistently found in the known. Note also the drawn quality of the questioned “E” of the signature and the faint outline of an erased version below it. The actual writer was subsequently identified, and he turned out to have the habit of making the printed “E” in the unusual two-stroke configuration (third row).

theless, this feature is fundamental to a proper evaluation of handwriting and must—whenever it is detectable—be taken into account in order to avoid error.

The Use of Self-serving Exemplars

The comparison standards, or exemplars, are an essential element in forensic handwriting comparison. They are so basic that they can fairly be said to decide the outcome of the comparative analysis. A reliable conclusion requires that these specimens be essentially spontaneous in quality and extensive enough to be representative of the purported, or suspected, individual’s handwriting habits.

It is generally recognized that exemplars written before the fact are better than those written after the fact [9]. It is also true that there are circumstances when after-the-fact (request) specimens are useful or even the only kind available, particularly in criminal investigations. But aside from the relative merits of the two types of exemplars, there is one type that should generally not be

accepted, those that are self-serving evidence. A. S. Osborn puts the case bluntly: “The informed expert promptly refuses even to look at this volunteered writing which is inadmissible in evidence” [10]. That such specimens are not admissible in court has long been established, notably by the famous *Molineaux* case and by other appellate court decisions on the subject (*People v. Molineaux*, 168 N.Y. 264, 326 (1901)).

It does not matter whether the individual under investigation offered such specimens, whether his attorney arranged for them, or whether the document examiner actually asked for them. What matters is that they are of a self-serving nature, that is, not requested by the opposing party, and that they are therefore potentially or even probably not representative of the persons’s handwriting and therefore misleading. Experienced examiners reject such samples whenever adequate, pre-existing samples are either on hand or could reasonably be located with additional effort. Unfortunately, there are examiners who are not wary enough of the games that can be played by their own client. The uncritical acceptance of self-serving exemplars may be due to the examiner’s having become so used to request writings during a career in law enforcement that it seems only natural and reasonable to obtain the same kind of samples in civil case problems as well. Moreover, it is not uncommon for lawyers to approach the examiner with the seductive remark, “my client will write as many samples as you need.”

A hybrid form of this problem is the offer of pre-existing samples—say signatures on cancelled checks or receipts—that have in actuality been carefully selected to present a one-sided picture of the individual’s handwriting. The client may simply have selected specimens that are the least like a falsely denied questioned signature in hopes of misleading or at least confusing the expert by “stacking the exemplars.” To prevent this sort of editing, the examiner should ask for specimens that the individual had no hand in selecting, for example by locating specimens from sources outside the individual’s control or by requesting all cancelled checks for two or more months, complete with bank statements.

A special problem in this category are the handwriting questions that are the reverse of the ordinary, that is where an individual is supposed to have written a document but it is suspected that he did not. This is the type of case encountered in aptitude tests or other exams where an impersonation is suspected.

Although the problem is one of “forgery” by collaboration of a willing victim, the handwriting question remains the same as in any other case, namely to determine whether the writing is genuine or not. And the rules of forensic handwriting analysis still apply. Yet this kind of case can be a definite source of error, especially when the test taker’s own expert asks for or accepts unsolicited exemplars written after the fact. The client in this situation is especially well placed to supply doctored specimens in which the handwriting has been “adjusted” to fit the writing of the person who actually took the test, simulating the simulation, as it were. Figure 5 illustrates such a case of obviously adjusted writing. This process is made even easier when the test taker has been supplied with a first examiner’s report citing specific differences as the basis for an opinion that some other person wrote the test. In the age of discovery of evidence this is a common occurrence. It is also common that the purported test taker or his attorney will have been supplied with copies of the pertinent documents. This makes the handwriting adjustment still easier, as the individual can practice matching his co-conspirator’s handwriting habits or at least confuse the handwriting comparison by producing “handwriting gymnastics” with lots of extreme and bizarre variations. When this happens, it seems that even experienced examiners may fall

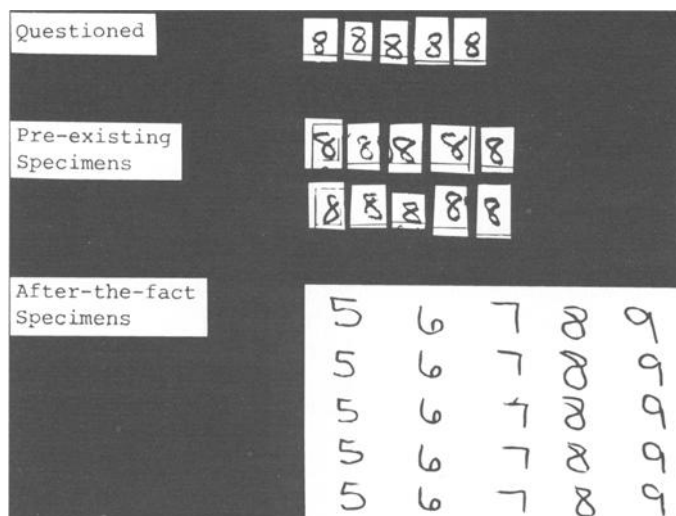


FIG. 5—The different numeral “8” is by itself specific evidence that the writer of the natural, pre-existing specimens did not write the questioned figures on a test answer sheet. They are consistently closed at the upper left and drawn with the bottom oval in a counter-clockwise direction. Additional differences in signatures and handprinting confirmed that some other person had taken the test. Despite the availability of pre-existing exemplars, the test taker’s examiner accepted self-serving specimens written after the fact, and concluded that the disputed writing was genuine (and this was after the test taker had had an opportunity to study both the questioned answer sheet and the first examiner’s report). The strained figures “8” in this sample speak for themselves as examples of contrived writing produced to skew a handwriting analysis.

for the deception and commit serious error based on deliberately distorted exemplars, sometimes even written in front of the document examiner.

Case History

In a scholastic testing case, the questioned answer sheet showed clear evidence of a different writer from the pre-existing exemplars: a poorly simulated signature and differences in handprinting features. However, the test taker sued the testing organization and hired another document examiner. This examiner concluded that the answer sheet was genuine, based on at least two sets of self-serving exemplars, one produced for the investigator employed by the test taker’s attorney, and a second set of voluminous samples written at dictation for the document examiner in two separate sessions. The test taker had previously been supplied with a copy of the answer sheet in question, and it was clear from these exemplars that the writing came progressively closer to matching the signature simulation and handprinting of the impersonator. Although these samples consisted largely of strained, over-controlled handwriting and other “gymnastics” that should have alerted the examiner to deception, this second examiner testified in court that he had been very surprised at the “incredible” range of variation in his client’s handwriting. The test taker lost his case in court and, after the actual writer of the answer sheet was subsequently identified, was

convicted of perjury and sentenced to a jail term. (For confidentiality reasons no illustration is provided with this case).

Moreover, just as in the ordinary case where a person denies a writing sample, the opportunity also exists to deceive the examiner by submitting ostensibly pre-existing samples that are actually fakes [11]. Over a number of years this writer has experienced several variations of this kind of deception, including copies of cancelled checks with proper dates and bank stamps showing that they pre-date the dispute, while the handwritten entries were in fact done by the impersonator and added in by cutting and pasting. Such copied exemplars are often submitted in spite of a specific request for original documents only. Another variation is a carbon signature appended to a carbon copy of a genuinely pre-dated document, such as a receipt or repair bill that originally did not require a signature. Or the individual supplies an original document in ink, often some official-looking paper or form, that was simply written by the impersonator and back-dated. Yet another version of doctored exemplars is the writing of some samples of signatures or other writing on a sheet of paper that is then sworn to as genuine before a notary public. The problem is that the writing may actually be by the impersonator, or as a sub-variation it may be a mixture of genuine writing (properly attested as genuine by a notary) and samples by the impersonator inserted in pre-arranged gaps in the writing after the notarization.

The basic point to remember here is that handwriting is subject to deliberate manipulation and that artifacts can easily be created to deceive the unwary examiner into a wrong conclusion.

In summary, forensic handwriting analysis is a complex and difficult task that demands not only attention to detail but also an understanding of, and close adherence to, basic principles in order to minimize the chance of error.

References

- [1] Osborn, A. S., *The Problem of Proof*, Boyd Printing Co., Albany, N.Y., 1946, pp. 478–480.
- [2] Howard, L. B., “The Dichotomy of the Expert Witness,” *Journal of Forensic Sciences*, Vol. 31, No. 1, Jan. 1986.
- [3] Harrison, W. R., *Suspect Documents—Their Scientific Examination*, Praeger, N.Y., 1958, p. 343.
- [4] Osborn, A. S., *The Problem of Proof*, Boyd Printing Co., Albany, N.Y., 1946, p. 484.
- [5] Hilton, O., *Scientific Examination of Questioned Documents*, Revised Ed., Elsevier, N.Y., 1982, p. 161.
- [6] Harrison, W. R., *Suspect Documents—Their Scientific Examination*, Praeger, N.Y., 1958, p. 345.
- [7] Huber, R. A. and Headrick, A. M., “The Identification Process,” presented at the Eleventh Meeting of the International Association of Forensic Science, Vancouver, British Columbia, Canada, August 1987.
- [8] Hilton, O., *Scientific Examination of Questioned Documents*, Revised Ed., Elsevier, NY, 1982, p. 154.
- [9] Conway, J. V. P., *Evidential Documents*, Charles C Thomas, Springfield, IL, 1959, p. 77.
- [10] Osborn, A. S. and Osborn, A. D., *Questioned Document Problems*, Boyd Printing Co., Albany, N.Y., 1946, p. 135.
- [11] Keckler, J. A. and Moore, D. S., “A Case Study of the Dangers of Office Machine Copies: Beware of Self-Serving Standards,” presented at the Forty-first Annual Conference of the American Society of Questioned Document Examiners, North Lake Tahoe, NV, 1983.

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