



Is it Fabricated?

Presented at the Mid-Atlantic Association of Forensic Scientists April 2002

Photocopiers have become standard equipment in the office. The writer remembers when he worked in an office the early 60's got its first copier. The administrative officer did not believe that a machine could accurately produce a preset number of good quality copies. He spent at least an hour at that machine testing it by copying a number of different documents. He changed every setting from copy quality to the number of copies he wanted of each original. The copier, made by Xerox®, performed very well. All he accomplished was to waste a lot of time, toner, and paper.

Copier technology has advanced significantly from the Xerox® machine of the 60's. The first copiers were analog machines. Today there are both analog and digital copiers in tabletop models selling for approximately \$500, to room size units for large scale document production work. Many of them have the same features and produce a similar quality copy. There are both black and white, and color copiers. Some standard features found on modern copiers include copy darkness settings, automatic paper selection based on the size of the original, variable enlarging or reduction capabilities, automatic document feeders, collators, etc. There are also dual-purpose copiers that function as both a copier and printer. Special machines are available for projects like making poster size documents, architectural drawings, manuals, production runs of forms, and other printed material.

In our business environment today holding onto paper is equivalent to committing a cardinal sin of epic proportions. As a result, Forensic Document Examiners (FDE) frequently receive only photocopies for examination. Recently Congress passed, and the President signed, legislation allowing banks and other businesses to scan and then destroy original documents. This will only increase the number of copies and reduce the number of original documents being submitted to FDE's for examination purposes.

More research time by the FDE is being devoted to understanding the process of making copies and the development of reliable examination methods he can use in their examination. He is also trying to deal with the limitations imposed on him when he has only copies for examination and how, if he can, accurately and reliably attribute what he sees on the copy to the original the copy purportedly represents.

To assist the FDE, the American Board of Forensic Document Examiners (ABFDE), in conjunction with Canon Corporation, developed and sponsored special training programs at the Canon training facility in Atlanta, GA. The training covers copiers, faxes, microfilm and micro-film document reproduction, storage, and retrieval systems. The problems and issues presented in this class reflect the same type of problems FDE's encounter in their laboratories on a daily basis.

Document examiners from the Federal Bureau of Investigation (FBI) laboratory, and other laboratories as well, are presenting papers concerning the need for caution in working with copies. One example is a paper presented at the American Academy of Forensic Sciences (AAFS), by Ms. Dorothy-Anne E. Held, MA, in which she said her goal was to "...open a dialogue regarding some of the secondary issues arising from the examination of nonoriginal handwriting."¹ She discussed several important issues, such as telling the submitter of photocopies about the limitations of working with copies, the likelihood of receiving only a qualified conclusion, and the possibility that a photocopy document can actually be a fabricated document. Depending on how careful the fabrication process and the source of the components used, it may not be possible to determine, from an examination of the copy, that its source is actually a fabricated document.

This paper is one contribution to the dialogue about examining copies. In the following pages some actual case material is presented, along with experimental work. Two of the examples involve fabrication using a photocopier and two using a computer and scanner. None of the work shown here is beyond the skills of the average person.

This paper was first presented at the Mid-Atlantic Association of Forensic Scientist (MAAFS) meeting. There was a hearty discussion of the implications of examining copies and making definitive statements about the originals the copies purported to represent. Since that time, additional work has been undertaken and some of it is referred to here.

In most instances, the presentation of copies rather than original documents is done for self-serving reasons. That alone is sufficient to be cautious about the validity of the contents of the copy. While this caution is not, and never is intended to be, a factor in the examination, it does suggest that the approach used by the FDE should be one of caution and conservatism.

This paper consists of two case studies and two examples of how a scanner and computer with basic office software can be used to alter or create totally fictitious documents. Based on the examination of the copies, the truth about the source document may be virtually undetectable. The case studies show how the evidence in the copies help to support the argument that portions of the document combined to show that a person had signed the document the copy purported to represent. However, the evidence in the examined copy actually showed that it was a self-serving, fabricated document.

One example shows how a document, mailed as part of a mass mailing, had its signature block changed using a computer, MSWord software, and a scanner. The reader will see how easy it is to do, even with minimal ability with a computer. Another example shows how easy it is to take parts of three different signatures, combine them to create a "signature," and attach that fabricated signature to a fabricated document.

The examples in this paper illustrate why the examination of copies must be performed conservatively. Because of the ease with which documents can be altered or fabricated using copiers and computers, the author has established a policy of discussing the limitations of working with copies with the client when he says that only copies are available for examination.

What can be on a copy in addition to the material on the original being copied? First, copies may include toner reproduction of scratches, trash, dirt, etc., found on the glass or drum. Based on the examination and evaluation of the copy, original being copied, and the copier, it may be possible to determine the source of these extraneous marks and features on the copy.

Second, photocopies are not always able to reproduce:

- a. All of the qualities and features of the original writing, i.e, delicate and lightly written strokes found in normal, natural writing; and occasionally found in patching and retouching of individual strokes, letters, fine tremor movements, stroke direction, substituted letters, etc. Notwithstanding the improvement in copier design, image processing, and reproduction, copiers still do not exactly reproduce all of these qualities and features. If the copy is a first generation copy, the copy quality is typically better than that of a second, third or fourth generation copy.
- b. Even if a number of these qualities and features are present in the copy, it cannot be concluded that the copied document contained an originally written signature. Document fabrication, complete with the addition of signatures extracted from other documents, is relative easy to accomplish.
- c. Writing features found in the original document paper stock, such as indentations or indented outlines of letters and words, the disturbance of paper fibers due to mechanical abrasive erasure or the use of liquid solvents or eradicators, insertion of a number or letter using a different ink, etc., are not exactly reproduced during the copying process.
- d. Embossing caused by heavy writing pressure on a soft writing surface.
- e. There are a number of other characteristics, qualities, and features found on an original that are not accurately reproduced during the copying process.

To summarize, detecting additions and deletions to a document, or even finding evidence that the entire document was fabricated, is not impossible if the document is an original. When the document is a photocopy, fax, or some other type of copy of the original, evidence found on the original is not always found on the copy. The further the copy generation is from the original, i.e., second, third, fifth, etc., the greater the differences in the quality of the reproduction of the original. Even a second generation copy no longer records the characteristics on the original but is recording what is on the first generation copy. That is why a first generation copy, one made directly from the original is always preferable if a copy must be examined.

If the original the copy purports to represent is not available for examination, which is usually the case, the FDE must carefully and conservatively evaluate the significance of the evidence on the copy. The significance that can be attributed to the evidence is based on the quality of the copy and clarity of the writing.

The American Society of Testing and Materials (ASTM) developed standards for the examination of handwriting. In their standard, Designation: E 2290-03, "Standard Guide for Examination of Handwritten Items," Section 7, Procedure, Paragraph 7.5, the standard states, "Determine whether the questioned writing is original writing. If it is not original writing, request the original." Note 4 that references this item states "Examination of the original questioned writing is preferable." In Paragraph 7.5.1 the standard states, "If the original is not submitted, evaluate the quality of the best available reproduction to determine whether the

significant details of the writing have been reproduced with sufficient clarity for comparison purposes and proceed to the extent possible. If the writing has not been reproduced with sufficient clarity for comparison purposes, discontinue these procedures and report accordingly.”

If there is evidence on the available copy that it may be a fabricated document, the original document is defined as the document that was fabricated, altered, etc., and then copied.

CASE STUDIES

Working with copies is becoming a large part of the FDE work. Many of these copies contain added signatures and in some cases signatures that are a composite of two or more signatures taken from different sources. When examining any copy, how is it possible to determine that a signature is added or possibly a combination of several signatures? The following two cases studies help to illustrate the methodology employed and the evidence found to support the conclusion reached in each case.

In both of these case studies, evidence of document fabrication was found in the copy that purportedly represented an original document. The parties presenting the photocopies as evidence of their position said the original had been destroyed in the normal course of business.

Case study No. 1

The questioned document in this case was a copy of a contract for services purportedly signed by both husband and wife. The person offering the document claimed that the husband and wife signed the agreement in his presence and were now claiming they did not sign it just to avoid paying him what he claimed they owed.

An examination of the questioned document was conducted. Authorship of the signatures appeared to be the only thing that needed to be addressed. But, on closer examination, questions were raised concerning how the original document this copy purportedly represented was prepared. During the consultation with the submitter, it was learned that the document was purportedly a standard contract form. The reason for wanting more information about the purported original document was to try and resolve the following questions.

The pre-drawn signature baselines for both signatures included the printed word “Seal” in parentheses (Illustration No. 1). If, in fact, the original document was a standard form contract that a contractor could copy and have all the parties to the contract sign, it would be expected that all of the preprinted material on the form would be consistent, using the same type style, with uniform spacing between the elements of the form, etc.

If the examined copy was what it purportedly represented, in this case that meant the preprinted part of the copy being examined was a copy of a standard form. The signatures on the examined copy should have been a first generation copy of the original signatures on the contract.

During the examination, it was observed that the word “Seal” following the signature of the wife and her husband had different type designs and point size. In addition, the pre-drawn baseline under her signature had a slight ascending slope relative to the pre-drawn baseline under his signature. Conclusion, these two baselines were not parallel, nor were they parallel to the pre-drawn baseline under the contractor’s signature. Note: The length of the “red” double arrow pointed lines is the same. As shown in the illustration, the distance between the baselines widens from left to right. This, in conjunction with the difference in type design and differences observed in the questioned and known writings of the husband and wife, was sufficient to conclude that the questioned document was fabricated.

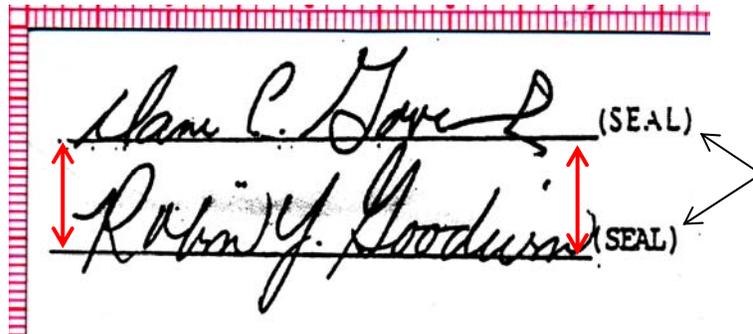


Illustration No. 1

The different type style and spacing of the letters in the printed word “SEAL,” the difference in the spacing between the two pre-drawn baselines, and the questioned and known writings was sufficient to conclude that the copy presented as proof of the agreement was not what it was purported to be. Unfortunately the purported original of this document was not available for examination.

Did the husband and wife sign the original document the copy purports to represent? If an examiner conducted just a handwriting comparison without considering the features described in the paragraph above, he would have concluded that the wife probably wrote her signature, and that there was some evidence to suggest the husband wrote his signature. Even though they may have written these signatures they may have been extracted from some other document(s) and affixed to this document. The evidence here is very persuasive that their signatures were not affixed to the original this copy purports to represent. The handwriting opinions reached in this case were justified, based on the evidence within the signatures and the quality of those questioned signatures as reproduced in the photocopier process.

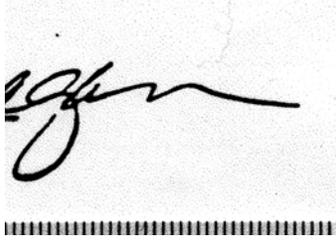
Case study No. 2

The second case involved a signature on a photocopied document. The original had purportedly been lost or destroyed. When submitted, the only question addressed the authorship of the handwritten signature on the questioned document. An examination and comparison of the questioned signature with known signatures of the owner of that signature revealed the following: Parts of the questioned signature were the same as parts of *two* of the submitted known signatures. Further study revealed that all but the last letter in the surname was identical to a known signature here identified as the Source No. 1 (Illustration No. 2). The last letter, “n,” of the surname in the questioned signature was the same as the last letter of another known signature, here identified as Source No. 2 (Illustration No. 2), except for the direction of the terminal stroke.

But how could this be? The absence of a wide range of variation by the writer of the known writing might account for part of the answer, but that does not explain why all the other letters in the questioned and Source No. 1 signatures are identical. Since one of the basic principles of handwriting identification is that no writer writes exactly the same way twice, there is always the expectation to find some variation in writing. If a writer has a limited amount of variation, then the only way to determine that two writings are so close that they cannot be separated, requires a sufficient quantity of known writing to ascertain the writer’s normal range of variation. It should be obvious that the author is assuming that the submitted known writing is contemporary with the purported date or period in which the questioned signature was purportedly written.

If the known writer has a normal range of variation and not a limited range, then is it possible that the questioned signature was fabricated? In this case, the known writer’s normal range of variation was sufficient enough that it would have been impossible for her to have written the signature with the degree of similarity found between the questioned signature, Source No. 1, and Source No. 2.

An examination of the questioned signature and the two suspected source signatures was conducted using grids and a light box. Notwithstanding the differences in the size of these writings that could be attributed to the copying process, the relevant components of the two source signatures were found to be identical with the questioned signature. The conclusion reached after these studies, that the questioned signature was a composite of the two source signatures. The next question then became, well how was this done? How was the questioned document fabricated?



Questioned



Source No. 1



Source No. 2

Illustration No. 2

The questioned and Source No. 1 signatures agreed in every respect except for the terminal letter “n.” The terminal “n” on Source No. 2 bore a striking similarity to that same letter on the questioned signature, except for the direction of the terminal stroke. But, when it was isolated from the preceding letter in Source No. 2, laid over the “n” on Source No. 1 and tilted slightly downward, the combination is identical with the questioned signature.

To establish that this is how the questioned signature was created, the writer used the original documents bearing the signatures that appeared to be the sources for the questioned signature. One copy of Source No. 1 and two of Source No. 2 were made for the experiment. A pocketknife was used to cut a rectangular box around the terminal “n” from the photocopy of Source 2 (Illustration No. 3A). After cutting out the “n,” the cutout was positioned over the terminal “n” on Source No. 1 and attached it with a small amount of glue to keep it from moving (Illustration No. 3B). The placement was somewhat arbitrary because the purpose was to illustrate that this is one way the questioned signature was made.

Illustration No. 3C is the photocopy of Illustration No. 3B. If the copy darkness setting on the photocopier is adjusted properly, there is no way an examiner could tell that the letter “n” was not a part of the original writing without having the two source signatures!

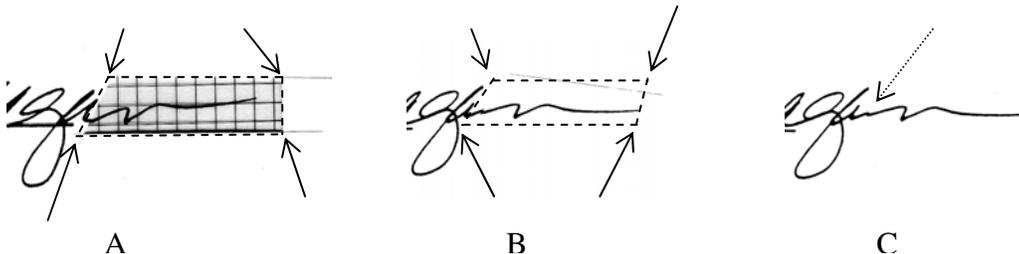


Illustration No. 3

“A” shows the rectangular area cutout of the photocopy of the Source No. 2 document. The grid was placed between the two photocopies to show the shape of the cutout and the arrows point to the bottom of the cutout area.

“B” shows the rectangular cutout from “A” covering and attached to a photocopy of Source No. 1. The black arrows point to the edges of the cutout and the dotted line arrow to the offset of the connecting stroke between the “a” and “n.” The author deliberately made this offset to show how the letter was added to the source signature.

“C” is a photocopy of “B.” Note the connecting stroke offset between the “a” and “n.” Were it not for the deliberate displacement of the added letterform, it would appear that the added letter “n” was originally written with the other letters in the name. Another possible explanation could be that the writer lifted the pen after making the “a” and reapplying it to the paper before writing the “n.”

By its very nature the photocopy process does not accurately record all of the details of the copied document or offer sufficient evidence of the cause of the characteristic quality and feature. That is why conclusions reached, based on the examination of copies, must be very conservative.

Computer Substitution

This example is not from an actual case. It is one the author chose to create a fabricated document. This example illustrates how a computer, readily available software, and scanner can be used to fabricate documents. The methods discussed are by no means the only two ways to achieve the desired objective. Using a computer to fabricate a document with a signature not written by an authorized writer, or to substitute a signature to make it appear a person wrote the signature in his name is relatively easy.

MSWord and Adobe Photoshop® are very powerful programs. They are the ones the author has on his computer and used to perform the following document alteration/fabrication. It is possible to use any of a number of similar software programs to achieve the same end. What is important is not which ones are used, but that they can be used and leave virtually no evidence that the document being examined is fabricated.

Example No. 1

Illustration No. 4 shows the signature block on a mass mailing letter. Question, how difficult would it be to change the signature block on the letter? One method is to remove the signature from the mass mailing letter and substitute it with a signature of a different person on a different letter. After thinking about the problem and how to accomplish this objective, the process chosen is rather simple.

Is It Fabricated?, cont.

The signature block on the mass mailing letter as received is shown in Illustration No. 4.

it's 1-800-866-6639) before the expiration date
ds to grow and prosper fast! We look forward

Sincerely,



Beverly Zimmerman
President

inesses. Let us prove it to you. Call 1-800-86-MONEY
Friday, 9 a.m. - 7 p.m., or Saturday 10 a.m. - 2 p.m., EST!

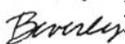
Illustration No. 4

The mass mailing letter was scanned into MSWord. After adjusting for size, a text box was placed over the signature block area on the scanned letter. A text box is used to insert text material or a scanned image. In this example the text box was placed over the entire signature block area. Illustration No. 5 shows a text box containing a pattern of dots over part of the signature block.

Illustration No. 5 shows a textbox placed over part of the signature area.

it's 1-800-866-6639) before the expiration date
ds to grow and prosper fast! We look forward

Sincerely,



Beverly Zim
President

inesses. Let us prove it to you. Call 1-800-86-MONEY
Friday, 9 a.m. - 7 p.m., or Saturday 10 a.m. - 2 p.m., EST!

Text box

Illustration No. 5

This illustration shows a text box placed over part of the signature block. When preparing the first scanned image to receive the second scanned image, the complete signature block area on the bulk mail letter was covered by the text box. The signature block of the second scanned letter was then placed inside the text box.

The signature block on a second document is scanned. This second letter contained a signature of a different writer. After scanning the second signature, printed name and title, the scanned material was pasted in the text box placed over the original signature block area on the document shown in Illustration Nos. 4 and 5. After the new signature was placed inside the text box, some editing of the scanned material was done to make it appear more like the original letter. The border around the text box was removed.

Is It Fabricated?, cont.

After fabricating the new signature block, filling in the background and removing the border, the fabricated document was first printed using an ink-jet printer. That document was then copied on a photocopier.

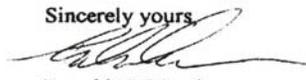
Illustration No. 6 shows the signature area on the fabricated document. The fabricated document was also printed using a laser printer. The results were equally good. The difference between a laser printed document and a photocopied document are of about equal quality. One of these copies could be submitted for examination purposes.

If time had been taken to change the type style of the new signature block background printing to match the text of the original letter, and properly aligned, it would be virtually impossible for a FDE to conclude that the fabricated document is anything but a copy of the original it purports to represent.

It is the position of the author that determining the authenticity of an original document, based on the examination of a copy of that purported document, is not possible. To determine the authenticity of an original document can only be done by an examination of the original.

Illustration No. 6 shows the new signature block area on the fabricated letter. On initial inspection, the printed material of the signature block appears very similar to that of the other material. In this case, if the examiner had sufficient known writing of the writer of the substituted signature, he could reach a very strong conclusion concerning authorship of the signature on the copy. However, that strong opinion applies only to the examined copy and not to the original the copy purportedly represented.

0-866-6639) before the expiration date
ow and prosper fast! We look forward

Sincerely yours

Ronald N. Morris
President

Let us prove it to you. Call 1-800-86-MONEY
9 a.m. - 7 p.m., or Saturday 10 a.m. - 2 p.m., EST!

Illustration No. 6

Illustration No. 6 shows a photocopy of the fabricated letter's signature block area. If the author had taken the time to match the type style and point size of the typed material to that of the original letter, there is no way a document examiner could ever tell that the signature block material was added.

Example No. 2

The next example illustrates how a computer, software, and scanner can be used to take portions of different signatures, combine them, paste them to a fabricated document, and when printed on a laser printer, that document could be presented as a copy of a self-serving document. The author also printed the combined signature on a photo-quality ink jet printer and then photocopied that document. The quality of the resulting photocopy of that document was amazing. It had all of the characteristics, qualities, and features of a photocopy of an original document. Had that photocopied document been offered for examination, there is no way of determining, from the photocopy alone, that the master document was printed on an ink jet. In neither instance would the examiner be able to tell, just from the examination of the copy offered, that the laser printed document had been fabricated in a computer. In both instances, the resulting document that would have been the subject of an examination did not contain any evidence of its origin.

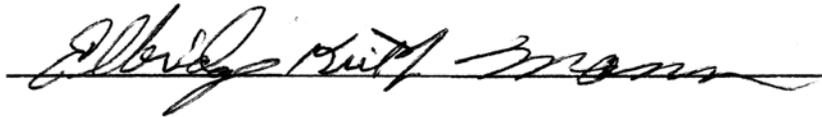


Illustration No. 7

The questioned signature.

The questioned signature, Illustration No. 7, consists of three names written on a pre-drawn baseline. The overall linear space occupied by the signature is approximately equal to that of other signatures by this writing on other documents.

The writer's skill level is average if not slightly above average. The writing is naturally executed, and there is no evidence that the writer is uncertain about how letters and letter combinations are formed and written. The pen is working properly, as there is no evidence of patching, retouching, or breaks in the writing due to inconsistent ink flow. If anything, the evidence shows smooth lines with good relative pressure habits and control of the pen by the writer. There are even striation marks within some of the up and down strokes caused by ball and ball housing interaction.

Illustration No. 7 shows a signature containing no evidence of internal inconsistencies. If anything, all the evidence is consistent with normal, natural, writing. If this signature was on a photocopied document being examined by a FDE, and he had comparable known writing of the signature's writer, he might be very tempted to identify the questioned writer.

As with all writings, there is a history associated with this questioned signature. What is that history in this case? First, let's define what is meant by "signature." The author consulted three different reference sources in an effort to define the word. All three essentially define it the same way. A signature is the act of a person signing his own name. Also, a signature can be his name written by someone else who had permission to sign it. With this as the working definition the question becomes, is Illustration No. 7 a "signature written by the owner of that name or his signature written by someone having his permission to write it?"

Illustration Nos. 8-10, are known signatures by the actual writer. They are also the sources of the writing for the signature in Illustration No. 7.

A. → 

Illustration No. 8

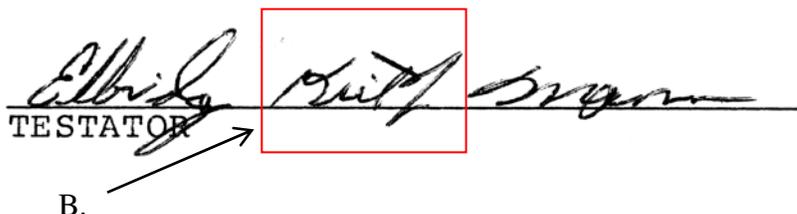

TESTATOR
B. →

Illustration No. 9


C. →

Illustration No. 10

A careful examination and comparison of the questioned and known signatures reveals that the questioned signature, Illustration No. 7, is a composite of the other three, Illustrations No. 8, 9, and 10. The given name, A, is from Illustration No. 8, the middle name, B, is from Illustration No. 9, and the surname, C, is from Illustration No. 10. But how can this be? The questioned signature contains no evidence that it is anything but normal, natural writing.

Is it possible that the writer has a very limited normal range of variation? Not really. Then how do we account for the strong similarity, in fact identical writing of the letter forms, qualities, and features of the writing of each name, A, B, and C, and their counterparts in Illustration No. 7?

Back to the original question, how is this possible? In this example, the questioned signature, Illustration No. 7, was fabricated using a computer, scanner, and Adobe Photoshop®. Photoshop allows the user to isolate portions of material, place each portion on an individual “layer,” adjust the position of each layer relative to material on another layer, combine the final product, and lock the layers. The resulting combined image can be stored and transfer to another software program where they it can be used.

In this experiment the Adobe Photoshop® image was stored and transferred to MSWord, where the new signature was placed on a fabricated document. The result, when printed on a laser printer, was indiscernible from a photocopy of an original document signed by the known writer.

If the fabricated document, printed on the laser jet, ever became the subject of an examination and the examiner was provided with known signatures, the FDE might be tempted to identify the writer of the known as the writer of the questioned. This assumes that none of the known signatures was a model signature for the components of the questioned fabricated signature.

If the FDE were to identify the writer of the known as the writer of the questioned signature, he would be wrong. Although the known writer wrote each component of the **combined** questioned signature, Illustration No. 7, **he did not write the questioned signature**. He did not authorize anyone to write it for him or to sign the document on which it was placed. The signature and document are fabrications.

The problem would be more complicated if the author had also manipulated the combined signature by distorting it, or parts of it. The same would be true if portions of the questioned signature were erased, or by adding features to the writing using tools available in Photoshop®. Had some combination of these altering techniques been incorporated in the final product, the signature in Illustration No. 7, the printed questioned signature, could be virtually indistinguishable from a possible variation in writing that could be attributed to this writer.

Summary

What conclusions can be drawn from these examples and the contributions of other document examiners who have written about their work? They all show how easy it is for someone to produce a document of excellent quality, which, if not approached conservatively, could yield a wrong conclusion. The standard that must always be applied by the FDE in any examination and comparison he conducts is that, in the absences of observable evidence allowing for the accurate and verifiable interpretation of its significance, then the resulting findings and report of those findings is nothing more than speculation.

The FDE has reached the wrong conclusion if he assumes that the copy he is examining is a faithful reproduction of the original it purports to represent without doing a side-by-side comparison of the two documents. *Any conclusion reached by the FDE after completing his examination of the copy applies only to the observable evidence on the copy. It is not possible to authenticate an original or genuine document based only on the examination of a purported copy of that document.*

The purpose of this paper has been to present several practical demonstrations of why photocopied and computer generated documents are problematic for the FDE. The copy being examined may not be an accurate recording of all the evidence on the original it purports to represent. In fact the, copy may actually be a fabricated document made by using a photocopier, computer, software, and scanner.

The fabrication or alteration of a document using one or a combination of these technologies is becoming common place. With the proliferation of this equipment and the fact that a person does not really need a lot of specialized training to use it, more of these types of cases will be presented to the FDE for analysis.

Between the time this paper was first written and now, Mr. Gary Herbertson wrote a book on the use of Adobe Photoshop®. Document Examination on the Computer, is a very useful book that provides an overview of a number of techniques on the use of a computer, scanner, and Photoshop® software in the examination of documents. Mr. Herbertson makes the following observations: “What this means for the document examiner is that some of the old techniques for determining that the questioned signature is a forgery on a photocopy are now inadequate for reaching the same determination....I feel it is the obligation of the interested parties to provide original documents. If there are no original documents available, then the court should wonder why. If there are no original documents to examine, then the value and the nature of the expert’s opinion can be significantly reduced. The use of photocopies, in my opinion, has grown beyond their value as evidence, at least from the view point of what that document alleges to be. If the courts and lawyers are going to permit and rely on photocopies there is little to prevent all kinds of abuse.”ⁱⁱ

The law will one day have to catch up with the reality of technology that is used to create documents, and when they do, the courts will be forced to take the position, **“No original, no case!”**

Although not directly addressed in this paper, fax copies can be more problematic than those discussed. Most fax documents are a very poor quality, pictorial representation of what is supposed to be on the faxed document. And, if the examined document is a fax of a fax, the problems associated with any meaningful examination of this type of document can be insurmountable.

i Held, Dorothy-Anne E., “Issues Arising from the Limitations of Comparison Involving Non-original Handwriting,” p. 261, Proceedings American Academy of Forensic Sciences,.

ii Herbertson, Gary, *Document Examination on the Computer, A guide for Forensic Document Examiners*, pp. 93-94, WideLine Publishing, Berkeley, CA, 2002

The author would like to take this opportunity to thank Mr. Gerald Richards, MS, for his review and comments of this paper.