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Significance of Reverse Side Analysis in Revealing Interpolation as Well as Relative Age of Writings – Illustration through Forensic Examination of Documents

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Abstract. Letters, figures or words are sometimes fraudulently added to a contract or other legal documents after it has been signed or produced. This can drastically change the intent of the document. It is more difficult to detect additions that are skillfully added to a document than erasures. It becomes the task of the document examiner to determine if the addition or alteration was made after the document was executed or these were the part and parcel of the document earlier. The forensic document experts can examine, detect and interpret the evidence of alteration by means of additions/insertions, as well as relative age of writings and spuriousness of the documents even in the absence of samples. Besides examining the different types of forgery involved in the writings/ signatures, the ink of the writings, misalignment between the letters, figures, words as well as lines, crowdedness of the writing, rhythm of the writing¹, detection and analysis of indented and other accidental markings in the front as well as back side of the document under observation need to be carefully and thoroughly examined. In this study, the systematic method of identification of fraudulent nature of the document with respect to alteration by means of additions/ insertions/interpolation, as well as relative age of writings are discussed.

Keywords: Addition; Alteration; Fluorescence; Ink; Rhythm; Spectral comparator.

1. Introduction

Nowadays, forensic document examiners are dealing with fraud cases in which fraudsters are continuously exploiting and developing new methods to cheat both individual and various organizations. In some of the cases it has been observed that alterations are done in such a way that it is difficult for layman to identify these alterations but their impact is so high which changes the nature and intent of the document thus produced in order to cheat the innocent person(s) or organization(s).

A large number of crime case exhibits such as wills, agreements, contracts, receipts, mortgages, deeds of land, insurance applications, financial agreements; ledgers, pecuniary records, anonymous letters, etc. are submitted for forensic examination and opinion. In some of the document problems it has been observed that some part of the document has been added subsequently which all together alters the nature and purpose of the document. In such type of cases mainly following questions arises -Whether any addition/ alteration has taken place in the document, if yes, which part/portion is added and when. In general, analysis are conducted to determine by whom or what device a document was created, weather it is printed, typed or handwritten, what changes have occurred since its original production, and if it is as old as it purports to be. In case of handwritten documents, the range of examinations include handwriting, hand printing, and signature comparisons, detection of alterations, deletions, and substitutions; decipherment of obliterated text, ink and paper comparison, sequence/relative age of entry determinations, detection and analysis of indented and other accidental markings, depth of indentations, pressure as well as front and back side impressions on the document. Any combination of aforesaid examination techniques may be required on such documents depending on the questions raised about their integrity and method of production.

In Forensic Document Examination generally the experts compare and examine the unknown disputed samples with the known standard samples. However, in some cases document examination solely depends upon the unknown disputed samples and there is no need to examine the known standard samples. Forensic examinations are directed toward the discovery of those elements that become a document's identifying attributes or

characteristics. Actually, all the elements help to identify it, but the most unusual have the greatest importance which is discussed in this case study.

2. Methods

Documents related to agreements, sale deeds, wills, contracts, etc. are generally submitted for examination and opinion with a query - whether any addition² has been made in some part of the writings and if, yes where & when?. In the present case study systematic method of examination has been discussed.

Different samples of alterations³ by means of addition were prepared and scientifically examined along with exhibit supplied for examination in Central Forensic Science Laboratory, Shimla/Kolkata using various available scientific instruments viz. Video Spectral Comparator - 8000, Foster and Freeman, various light sources (Visible, Infrared, UV, etc.). These documents were microscopically analyzed at magnification (3x to 30x) using hand magnifier, Stereo-zoom microscope (Carl Zeiss Jena Technival-2). The documents were scientifically and thoroughly examined using above mentioned instruments & scientific-aids and following examinations were carried out in the light of following points:

- a. Whether the additions are done with the ink of similar/different tint and luster -Ink examination using VSC-8000 and various light sources by studying their spectral behavior.
- b. Misalignment between the letters, figures, words as well as lines, crowdedness of the writing, rhythm⁴ of the writing, detection and analysis of indented and other accidental markings, relative depth of indentations, gradation of pressure between letters /words/figures as well as front and back side impressions, their intensity, etc. - Physical as well as microscopic examination using hand magnifier and stereo-zoom microscope.

3. Case studies

3.1 Case 1

The tint and luster of the inks of the original writings vis-à-vis altered strokes/writings by means of additions do not show any significant difference

and even spectral comparator is unable to differentiate inks between the two groups.

In the aforesaid problem the document i.e. red enclosed writings marked Q1 (Figure 1) was examined with a query regarding age of the words “As a Tetent” vis-à-vis rest of the writings in the red enclosed portion marked Q1. The front as well as back side of this document have been scientifically examined in the light of aforesaid parameters and following oddities were observed:

- A discontinuity in the writing rhythm for the words “As a Tetent” in the red enclosed portion marked Q1 has been observed (Figure 1).
- The intensity of impressions on the reverse side of the sheet of the red enclosed portion marked Q1 shows differences for the words “As a Tetent” vis-à-vis rest of the writings in the red enclosed portion marked Q1 as shown in Figure 2.

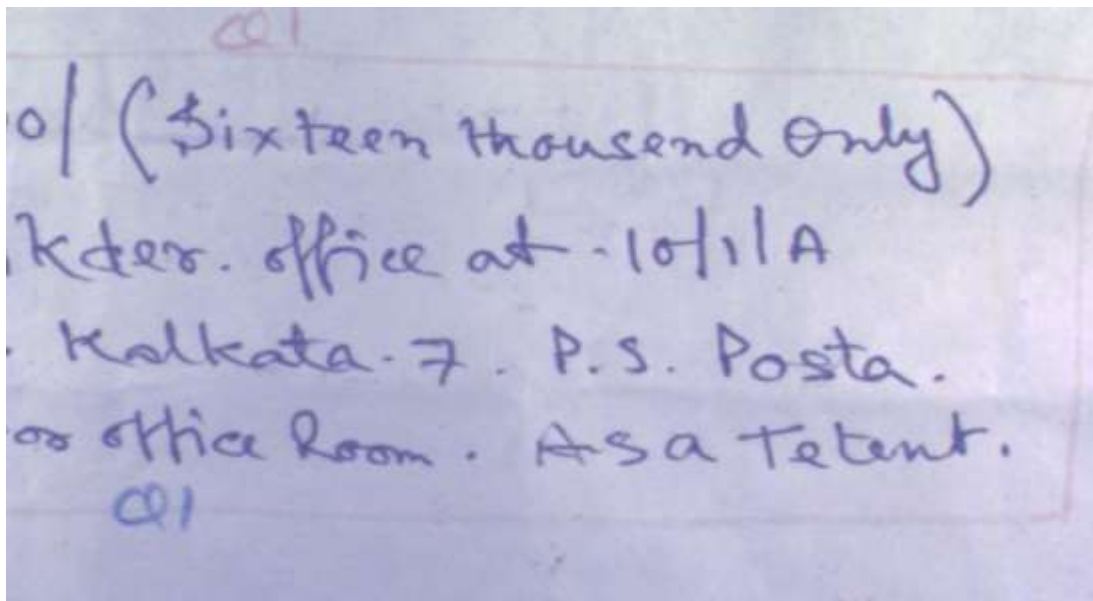


Figure 1. Depicting discontinuity in the writing rhythm for the words “As a Tetent” in an agreement.

The aforesaid oddities indicate that the word “As a Tetent” vis-à-vis rest of the writings in the red enclosed portion marked Q1 have been written in different operations of writings.



Figure 2. Reverse side of document marked Q1- red arrows showing intensity of impression of letter 'A' of the words "As a Tetent" and blue arrows showing intensity of impression of letter 'm' of the terminal word 'Room' and dot(.) of rest of the writings.

3.2 Case 2

The tint and luster of the inks of the original writings vis-à-vis altered strokes/writings by means of additions show significant differences.

In this sample problem the document i.e. red enclosed writings marked QA (Figure 3) was examined with a query regarding age of the words "towards Rent" vis-à-vis rest of the writings in the red enclosed portion marked QA. The front as well as back side of this document has been carefully and thoroughly examined in the light of aforesaid parameters and following oddities were observed:

- Under various light sources/filters/spectral comparator³, difference in the ink of the writings of the words "towards Rent" vis-à-vis rest of the writings in the enclosed portions marked QA has been observed and shown by the difference in the fluorescence⁵ of ink (Figure-4)
- The reflectance spectrograph⁶ (Figure-V) also shows significant difference for the inks of both the sets. The 1st letter 't' of the 'towards Rent' vis-à-vis letter 'B' of word 'Banaras' of rest of the writings is shown by the red and blue lines respectively (Figure-V).

- The intensity of impressions on the reverse side of the sheet of the red enclosed portion marked QA shows differences for the words “towards Rent” vis-à-vis rest of the writings in the red enclosed portion marked QA as shown in Figure 4.

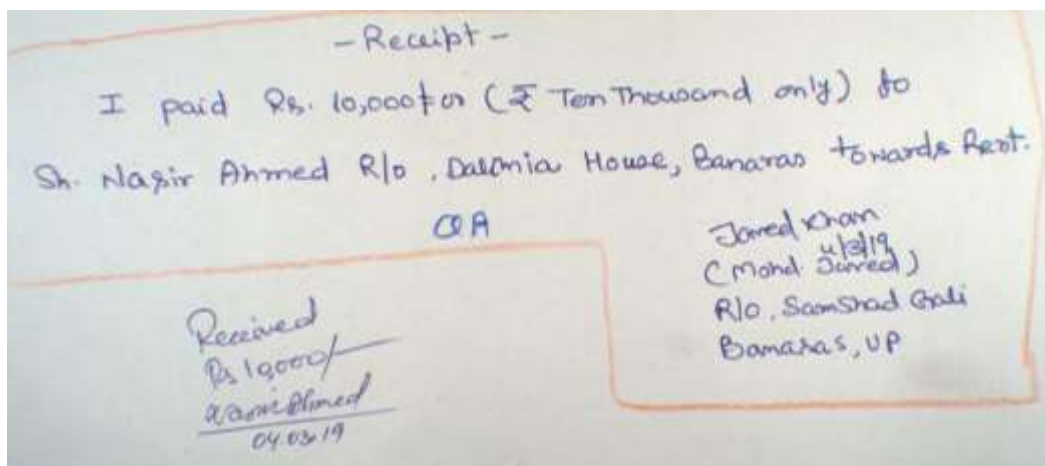


Figure 3. Analysed sample – Case 2.

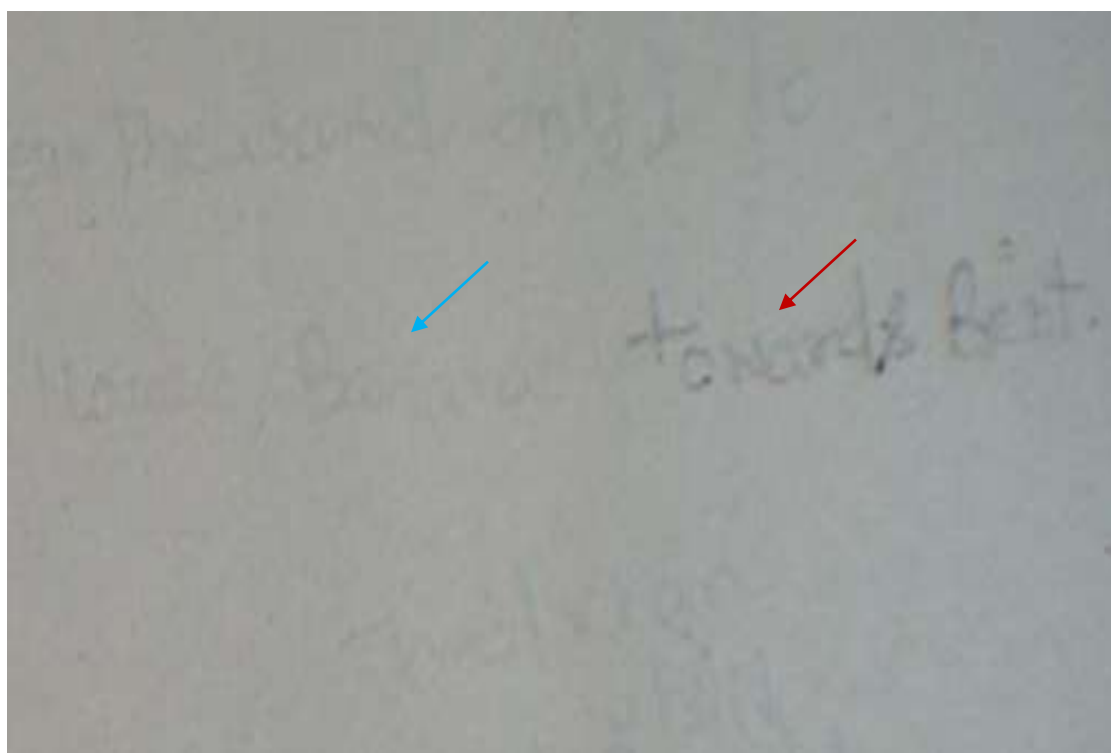


Figure 4. Front side showing fluorescence difference.

The aforesaid oddities indicate that the word “towards Rent” vis-à-vis rest of the writings in the red enclosed portion marked QA have been written in different operations of writings.

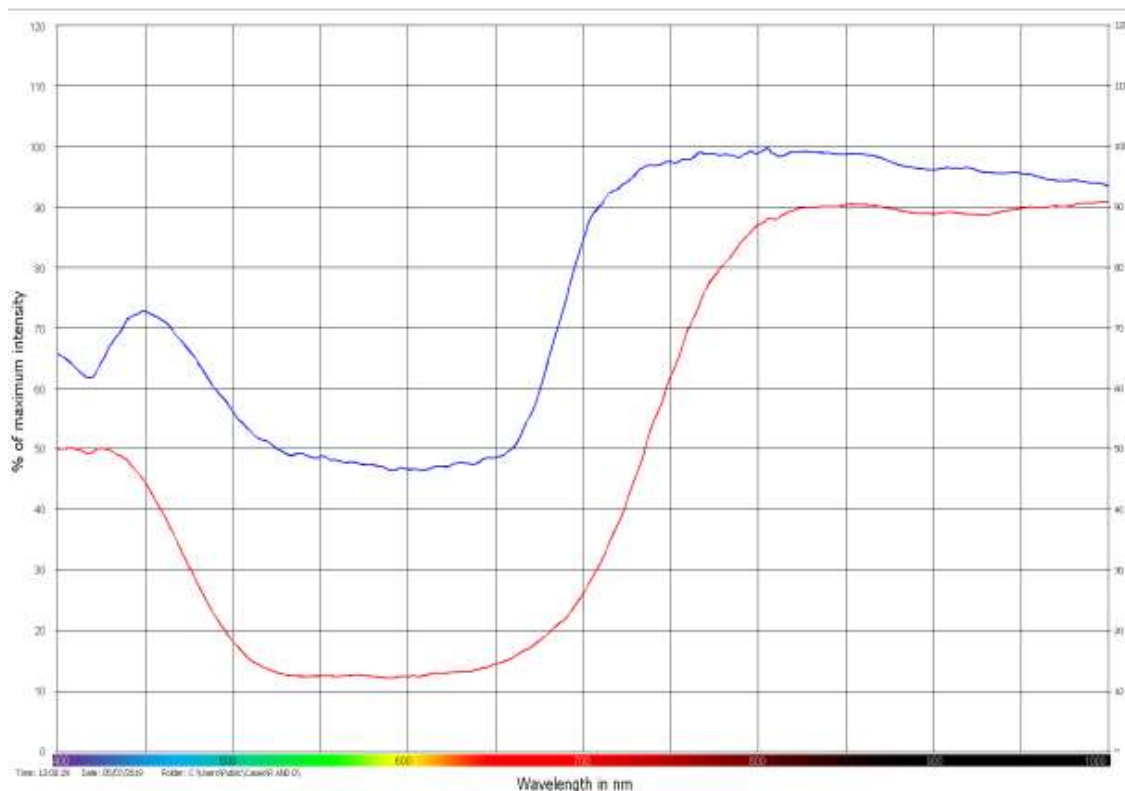


Figure 5. Reflectance Spectrograph.

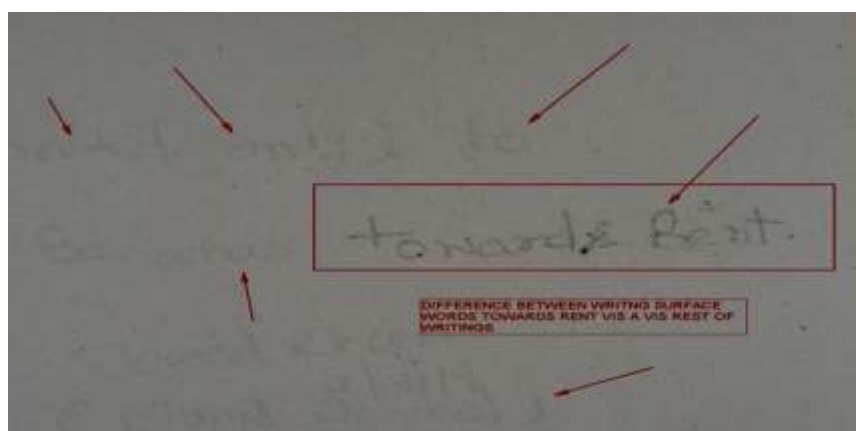


Figure 6. Back side of document marked QA- red arrows showing difference in the intensity of impression of the words “towards Rent” and rest of the writings.

4. Discussion

The aforesaid examination reveals that besides general observation, such as examination of ink⁷, interlineations, spacing between letters, words and figures, writing rhythm, etc. The back side examination as depicted in Figure-II and Figure-VI also plays an important role in revealing the location of alteration as well as its relative age. The intensity of impression on the backside of the documents having altered writings by means of additions depends upon the pen

pressure⁸, change of supporting surface, change of writing condition, etc. In case of such addition problems (Case 2), if the supporting surface beneath the document at the time of alterations is having some dust or dirt particles then these particles will offset to the back side of the document at the place of alteration and intensity of impressions on the back side will clearly reveal the place of additions/alterations. Its vice-versa (Case 1) is also possible in which, during execution of the original writing the document is placed above a supporting surface having dust/dirt particles and at the time of additions/alterations the supporting surface beneath the document is neat and clean. Also, in these cases the difference in the intensity of the impressions in the back side is an important factor in order to solve the problem (as depicted in Figure 2 and Figure 4).

5. Conclusion

The authors are of the strong view that the reverse side of documents have as much as importance as the front side and this side should also be examined carefully and scientifically to solve such type of forensic document problems as handwriting experts (and opinions) are emphatically scientific and not merely empiric. The professional acumen, experience and competence of document examiner has always a vital role to play in bringing out the truth through innovative skills, continuous thought process and objective interpretation of the data related with all these forensic document problems. There are some limitations of back side examination, if the supporting surfaces beneath the documents having similar conditions i.e. at the time of production of original document and its altered version then it are difficult to explore the difference in the intensity of impressions on the back side. However, in such cases difference in ink, pen pressure, writing rhythm and spacing between letters⁹, words, figures, etc. may be examined to solve these problems.

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