Damaging Similarities in Highly Skilled Signature Simulations - Their Detection and Authorship

أوجه التشابه الضارة في المحاكاة عالية المهارة للتوقيعات؛ تحديدها وتحديد كاتبها

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Abstract

Questioned document examination is a highly specialized and challenging field of study, because of the variety and complexity of problems that are referred to document examiners. Detection and identification of practiced simulated forgeries is an area of forensic science which requires the professional skill, capability and acumen of an examiner, every time he (or she) is called upon to examine and report a case of this nature. This is because firstly, the practiced simulations bear a striking semblance to the copied model and usually contains the handwriting features of the writers, the real person as well as the forger, though in varying degrees.Secondly, the skilled forger rarely leaves his own imprint in the forgery he committed. Most authorities on the subject have advised that the identification of authorship, in such cases, may be considered as an exception rather than the rule. Besides discussing and reviewing the work done in this regard, the authors have also presented and illustrated an intricate case study where the authorship of simulated signatures could be associated with the known handwriting of the suspected forger.

المستخلص

يعد فحص الوثائق المشكوك بها مجالاً دراسيًا عالي التخصص وصعبًا، وذلك نظرًا لتنوع وتعقيد المشكلات التي يتم إحالتها إلى فاحصي المستندات. كما أن اكتشاف وتحديد عمليات تزوير المحاكاة مجال من مجالات علم الأدلة الجنائية الذي يتطلب المهارة المهنية والقدرة والفطنة من الفاحص في كل مرة يُطلب منه فحص حالة من هذا النوع والإبلاغ عنها، وهذا لأن المحاكاة التي تم ممارستها تحمل مظهرًا لافتًا للنظر للنموذج المنسوخ، وتحتوي عادةً على ميزات الكتابة اليدوية للكاتب والشخص الحقيقي وكذلك المزور، وإن كان بدرجات متفاوتة، وأيضًا نادرًا ما يترك المزور الماهر بصمته في التزوير الذي ارتكبه.

وقد نصحت معظم السلطات المعنية بالموضوع بأن تحديد الكاتب في مثل هذه الحالات يمكن اعتباره استثناءً وليس قاعدة. إضافةً إلى مناقشة ومراجعة العمل المنجز في هذا الصدد، ويتم تقديم وتوضيح دراسة حالة معقدة حيث يمكن أن يرتبط تأليف توقيعات المحاكاة بخط اليد المعروف للمزور المشتبه به.

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1. Introduction

Quite often, forensic document examiners across the world are called upon to examine the purportedly forged questioned signatures existing on contested documents and compare them with the standard signatures of the real person (who was supposed to have written); as well as with the known handwriting samples of the suspected forger(s). The usual purpose of such examination is to first find out and report if the aforesaid questioned signatures were genuine or forged; and, if found to be forged, then the question that often arises is, whether or not their authorship could be associated (or linked) with any of the sample handwritings of the particular suspect? According to Hilton [1], it is a commonly held belief that document examiners can conclusively identify the writer of a forgery from specimens of his known handwriting; but, unfortunately, in a number of instances, it is far from the truth.

Of all the forgeries encountered by document examiners, simulated forgeries are by far the most difficult to detect and identify. As the name suggests, a simulated forgery is one in which an attempt is made by the forger to copy or imitate the writing of another person from an existing model that is either physically present before him, or stored in his memory due to long practice. It is reasonably expected that a simulated writing will obviously resemble to some degree the writing of the real person it seeks to imitate. Osborn [2] has stated that simulation is one of the most effective modes of disguise; it is, therefore, equally apparent that a disguised (simulated) writing will differ to some extent from the normal writing of the forger who attempts to hide his own personality.

Depending on the level of skill, muscular coordination and amount of practice put in, the simulation may look quite good at times and show remarkable pictorial similarity to the genuine model signature being copied. To be successful, the quality of the simulation needs to be good enough; but, good simulations are somewhat difficult to perform and equally, if not more, difficult to detect. However, both practiced and non-practiced simulations will still have noticeable signs of imperfections or shortcomings. As stated by Osborn [2], the intense concentration of attention on the matter and the process of writing make it extremely difficult to write even one's own hand in a free and natural manner; and due to these self-conscious conditions, that are required to successfully imitate the writing of another person, the task of the forger becomes all the more difficult.

The detection of simulated forgery that is copied from a (genuine) model signature, and skillfully executed by freehand after putting in lot of practice, is not always an easy task because of the apparent pictorial similarity between the model and letterforms of the questioned and the standard signatures. As stated by Harralson & Miller [3], the clear-cut differences between the questioned and the standard signatures may not be readily found at times; the same could be more subtle and observable at a micro-level, requiring a thorough and careful examination under a stereomicroscope with contemporaneous standards produced under similar circumstances. According to Black [4], imperfections of the forger, like the presence of pen pause and/ or pen lifts; or, symptoms of hesitation, retouching, or correction at places; as well as, other indications like a slow & drawn, hesitating and tremulous line quality may be revealed by careful microscopic examination that could lead to the detection of such forgery. As stated by Osborn [2], sometimes, such forgery may show a relatively higher order of movement and muscular control than is exhibited in the genuine writing imitated. Such an imitation (or simulation) may show an inconsistent strength and firmness that indicate that the writing being examined is not genuine. According to Hilton [5], in order that a forgery is successful, the characteristics revealed by a detailed examination of the model signature must be duplicated to a point where the variations from them are relatively few in number that could be explained either as accidental or as natural variations of the genuine signature. Successful duplication of these writing characteristics to the extent of desired accuracy is an uphill task. It is highly improbable, if not impossible, for the forger to execute such a perfect forgery.

As stated by Hilton [1], the problem of identifying the forger from his handwriting is much more difficult than any other handwriting problem in view of the more frequent sources of error arising from limited material and interpretation of data. Levinson [6] has stated that while it is generally possible to determine forgery, it is usually difficult to identify the forger due to heavy influ-

ence of copying. According to Hilton [1], if the disputed signature is a freehand simulation, there is a very rare instance, if at all, that the writer leaves enough evidence of his own writing habits in the fraudulent signature to permit even a qualified or partial identification. Unless the similarity between the forged signature and the forger's writing is so significant and rare that no significant difference exists between them, identification must be cautiously approached. Kelly & Lindblom [7] have stated that identification of the forger, in such cases, is the exception rather than the rule. Similar views have been expressed by other authorities like Muehlberger [8], and Ellen et al., (2018) [9].

Natural variations are the essential ingredients of genuine signatures of a person written over a period of time. If there are several practiced freehand simulations forming a group, it offers an additional advantage to the document examiner to examine and compare the range and extent of natural variation between them. As stated by Black [4], careful examination of the genuine exemplars to accurately define the range of normal variation of their writer will reveal that the questioned signature(s) lacks some significant component(s) of the genuine signatures. The forger is unlikely to successfully incorporate, into the simulations, natural variations in handwriting strokes that are within the scope of the real person, because he is usually unaware of their presence.

According to Koppenhaver [10], close similarity or exact duplication of letters indicates that the forger had one (particular) form of that letter in mind while imitating handwriting. The forger does not realize the importance of natural variation and, therefore, makes the letters and words as close to the known model as possible. In view of the attempted simulation, that is usually done by the forger, letter by letter, coupled with lack of natural variations, the resultant simulations may show unusual, abnormal, or what are sometimes referred to as 'damaging similarities' among themselves (inter-se) as well as with the copied model signature. Contrary to natural variations, such damaging similarities that are unusual and most unlikely to occur in natural signatures of a person produced by the normal 'neuromuscular' reflex action are common indicators of forgery; they are the hallmarks of signatures produced by tracing, or simulation.

Singh and Singh, (1999) [11] reported their real case experiences involving authorship of simulated signatures, which was a distinctive case for a number of reasons. First, due to well-practiced simulation, sufficient lapses may not be left by the forger; second, the number of simulated signatures was sufficiently large to magnify the lapses to the level of sufficiency & suitability; and third, the suspect voluntarily gave plenty of freely written specimens of his writing corresponding to the model signature of the real person to the investigating officer. The above authors discussed the issues around examining a group of simulated signatures, each in itself with limited natural features, to build up sufficient characteristics to identify the forger.

As stated by most of the authorities on the subject, fixing the authorship of simulated signatures is an exception rather than the rule; it is, therefore, not surprising to find that the actual case studies of this type that are presented and published in forensic journals are not plentiful. Therefore, the authors felt it necessary to report an actual case study of this nature from the list of several cases examined in their laboratory.

2. Materials & Methods

Black and white photographs of original questioned signatures marked Q-6, Q-7, Q-10, Q-11 and Q-12 were prepared from the original 35mm negatives kept for record in the author's laboratory. All five questioned signatures were used for illustration in the case study.

Black and white photographs of original specimen signatures of the real person marked S-1 to S-12 were prepared from the original 35mm negatives kept for record in the author's laboratory. Out of these, the specimen signatures marked S-1 to S-3 were used for illustration in the case study.

Black and white photographs of original admitted signatures of the real person marked A-11 to A-20 were prepared from the original 35mm negatives kept for record in the author's laboratory. Out of these, the admitted signatures marked A-13, A-17 and A-20 were used for illustration in the case study.

Black and white photographs of original specimen handwriting of the suspect marked B-1 to B-19 (corresponding to the questioned signatures), were prepared

from the original 35mm negatives kept for record in the author's laboratory. Out of these, the specimen handwritings marked B-1, B-2, B-6 and B-12 were used for illustration in the case study.

Comparison Charts (Figures-1-3) were prepared from the questioned and standard signatures described above, using applications like Microsoft Picture Manager and Microsoft office for the illustration of case.

Standard methods of comparison based on the analyze, analyze, compare, evaluate and verify (AACE V) methodology.

ASTM Designation: E2290, Standard Guide for Examination of Handwritten Items.

Appropriate Light source of sufficient intensity, magnifying lenses up to 10X magnification, Stereomicroscope with appropriate light source and Standard Photographic equipment were used for document photography and printing.

2.1. Case Study

In the author's laboratory, a few such cases were actually examined and reported where the authorship of simulated signatures could be identified. One such interesting case involving the study of group of simulated signatures, examined by the authors in the year 2005, which was considered as the most intricate and complex, is presented as a case study. In this case that was investigated by the police; a businessman was defrauded by his accountant to the tune of 2.0 million by withdrawing money using five stolen bank cheques, after copying the businessman's signature from a genuine model. The laboratory was supplied with the specimen and admitted signatures of the real person; as well as, specimen handwritings of the suspect corresponding to the model of the questioned signatures. For the purpose of illustration, the following comparison charts were prepared:

1. Comparison chart showing the questioned signatures on the left hand side and standard signatures of the real person (who is purported to have written the questioned signatures) on the right hand side to facilitate comparison [Figure-1].

2. Comparison chart showing the questioned signatures on the left hand side and handwriting specimen of the suspect, corresponding to the questioned signatures, on the right hand side to facilitate comparison (Figure-2).

3. Juxtaposed chart showing the extracted handwriting features of the questioned signatures (Column -1, Figure-3); corresponding portions extracted from the standard signatures of the real person (Column -2, Figure-3); and, similar portions extracted from the specimen handwriting of the suspect (Column -3, Figure-3).

3. Results and Discussion

3.1. Comparison of questioned signatures with standard signatures of the real person (Reference, Figure-1)

Inter-se examination of all the five questioned signatures as shown in the left-hand column of 'Figure-1', executed on different dates reveals consistency in skill, speed, slant, letter size, spacing and letter forms indicating that they could have been produced by a single writer. Likewise, inter-se examination of all seven standard signatures of the real person as shown in the right-hand column of 'Figure-1' executed on different dates reveals consistency in skill, speed, slant, letter size, spacing and letter forms indicating thereby that they could have been produced by a single writer. Scientific examination and comparison of the above two groups revealed that:

1. The questioned signatures show a relatively higher order of movement, level of skill, muscular coordination and speed of execution than the standard signatures. The standard signatures show natural variations in shape, size and formation of various characters around their master patterns, the extent and range of which is specific and well within the scope of the concerned writer. On the other hand, variations that are observed in the group of questioned signatures are somewhat superficial, unnatural and rather restricted; and, their extent and range significantly differs from that of the standard signatures. This indicates that the manner of production of these two groups of signatures could be different; one having been produced by the normal neuromuscular reflex process (the standards) and the other produced by imitation or copying from the model signature (the questioned).

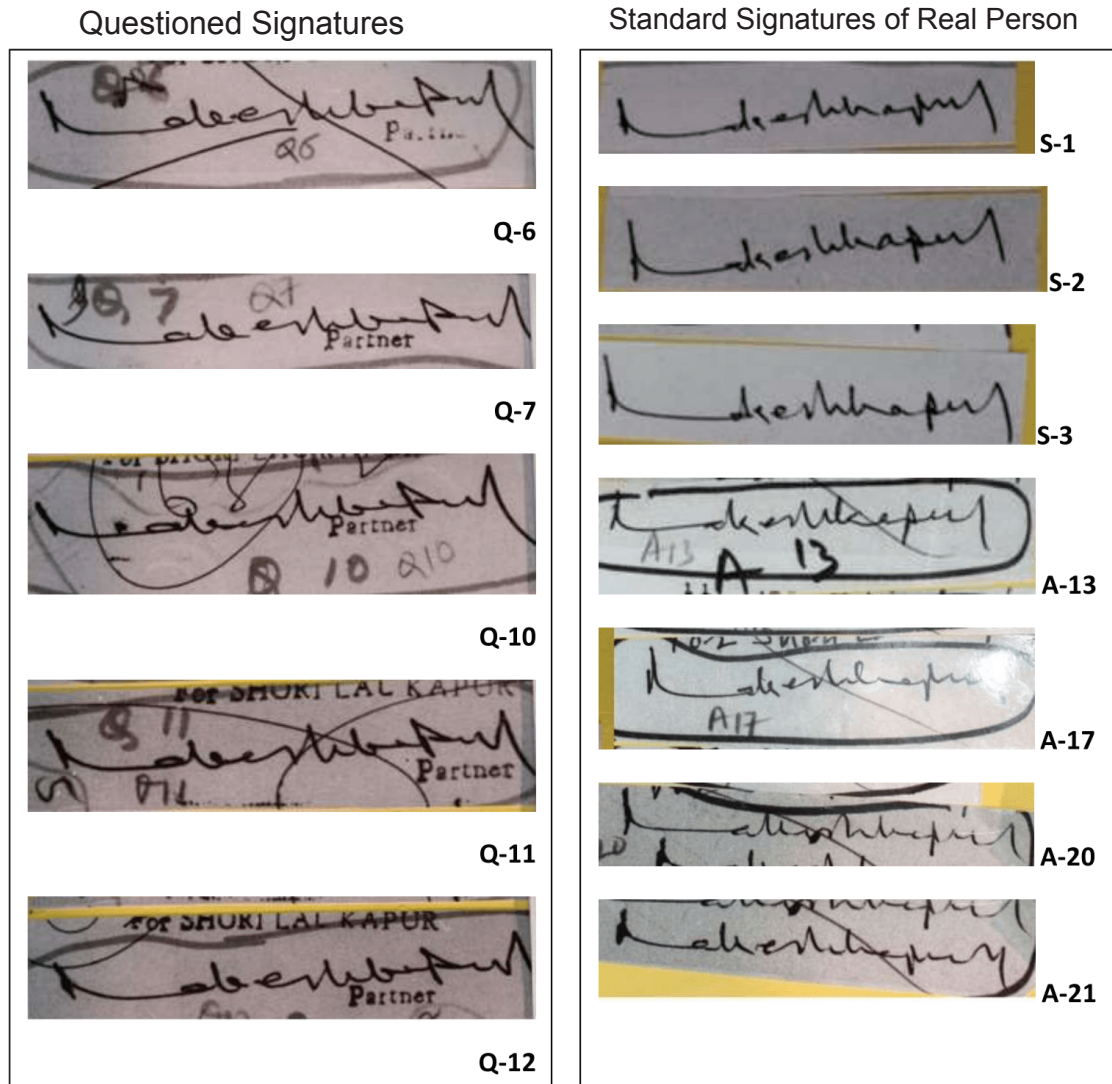2. Careful examination of the first character representing

Questioned Signatures

Standard Signatures of Real Person

Figure 1- *Questioned Signatures and Standard Signatures of the real Person (Businessman) which were suitably enlarged to have magnified view of the writing characteristics embodied in them.*

the letter 'R', as found in the standard signatures, reveals that this letter has been formed by the real person in a single operation of movement starting from the commencing stroke that is located somewhere in the middle of the vertical staff followed by retrace in the up-going stroke and its joining with the succeeding body curve. The suspect was perhaps unaware of this complexity of movement, which he failed to reflect in the questioned simulations. Microscopic examination of the questioned signatures reveals that the letter 'R' was, in fact, formed in two separate pen operations. That is, the vertical staff and the curved

part were written separately; contrary to what was observed in the standard signatures.

3. Careful examination and comparison of the body curve of the letter 'R' in the questioned and the standard signatures reveals that there was an impulse in the lower part of the standard signatures, which was not observed as such in the questioned signatures. The suspect probably could not follow the intricacy of such movement impulse and, hence, reflect the same at the appropriate place in the questioned signatures. It is usually not possible for the forger to maintain a reasonable balance between speed and accuracy of letter
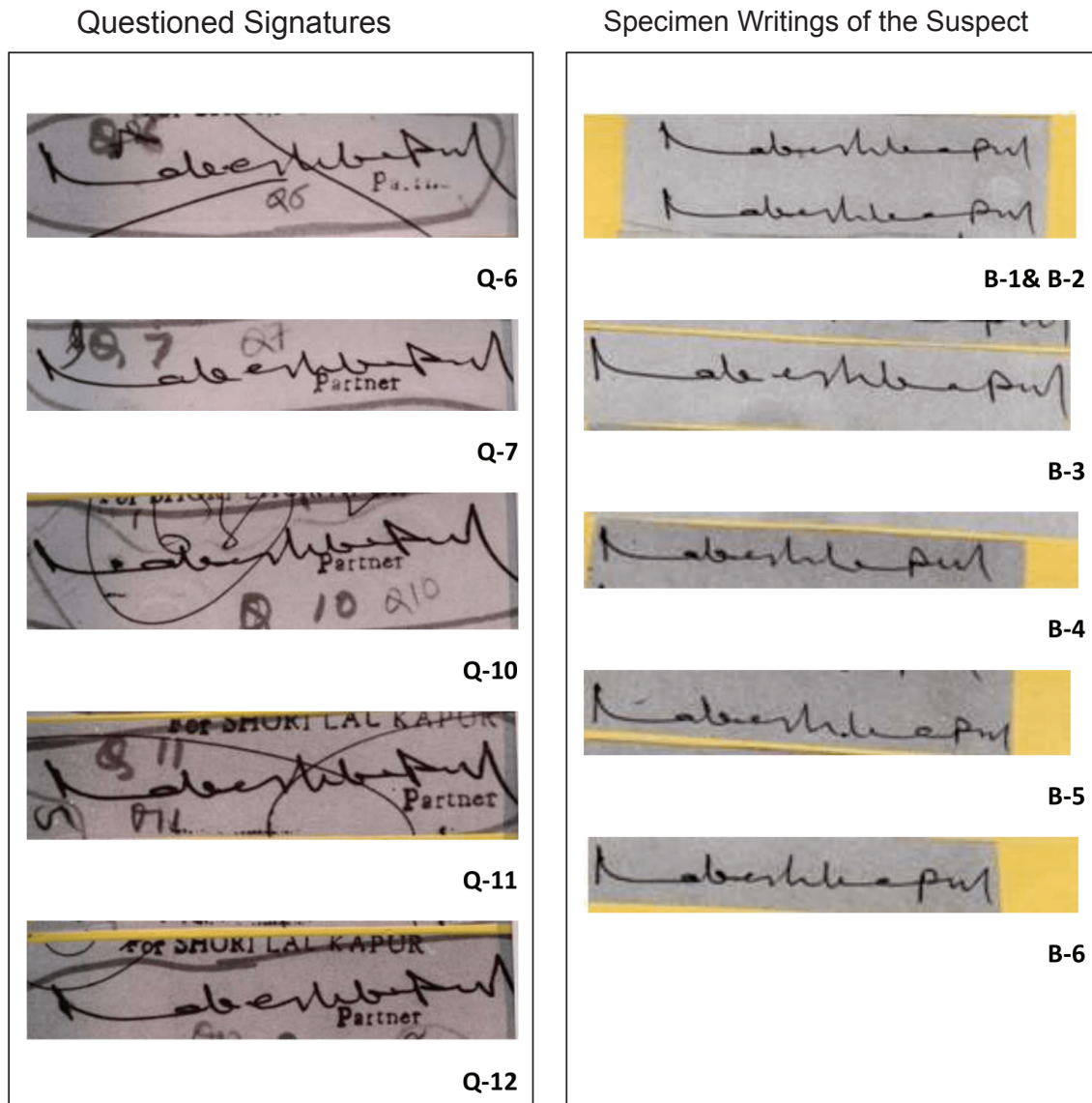
Questioned Signatures

Specimen Writings of the Suspect

Q-6

Q-7

Q-10

Q-11

Q-12

B-1& B-2

B-3

B-4

B-5

B-6

Figure 2- *Questioned Signatures and the corresponding Specimen Writings of the suspect (accountant) which were suitably enlarged to have magnified view of writing characteristics of the forger that were unconsciously introduced into the questioned signatures.*

formations, which often results in such imperfections.

4. Inter-se examination of the standard signatures reveal that vertical staff and lower curved part of the letter 'k' of the word 'Rakesh' was mostly formed in two operations; and at some places, the letter 'k' was found written in a single operation of movement by joining the lower curved part with its preceding vertical stroke. Both variations of this letter are within the scope of the real person. However, the extent and range of this variation went unnoticed by the suspected forger, consequently resulting in formation of let-

ter 'k', in all the questioned signatures, in a single operation of movement, whose manner of execution too was found completely different between the questioned and the standard signatures.

5. The formation of letter 'k' of the word 'kapur' at all places in the questioned signatures is found to be consistently different from that of the standard signatures. Perhaps the suspect could not precisely reproduce the minute and inconspicuous details of its formation because of the extra attention given to match the speed of the signature at the cost of its form.

S.No.	Writing Character--ristics	Questioned Signatures (Column-1)	Real person (Column-2)	Suspect (Column-3)
1.	'R' (Rakesh)			
2.	'k' (Rakesh)			
3.	'k' (Kapur)			
4.	'sh' (Rakesh)			
5.	'pu' (Kapur)			
6.	'r' (Kapur)			
7.	'ake' (Rakesh)			
8.	'eshk' Combn.			

Figure 3 - *Juxtaposed chart showing differences in writing characteristics between the Questioned Signatures and Standard Signatures of the real person namely 'Rakesh Kapur' as well as similarities with specimen writings of the suspected forger, which were suitably enlarged to have magnified view of the minute and inconspicuous writing habits.*

6. Despite pictorial similarity in form of the 'sh' combination as found in the word 'Rakesh', there was a noticeable difference in the joining of these letters in the questioned and the standard signatures, which became apparent on close examination. The suspect probably failed to match the form of these characters having concentrated more on speed.

7. Inter-se examination of the letter 'p' in the word 'kapur', in all questioned signatures, reveals damaging

similarity in its form with negligible variation, if any. There are peculiar variations in the formation of this letter at several places in the standard signatures of the real person. Perhaps the suspected forger was unaware of the extent and range of such a variation at the command of the real person, having produced the questioned signatures simply by imitation, probably from the same model. Furthermore, careful examination and comparison of the letter 'p' together with its

preceding and succeeding strokes, in the questioned and the standard signatures, reveals a noticeable difference in the 'pu' joining, probably due to the imperfections of the forger.

8. Inter-se examination of the final letter 'r' in the word 'kapur', in all questioned signatures, reveals damaging similarity in its long curved finishing stroke with negligible variation, if any. There are significant variations in the formation of this letter in the signature of the real person, which the suspected forger was probably unaware of and, hence, could not reflect in the questioned signatures. Further, the nature, extent, and direction of this tapering finish are different between the questioned and the standard signatures. The formation of such skillful strokes, as found in the questioned signatures, appears to be beyond the skill and capability of the real person.

9. The nature and location of stokes comprising the 'ake' and 'eshk' combinations are also different in the questioned and standard signatures. The probable reason for such differences could be the inability of the suspected forger to reproduce minute details of formation due to extra attention given to match the speed of the letters at the cost of their form.

10. The effect of simulation appears to be somewhat, more pronounced in the letters/characters representing 'R', 'a', 's', 'h' of the word 'Rakesh'; 'k' of the word 'kapur', at places, and in curved stroke comprising the letter 'u'. However, the same was restricted to their apparent forms only, paying little attention to the detail of their formation.

The afore-said differences, when collectively considered, indicate that the two sets of signatures, illustrated in column 1 (questioned signatures) and column 2 (standard signatures of real person) of 'Figure-1', were most probably written by different writers. However, before expressing a definite opinion, some other factors needed to be considered. Firstly, elimination of authorship is generally considered more difficult than the identification; and, secondly, in simulated signatures, the possibility of auto-forgery, though remote, always theoretically exists.

Koppenhaver [10] has reported that the task of elimination of a particular person as the purported author of questioned handwriting or signatures is much more dif-

ficult than that of the identification. While identification could be achieved with a few contemporaneous samples, elimination requires the examination of comprehensive handwriting samples of the person concerned written over a considerable time period and under varying conditions to have a sufficient knowledge about the extent and range of variations at his command during his lifetime before he could be ruled out as the author of any handwriting or signature.

Osborn [2] has stated that if the imitator possesses skill superior to that of the writer of the writing imitated, which in some instances is the fact, the forgery may show a higher degree of muscular control than is exhibited in the genuine writing imitated. Furthermore, an imitation may show an inconsistent strength and firmness that indicate that the writing is not genuine. Harralson & Miller [3] have stated that simulated forgeries of high quality will probably display little evidence of slowing down or lack of fluency that is normally one of the indicators of spurious signatures. While standard signatures of poor quality (or skill) call for equally poor quality in their duplication; however, the simulation may display superiority in writing style or writing skill. In the present case, the observations of Harralson & Miller [3] assume added significance because the questioned simulations showed comparatively higher skill than that possessed by the real person.

According to Koppenhaver [10], every person develops a skill level that suits his or her individual needs. Once the graphic maturity stage is achieved, the writer cannot exceed that skill level without serious effort applied over a period of time. In the present case, it has been observed that the level of skill and muscular coordination of the writer of the questioned signatures is of a relatively higher order than that of the writer of the standard signatures (i.e., the real person). According to the principle of handwriting identification, a person cannot exceed his maximum writing skill or capability all of a sudden; that is, the person with a lower order of skill cannot spontaneously produce handwriting or signatures of higher skill.

Further, in cases of disguise for subsequent denial, it has been experienced by the authors that, when a real person attempts to simulate his own writing or signa-

ture, the chances of reverting back to his normal writing style are far more and sooner than if somebody else simulates his writing or signatures. Thus, the possibility of auto-forgery, as a mode of disguise, in production of questioned simulations, in the present case could be ruled out. Furthermore, no significant similarity was observed between the questioned and the standard signatures of the real person in this case. On the other hand, characteristic differences were found in the minute and inconspicuous details of the formation of various letters/characters between them, pointing to a different authorship, rather than intended disguise of the real person. Hence, under these circumstances, the authors faced little difficulty in eliminating the real person as the author of questioned simulations.

3.2. Comparison of questioned signatures with specimen handwriting of the suspect

As stated above, inter-se examination of all five questioned signatures as shown in the left-hand column of 'Figure-2', indicates that they could have been produced by a single writer. Likewise, inter-se examination of all six specimen handwriting samples of the suspect as shown in right column of 'Figure-2' reveals consistency in skill, speed, slant, letter size, spacing and letter forms indicating that they could have been produced by a single writer. Scientific examination and comparison of the above two groups reveal that the questioned signatures agree with the specimen writings of the suspect in movement, level of skill & muscular coordination and speed of execution of various letters/strokes and their combinations. Despite the effect of simulation, there are similarities in minute and inconspicuous details of the formation of various characters, which appear in the form of lapses, wherever the suspected forger has departed from the copied model. Some unconscious habitual similarities occurring between the questioned and specimen writings are given below:

1. Microscopic examination of the questioned signatures reveals that the letter 'R' was formed in two separate operations; that is, the vertical staff and the curved part were written separately. The same is also similarly observed at several places in the specimen writings of the suspect. This is a significant departure from the writing habit of this real person where in the letter 'R' was formed in a single operation of movement having a retrace in its vertical staff. The probable reason for such departure could be that the suspected forger was unaware of complexity of movement of this letter, which he failed to reproduce in a similar manner in the questioned simulations, because he concentrated more on speed rather than the detail of its formation.

2. Careful examination and comparison of body curve of the letter 'R' in the questioned and the specimen writings of the suspect reveals similarity between them. This is a significant departure from the writing habit of the real person, which showed that there was an impulse in lower part of his standard signatures, which he failed to reproduce in the questioned signatures. The suspect probably could not follow the intricacy of such movement impulses and, hence, reflect the same at appropriate place in the questioned signatures. It is usually not possible for the forger to maintain a reasonable balance between speed and accuracy of letter formations, which often results in such imperfections, or lapses.

3. Careful examination and comparison of minute details of formation of the letter 'k' as found in the words 'Rakesh' and 'kapur' show characteristic similarities with the specimen writings of the suspect, giving it the peculiar appearance of letter 'b'. This is a significant departure from the writing habits of the real person, which showed that the letter 'k' was mostly formed in two operations; and, rarely in a single operation. The habit, which the suspect could not follow and appropriately reproduce in the questioned signatures, occurred because he had to pay extra attention to match the speed of signature at the cost of its form.

4. Careful examination and comparison of the 'sh' combination as found in the word 'Rakesh' reveals similarities in the angle of the connecting stroke between the questioned signatures and specimen handwriting of the suspect. Despite pictorial similarity in form, there was noticeable difference in joining of these letters in the questioned and the standard signatures of the real person, which becomes apparent on close examination. The suspect probably failed to match this combination accurately having concentrated more on

speed than form.

5. Careful examination and comparison of the letter 'p' as found in the word 'kapur' along with its preceding and succeeding strokes reveals characteristic similarities in its finishing stroke and joining with the succeeding letter 'u' at several places in the questioned signatures as well as the specimen handwriting of the suspected forger. Further, there is a noticeable difference in the formation of 'pu' joining between the questioned signatures and standard signatures of the real person. The forger probably failed to match these strokes accurately with the copied model, due to more emphasis on speed; and, instead, introduced his own unconscious writing habit into the forgery.

6. There are similarities in the nature and extent of curvature and direction of finish of the letter 'r' as found in the word 'kapur' both in the questioned signatures and specimen writing of the suspected writer. Further, the nature, extent and direction of this tapering finish are found to be completely different between the questioned signatures and standard signatures of the real person; apparently, beyond his skill and capability.

7. The nature and location of stokes comprising the 'ake' and 'eshk' combinations as found in the questioned signatures show characteristic similarities with the specimen handwriting of the suspect. At the same time, they show differences with standard signatures of the real person; the probable reason for such differences could be the inability of the suspect to reproduce minute details of formation due to extra attention given to match the speed of the letters at the cost of their form.

The afore-said similarities with the suspect along with differences from the real person have been illustrated in the Juxtaposed Comparison Chart, 'Figure-3'.

According to Osborn [2], handwriting is considered an acquired habit, which can neither be simply discarded nor assumed at will. Thus, there is a good possibility that some handwriting characteristics of the forger will be incorporated in the simulated forgery. Quite often, it has been found that adherence to the copied model results in pictorial similarities between the questioned simulations and the model signature that are of superficial

nature; whereas, departure from the same copied model could result in inclusion of the forger's own unconscious features into the forgeries. Conway [12] has stated that, in such cases, the influences of model simulation can be subtracted and the remaining handwriting features compared and evaluated with the writing of the suspected forger. Muehlberger [8] has stated that some simulations may reflect the writing habits of its maker. In some albeit rare instances, the simulated forgery can be identified through handwriting comparison. As stated by Harralson & Miller [3], the options available to any forger to be successful are rather limited; because, one cannot exclude from one's writing those (unconscious) habits that he is unaware of possessing (Principle of Exclusion). Further, one cannot include in one's writing those (minute & inconspicuous) habits of another person's writing which he is unaware as being present or significant (Principle of Inclusion).

Consistent with the views of several authorities as stated above, an attempt was made by the authors to examine the possibility of association of the known handwriting of a suspected forger with the questioned simulations. Accordingly, it was found that, besides deviating from the copied model at places, the forger had unconsciously included some of his own natural writing habits (as mentioned above) into the forged signatures, which were collectively considered to be 'suitable and sufficient', under the circumstances of the case, to associate or link the handwriting of the suspected forger as the probable author of the questioned simulations.

4. Conclusion and Suggestions

As stated by Hilton [1], if the forged signature is an imitation, the likelihood of its identification is very remote; and, in most cases, the forger cannot be identified from his handwriting. The entire problem is an extremely difficult one, and if not handled carefully and cautiously, can lead to serious errors.

Hilton [1] has further stated that; in a simulated signature, there may be some (mixed) hybrid characteristics originating from both writers, that is, the real person and the forger. Unfortunately, such hybrid features may be confusing; and, they are seldom sufficiently representative of the writing habits of the forger to form the basis

of his identification. However, as stated by Harralson & Miller [3], and Ellen [9], the simulations of two different skilled simulators could be differentiated under optimum conditions; and, with proper standards, the author of some simulations can be identified. Thus, the scope of identification of the forger of a group of practiced simulations, howsoever restricted, certainly exists; which can definitely be explored by an experienced document examiner, depending upon the availability of suitable and sufficient characteristics of the forger that are unconsciously left by him in the questioned simulations, in a particular case. If need be, the examiner can qualify his identification opinion with suitable riders, as suggested by Hilton [1].

However, the successful identification of the forger of signature simulations, to the extent possible, depends on the following factors:

1. Degree of simulation: The more accurate the simulation (or imitation) is, the fewer of the forger's own writing habits remain that could be found in the forged signatures.

2. Skill of the forger: If the forger is skillful enough to avoid his own subtle writing habits into the forgery, the chances of his identification are far less; than if it is otherwise.

3. Number of simulated signatures: more the simulations, the more the chances of departure from the copied model and, consequently, it will be easier to detect and identify the simulation; of course, subject to the availability of suitable & sufficient data.

4. Availability of contemporaneous standards of the real person of similar model & design: The detection of simulated forgery could be made easier, if adequate standards of the real person are provided for comparison.

5. Availability of the copied model: As stated by Muehlberger [8], the detection of the actual model used in simulated forgery can be both a boon and a bane to the forensic examiner. A comparison with the authentic model will reveal the extent and manner in which forgery differs from the genuine signature. Further, if there is sufficient deviation from the copied model, the simulation may facilitate a comparison with the known handwriting of the suspect.

6. Availability of freely written dictated specimen writings of the suspected forger: The task of procurement of dictated handwriting specimens of the suspected forger corresponding to the copied or assumed model is never easy. The forger cannot be compelled to write 'forged signature' specimens of somebody else, as that amounts to creating evidence, which may ultimately be used against the suspect. However, it depends on the capability and skill of the investigator. In some cases, the investigating officers could actually succeed in convincing the suspects to give such handwriting specimens, freely and voluntarily.

7. Availability of pre-existing admitted writings of the suspect: Sometimes, the admitted writings of the suspect (if containing similar letters and combinations) could be helpful to assess whether the similarities in writing habits found common between the questioned and specimen writings, as unconscious lapses of the forger, are the natural writing habits attributable to him, or not.

8. Practical experience, skill and competency of the forensic examiner:

Due to the complexity and intricacy of issues involved in such cases, the evaluation and interpretation of handwriting features that are present due to simulation and writing features that are unconsciously left by the forger and forming an appropriate opinion there-from is an extremely difficult task. Hence, correct decision making in such cases also depends upon the professional expertise, skill, competency, and experience of the examiner concerned.

The examiners who are handling such cases must always keep in mind that identificaton of forgery cannot be taken lightly or in a routine fashion. Accordingly, examiners must take adequate precautions to avoid error, as rightly advised by the standard authorities on the subject, placing extraordinary emphasis on correct application of their methods and techniques.

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