

Evaluation of Similarities among Conventional and Unconventional Writing for Qualified Opinion

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ABSTRACT

Handwriting as an evidence is considered as helpful part of information for forensic investigation which is commonly encountered in the case such as murder, suicides, kidnapping etc...Available pieces of handwriting are scrutinized to recognize a writer of the questioned document as it is based on the principles that no two people write exactly alike. Forensic experts often face difficulties in the examination of such notes and authenticating the original authors. The presents study is based on the forensic analysis of handwriting on unconventional surfaces by unconventional writing instruments. For studying this, 50 different conventional and unconventional handwriting samples were collected and examined for different handwriting features.

Key Words –Handwriting, Suicide Note, Unconventional Surfaces, Unconventional Writing Instruments

1. INTRODUCTON

Handwriting is an acquired skill and clearly one that is a complex perceptual motor task, sometimes referred to as a neuromuscular task (**Huber & Headrick, 1999**). Handwriting is the formation of letters, characters or symbols using writing implement, according to a recognizable pattern which is designed to communicate to another person (**Vos, et al. 2000**). Handwriting is a complicated operation that takes the average person many years to learn. Only over considerable time

can one develop the coordination of arm to hand to finger movements needed for what can be loosely coined as the handwriting of a literate person (**Levinson, 2001**).

Handwriting are usually refers to an individual writing with writing tool as a pen or pencil. Handwriting comparisons are based on the principles that no two people write exactly alike and that characteristics reoccur throughout every person's writing, although no one writes exactly the same way twice. This combination of characteristics is unique to every individual and is used by document examiners for comparison (**Held, 2001**).

Handwriting has long been considered by questioned document examiner to be a unique and distinctive individual behavior (**Smith, 1984**). The pattern of handwriting which distinguish the script of one person from that of another have been attributed to a variety of influences including the writer's perceptual abilities physiology musculoskeletal system nervous system, intellectual development emotions ,and motivation (**Bradley, 1986**), as well as education and occupation (**Saudek, 1933**). Even in the uncommon case in which an individual exhibits markedly different styles of writing, the questioned document examiner may conclude that the writing styles share critical identifying features after applying forensic methods for comparing handwriting characteristics (**Osborn, 1929**).

An individual may deliberately change a handwriting style to create a different appearance for a variety of reasons. It is commonly accepted by questioned document examiners that level and form of education, physical well-being, and many transient conditions affect the written product; including qualities of the writing instrument and writing surface (Baxter, 1966).

Identification of class and individual characteristics by the Forensic Document Expert during the stage of handwriting examination is very essential factor to individualize anyone. On the basis of letter design, there are a number of individual characteristics and distinguishable features that are important for either handwriting classification or identification purposes.

DIFFERENT CONDITIONS WHICH AFFECT HANDWRITING

There are several factors which influence handwriting under different conditions. It is well-known that writing on walls, on the roofs of cars, mirrors, or on any unconventional surface by any unconventional instruments are conditions that often create variations in handwriting. Consequently, following are the few conditions which can cause variations (Huber & Hedrick);

1. **The Writing Surface** – The examination of writing on the hard metal surfaces of fairly large copper tubing (2-in. diameter). In all cases, some evidence was found by which the lettering could be associated with the authors, although not definitively. Many factors had a bearing on these examinations, including the effects of the movement of the flesh with the writing instrument, and the curvature of the pipe (Brown, 1985).
2. **The Writing Instrument** – The influence of the writing instrument upon the writing of an individual is rarely very significant. If there is an observable difference between the writings of a given person made with different instruments, it may be due to that person's personal preference for, or comfort in using, a particular instrument as it is to the effects of the instrument itself (Mayther, 1969)
3. **The Writing Positions** – A distorted writing alleged to have been written under unusual circumstances. It was claimed that it was written while standing at a cluttered counter when the writer was holding a weight of unwieldy tools in

the other hand. Standards were obtained when circumstances were duplicated and a remarkable correspondence in the writings was revealed (Grant, 1974)

2. MATERIALS & METHOD

For present study, 50 handwriting samples were collected from different people belonging to 18-40 age groups for examining the individual's features of handwriting. The different unconventional and conventional writing instruments were purchased from local market like Lipsticks, Kajal, Pen, Marker, Coal, Alta, Liquid Vermilion, and Eyeliner. First of all every candidate were asked to write a sentence; "The quick brown fox jumps over the lazy dog" on A4 sheet with a ball point pen/gel pen in normal conditions. Same candidates were asked to choose any of the unconventional writing instruments to write on any unconventional surface with different positions. With this, candidate name, age, sexes were written on back side of the A4 sheet with sample number for maintaining the records. Students were instructed to write freely on unusual surface. The samples written on unconventional surfaces were photographed with a digital camera and developed to protect its evidential value. The developed photographs of unconventional handwriting samples were compared with the conventional handwriting samples on A4 sheets to evaluate the similarities among conventional and unconventional writing for qualified opinion.

3. RESULT

Collected 50 conventional and unconventional handwriting samples were examined for different class characteristics like alignment, diacritics, initial strokes, connecting strokes, terminal strokes, slant, size, style, ratio and individual characteristic like identifying and differentiating characteristics, repeated characteristics, characteristics those are modified by different writers in different ways. Handwriting samples were collected and examined for different handwriting features under two different parameters:

1. Surfaces
2. Instruments

After detail study of all the handwriting samples collected both conventional and unconventional, the statistical result was obtained for checking the significant and no significant difference between

percentage of similarities and percentage of dissimilarities by using "ANOVA Two Way

withoutReplication" shown in table 1, 2, 3 and 4.

Table 1: Observation table on the basis of Similarities for ANOVA Analysis (Surfaces)

Table 2: ANOVA Table on the basis of Similarities (Surfaces)

Surfaces	Features													
	F1	F2	F3	F4	F5	F6	F7	F8	F9	F10	F11	F12	F13	F14
S1	20	95	60	80	80	20	90	95	80	95	90	96	95	92
S2	40	95	80	80	90	60	95	95	80	98	94	95	99	95
S3	40	95	96	90	80	90	95	98	80	99	99	98	99	97
S4	60	92	80	90	80	80	80	90	60	90	85	95	90	95
S5	40	90	95	60	95	85	80	80	90	95	90	99	99	95
S6	20	80	90	80	80	60	80	80	80	90	96	92	96	90
S7	20	80	80	40	40	20	80	80	60	90	90	85	86	95
S8	40	95	80	80	85	60	90	95	80	95	99	94	96	99
S9	60	80	90	60	80	60	95	90	80	85	90	90	94	89
S10	60	80	80	80	80	40	90	95	80	90	95	96	93	98

Source of Variation	SS	Df	MS	F	P-value	F crit
Due to Surface	4536.971	9	504.1079	5.167199	6.74E-06	1.960818
Due to Features	32849.29	13	2526.868	25.90086	1.81E-28	1.804692
Error	11414.43	117	97.55922			
Total	48800.69	139				

Table 2 reveals that the calculated values of f due to surfaces are less than tabulated values of f at 5 % probability level, so accepting the null hypothesis concludes that there is no significant difference in handwriting due to the surface variation. But the calculated value of f

due to features is greater than tabulated values of f at 5 % probability level, so rejection of null hypothesis concludes that there is significant difference in handwriting regarding to the features.

Table 3: Observation table on the basis of Similarities for ANOVA Analysis (Instruments)

Instruments	Features													
	F1	F2	F3	F4	F5	F6	F7	F8	F9	F10	F11	F12	F13	F14
I1	20	95	60	80	80	20	90	95	80	95	90	96	95	92
I2	40	80	80	80	60	40	85	80	80	99	95	96	92	95
I3	60	90	40	60	60	60	90	80	80	96	95	99	98	94
I4	60	90	80	80	80	80	80	60	80	99	96	94	95	92
I5	60	70	40	60	80	80	80	80	90	96	98	95	95	99
I6	80	80	90	60	80	60	95	90	80	90	90	90	94	96

Table 4: ANOVA Table on the basis of Similarities (Instruments)

Source of Variation	SS	Df	MS	F	P-value	F crit
Due to Instruments	471.8571	5	94.37143	0.646143	0.66537	2.356028
Due to Features	16767.24	13	1289.788	8.830927	4.9E-10	1.87388
Error	9493.476	65	146.0535			
Total	26732.57	83				

Table 4 reveals that the calculated values of f due to instruments are less than tabulated values of f at 5 % probability level, so accepting null hypothesis concludes that there is no significant difference in handwriting due to the instrument variations. But the calculated value of f due to features is greater than tabulated values of f at 5 % probability level, so rejection of null hypothesis concludes that there is significant difference in handwriting regarding to the features.

4. DISSCUSION

As the suicide notes on unconventional surfaces by unconventional instruments are frequently encountered on crime scene. Hence, the experts face difficulties in examination of such suicide notes. In present study class and individual characteristics were examined in conventional and unconventional handwriting samples were studied and comparison of similarities and dissimilarities was done.

Few studies were already available, **Totty (1981)**, had examined a case where writing on the stomach of a dead victim was compared with the handwriting of a suspect and a helpful link was found between the questioned and specimen handwritings. Considering his result as the basis the present study was conducted to study the similarities in handwriting due to unconventional surfaces and instruments.

Another study was conducted by **Moran (1999)**, hereported the loss of identifying details with a change in the type of writing instrument, but was of the view that there are still many recurring features that are of help in establishing the authorship. In present study, in spite of change in writing instruments the link can be establish between unconventional and conventional writing sample.

Jasuja et al. (2014) undertook a study which was based on the examination of writing samples written with spray paint cans on vertical surfaces. A preliminary study was conducted consisting of examining the handwriting of 30 individuals, executed on vertical writing surfaces with spray paint cans, and handwriting written under normal writing conditions. Although writings written with a spray paint can show variations in overall appearance, relative sizes and positions of letters and words, in this study no significant change was observed in writing habits, basic letter formations and other identifying details.

In present study, different type of unconventional writing surfaces and writing instruments were used. No significant difference result were observed due to change in writing surfaces and instruments whereas significant difference due to features, which clearly represent that handwriting of individual remains unaltered due change in writing surfaces or instruments.

5. CONCLUSION

On the basis of ANOVA analysis there is no significant difference due change in writing surfaces and instruments whereas there is significant difference regarding to the features of an individual handwriting. Therefore, the present study has proved that handwriting of any individual is not affected due to unconventional surfaces and instruments.

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