**Effect of Intoxication on English Handwriting**

**Ayushi Rana**

**ABSTRACT**

Writing is a complex task. It requires the coordination of fine motor skills and cognitive skills which reflects the social and cultural patterns of the writer and also linguistically complex. Handwriting is one of the most fundamental stone of civilization. It is a system of graphic sign, which are agreed by certain human society. People show variation in handwriting on the basis of difference in their expression of speech, physical attitude, gesture, postures, and modulation of voice. The research work has been done to determine the natural variation among the same individuals in their pre and post stage of intoxications. The handwriting was evaluated on the basis of variation of writing based on graphlogical parameters and the observed features were evaluated.

**Keywords**: *Forensic Science, Alcoholic strength, Document examination.*

**INTRODUCTION**

Handwriting is a principal factor in many criminal offences and has been the subject of expert study. The handwriting examination is compactly related to observational learning and practical experience. It is typically a behavioural exercise that is identifiable because of the presence of characteristic features and qualities within the written matter. It is aneuro-muscular task which originates in the mind as a mental picture but natural variation is the major factor which does not allow the exact duplication of image generated in mind on paper because of its inevitable nature which indirectly gives the authenticity to handwriting. It is outlined as the imprecision with whom the habits of a writer are executed on repeated occasions. Preliminary examination of handwriting of a disputed document is done to find out whether the document is fit for detailed examination or not usually the document is checked for any kind of forgeries, disguise, tampering with them. The questioned examination is done to find out the authenticity, adequacy and integrity of the input materials and lays down the foundation for detailed examination.The penmanship is analysed by comparing the questioned and the standard writing for class characteristics and the individual characteristics to prove the identity of a person. Some of the class characteristics involve Line Quality, Skill, Size & Proportion, Spacing, Slant, Rhythm, Alignment, Movement, etc. When the When the writings are closely examined, some basic differences allow the individualisation of the handwriting. These characteristics are the most important factors to determine the penmanship. These individual characteristics involve Letter formation, Connecting Strokes, Embellishments, Initial and Terminal strokes and any peculiar and unique style of writing. **Osborn *et al* (1929)**, suggested phenomenon.of distinguishing different system of writing using proportion of letters as an element Computation of average heights and widths of letter combinations. Writing is a complex task brain guides hand everything put on paper is a result of a two- way circuit between brain and the motor reflex muscles of hand. Thus handwriting becomes polygraph or oscilloscope to read out complete self.

**JUSTIFICATION**

The justification for this research work is forgeries of the documents or during signature forgeries, cases of testamentary will and cheque forgeries and so on. Many times it is claimed that a particular document has not signed by the alleged person or when the signature was obtained the person has no knowledge of it because of intoxication. In these circumstances two issues are to be decided. Whether the signature belong to the alleged person or whether the signature has taken under the influence of intoxications. The dosage of intoxication leads to the imblancement of our nervous control and causes affect to the physiological mechanism of writing which corrupt the formation of the letters and leads to the irregularity in the formation of class characterstics of handwriting .Each and every writer posses its natural master pattern of writing that changes from sober to unsober writing due to the drunkenness and loss of control of the writer while the causing movement of pen. .Handwriting play a major role in the analysisof this natural variation of individual writer. The features that are found to be deteriorated in the intoxicated writers helps in the discrimination of the pre and post stages of handwriting of the writers.

OBJECTIVES

1. To study the effect of intoxication on english handwriting.
2. To evaluate similarity and dissimilarity in normal and intoxicated writing .

**RESEARCH METHODOLOGY**

**Sources of Data**: Handwriting samples for the analysis were collected from the same individuals in their pre and post stage of intoxications from the bar, disc and pub. There are total 100 samples which were collected, with given consent form at the time of the conscious stage of the individuals in which they have to write the same paragraph which was given. For the purpose of further studies for making comparison of handwriting in their pre and post stage of intoxications. The alcohol brands were not selected this study is entirely based on the calculated alcoholic concentration vol/vol. Subjects were intoxicated with alcohol and the samples were taken after 1 hour of consumptions of their drinks after determining their alcoholic strength with breath analyzer.

**Categorization**

The subjects were categorised on the basis of blood alcohol concentration vol/vol. **Asicioglu *and Turan (*2003).**

Type 1- 0- 25% blood alcohol concentration vol/vol.

Type 2- 25- 50% blood alcohol concentration vol/vol.

Type 3- 50-70% blood alcohol concentration vol/vol.

**Preliminary Examination of the Handwriting samples**: The eleven handwriting features were analyzed which are as follows.

* Rhythm- Rhythmic/non rhythmic.
* Word alignment – Even/uneven.
* Line quality-Good/poor/smooth.
* Hesitation- Present/absent.
* Pictorial effect- Skilled/unskilled.
* Spacing- Present/absent.
* Misspelling- Present/absent.
* Tremors-Present/absent.
* Connecting strokes-Connected/disconnected.
* Size- Small/large/medium.
* Slant- Left/ right/vertical.

**Statistical tool**- Chi square test is used to analyse and interpret the date.

**RESULTS AND DISCUSSION**.

**1. Frequency of the affected features of handwriting at different blood alcohol concentration.**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **S. No.** | **Features** | **Blood Alcohol Concentration** | | |
| **(0-25% v/v)** | **(25-50% v/v)** | **(50-70% v/v)** |
| **Frequency** |  | **N- 30** | **N-30** | **N-30** |
| 1 | Slant | 6 | 7 | 11 |
| 2 | Tremors | 4 | 4 | 12 |
| 3 | Connecting strokes | 22 | 25 | 27 |
| 4 | Alignment | 19 | 23 | 24 |
| 5 | Size | 19 | 24 | 26 |
| 6 | Spacing | 23 | 27 | 28 |
| 7 | Pictorial effect | 22 | 24 | 28 |
| 8 | Misspelling | 12 | 25 | 27 |
| 9 | Hesitation | 23 | 24 | 28 |
| 10 | Line quality | 23 | 24 | 25 |
| 11 | Rhythm | 24 | 25 | 27 |

**Table 1.**Shows the frequency of the occurrence of affected features of handwriting at different alcoholic level. The eleven features were selected to further analyze the natural variation of the handwriting in their intoxicated stage at different alcoholic level of the writer. The frequency of the sample is homogenous (n-30).

Graphical presentation of the frequency of the specific characterstics of handwriting of intoxicated writers at different blood alcohol concentration. The (blue bar) Depict the alcoholic strength between (0-25%) as their affected percentage are as follows slant 6%, tremors 4%, connecting strokes 22%, alignment 19%, size 19% spacing 23% , pictorial effect 22%, misspelling 12% , hesitation 23%line quality 23% ,rhythm 24% to be affected in the intoxicated writers therefore rhythm, connecting strokes found to be much affected among writers at this range .( Red bar). Depict the alcoholic strength between (25-50%) features such as .slant 7%, tremor 4%, connecting stroke 25%, alignment 23%, size 24%, spacing 27%, pictorial effect 24%, misspelling 25%, hesitation 24%, line quality 24% and rhythm 25% misspelling found to be majorly affected. (Green bar).Depict the alcoholic strength between (50-70%) features such as slant 11%, tremor 12%, connecting strokes 27%, alignment 24%, size 26%, spacing 28%, pictorial effect 28%, misspelling 27%, hesitation 28%, line quality 25% and rhythm 27% at this range many features found to be affected with their achieved highest percentage Respectively.

**Table2.Chi square value of the characters found in the handwriting sample at different blood alcohol concentration.**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **S. No.** | **Features** | **Blood alcohol concentration** | | |
| **(0-25% v/v.)** | **(25-50% v/v.)** | **(50-70% v/v.)** |
| 1 | Slant | 5.4 | 4.2 | 1.0 |
| 2 | Tremors | 8.0 | 8.0 | 1.0 |
| 3 | Connecting strokes | 3.2 | 6.6 | 9.6 |
| 4 | Alignments | 1.0 | 4.2 | 5.4 |
| 5 | Size | 1.0 | 5.4 | 8.0 |
| 6 | Spacing | 4.2 | 9.6 | 11.2 |
| 7 | Pictorial effect | 3.2 | 5.4 | 11.2 |
| 8 | Misspelling | 0.6 | 6.6 | 9.6 |
| 9 | Hesitation | 4.2 | 5.4 | 11.2 |
| 10 | Line quality | 4.2 | 5.4 | 6.6 |
| 11 | Rhythm | 5.4 | 6.6 | 9.6 |

**\*(Level of Significant value- 99.5)**

**Table2.**Represent the chi square value of the characterstics features found in the handwriting sample of intoxicated writers at blood alcohol concentration. The result found that at the range of 0-25 % of alcoholic strength the affected significant features found in the handwriting were spacing, hesitation, line quality and rhythm. Leaving the features such as slant, connecting strokes, alignment, size, tremors and misspelling found to be unaffected or non significant. Whereas at the range of 25-50% of alcoholic strength the significant features are slant, connecting strokes, alignment, size, spacing, pictorial effect, misspelling ,hesitation, line quality and rhythm .Except tremors that is found to be non significant. The range between 50- 70 %.we establish that all the features found to be significant.

**Table 3.Frequency of the affected features of the handwriting sample.**

|  |  |  |  |
| --- | --- | --- | --- |
| **S. No.** | **Features** | **Total Affected** | **Total**  **Sample** |
| 1 | Tremors | 9 | 100 |
| 2 | Connecting strokes | 46 | 100 |
| 3 | Misspelling | 34 | 100 |
| 4 | Rhythm | 35 | 100 |
| 5 | Slant | 46 | 100 |
| 6 | Alignment | 47 | 100 |
| 7 | Pictorial effect | 43 | 100 |
| 8 | Hesitation | 28 | 100 |
| 9 | Spacing | 45 | 100 |
| 10 | Line quality | 66 | 100 |
| 11 | Size | 33 | 100 |

Table 3.Shows the frequency of the affected features of handwriting sample of the writers.where the total no of sample is 100 or (n- 100).

Graph2. Shows the graphical representation of the frequency of the affected features of handwriting of writer where (bluebar) that is on the y axis which depict frequency and x axis depict the selected features of handwriting which as follows Tremors found to be affected only in 9 writers among them the least ,connecting strokes 46, misspelling 34 ,rhythm 35, slant 46 ,alignment 47, pictorial effect 43 , hesitation 28, spacing 45 ,line quality which is the highest among them found to be affected in 66 writers and size found to be affected in 33 writers**.**

**Table 4. Statistical analysis of the characters to prove chi square value significant or non significant.**

|  |  |  |  |
| --- | --- | --- | --- |
| **S. No.** | **Features** | **Chi square value** | **Significant/Not significant** |
| 1 | Slant | 0.32 | Not significant |
| 2 | Spacing | 0.5 | Not significant |
| 3 | Pictorial effect | 0.98 | Not significant |
| 4 | Size | 5.78 | Significant |
| 5 | Connecting strokes | 0.32 | Not significant |
| 6 | Misspelling | 5.12 | Significant |
| 7 | Hesitation | 9.68 | Significant |
| 8 | Rhythm | 4.5 | Significant |
| 9 | Line quality | 5.12 | Significant |
| 10 | Tremors | 33.62 | Significant |
| 11 | Alignment | 0.18 | Not significant |

**\*(Level of Significant value- 99.5)**

Table 4.Shows the statiscal analysis of the characters of handwriting to prove it significant or non significant on the basis of the chi square test .The result that have found by processing it are as follows size found to be significant, misspelling found to be significant, hesitation, rhythm line quality and the tremors found to be affected in the intoxicated writers and proved to be significant by applying chi square formula.

Discussion

These data suggest that alcoholic ingestion are indeed reflected in handwriting and can be predicted by selected handwriting characterstics and help in evaluating the authenticity of handwriting in judging whether the writer was sober or intoxicated.*Similarly* ***Simon*, (2004)** also proposed a multiple classifier system method in domain of handwriting recognition system as based on slant and baseline. There may be found some person who is drunk with a small quantity while others consume more before becoming drunk irrespective of the quantity of alcohol taken by the individual that leads to demarcation of individual of natural variation of handwriting in sober and intoxica stage. Although study of the selected features based on the calculated data shows that there is an increase in size of the letters found to be affected among 33% of the writers. Hesitation, lack of smoothness, correction leads to unrhtymic and poor line quality of the writing. Carelessness and clumsiness of the handwriting due to lack of control in the execution of letters because of poor immovement of hands that leads to declination of legibility of writing and noting out the features of hesitation and tremor that found to be affected in 28% and 9% among the writer. Misspelling found to be in 34% of the participants. So we can conclude that the features found to be apparent deteriorated with their high values The alcoholic strength between (0-25%) low level, (25-50%) moderate level and (50-70%) high level. Where n is the frequency taken to be homogenous (N=30). The dosage of administration of intoxication level play a vital role. Toxic ingestion induces changes in the central nervous system affect the writing mode and it corrupts the formation of letter. There would found some discerning features observed at different levels the metabolism of the individual is affected from moderate to high level depending upon the alcohol level. It is concluded that handwriting is arranged mentally and performed neuromusculary which get affected during alcohol consumption which causes cognitive and physomotor effect. Which suggest that with the increase quantity of alcohol there is a sharp increase in the features for getting affected. There is an observable localization of tremors in the handwriting that is found at the increased range there found a irregular deterioration and occasional restoration of the muscular coordination. There found a irregularity of line and haphazard change of curvature and lack of smoothness from stroke to stroke the number of lapses found in writing that give it spacing and increase in the size of the writer handwrittting calligraphy which reflects a particular and oscillating individual pattern of the affected person.

**CONCLUSION**

The study conducted on the effect of intoxication on handwriting was estimated in 100 subject and found that the alcohol consumption have significant effect on the general characteristics of handwriting. The evaluation on similarity and dissimilarity in normal and intoxicated writing showed that the shape independent features show significant variation in the following features such as misspelling, hesitation ,rhythm,, line quality ,tremors and size in the handwriting of the individuals in their pre and post intoxicated stage. However the formation and other internal characterstics remain similar independent of intoxication.

**RECOMMENDATIONS**

This is the general study that is based on the alcoholic concentration to comprehend the effect of intoxications on handwriting. Further detailed study can also be conducted with the different alcoholic brands, age factor, demulcents consumed, time factor and occupation of the writer to comprehend the effect of intoxications on handwriting.

**REFRENCES**

1. **Asicioglu, f.andTuran,N. (2003).** Handwritting changes under the effect of intoxication”**,** *Journal of forensic*
2. **Beck, J. (1985).**Sources of error in forensic handwrittingevaluation*Journal of Forensicsciences,40*,issue (78),31.
3. **Bertolini, D., oliveira, L.S. Justino, E. and Sabourin, R (2012).**Textured based descriptors for writer identification and verification, Expert *system with Applications***,** *40***,** issue (6), 2069-2080.
4. **Briggs, M.E. (2002).**Empirical study, writer identification: Determination of gender from check writing style,*journal of question document examination* ,*10,* Issue (1), 3-2.
5. **Cha, S.h. and Tappert, C.C .(2002)**.Automatic Detection of handwritting Forgery. Proc. 8thInt workshop Frontiers Handwriting Recognition(IWFHR). Canada:, pp. 264-267.
6. **Chen, Hung.Chun.(2003).**Forged Handwritting Detection, M.S. Dissertation school of CSIS, Pace university.
7. **Dvorsak ,Ann. (2010).**Rubber stamp fake or genuine.how to distinguish the fake from the genuine ,author of several books and scientific articles, *Slovenian manual for private detective by Google sources.*
8. **Epstein, G***. (****1987),***Examination of the Josef mengele handwriting*, journal of forensic science, 32, (1),* 100-109.
9. **Fisher,J. Maredia,A. Nixon, A. Williams,N. and Leet, J. (2012**), Identifying personality traits and especially traits resulting in violent behavior through automatic handwriting analysis*, Center for strategic and International studies, D6.1-D6.sic medicine , 132***(**3):201-10.
10. **Osborn, A.S., (1929).**Questioned document/by Albert S.Osborn, with an introduction by john Henry Wigmore Boyd Pr Albany, N.Y.
11. **Simon, gunter. and H, Bunke.(2003).** Handwritten word recognization using multiple classifier system, *International Journal of pattern recognition and art, vol.18,*no.5,pp. 957-974, 2005.