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Review Article:

Correlation of handwriting characteristics with different cultural and language factors: A Review Study

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Abstract: Handwriting is a psyco-motor activity. It can used in criminal activities related to text on documents other than the normal legal means of communication. It acts as physical evidence that connects, links and associates the accused person to acts of misconduct in civil,criminal or regulatory cases under investigation. This review paper aimed to examine the correlation between handwriting characteristics with different professions and occupational traits. It may be beneficial for gaining information related to an individual's handwriting characteristics which lies with the profession. This review study deals with the aspects of correlating handwriting features with professional traits to identify the authorship of writing in the case of anonymous letters. Along with this, it may help evaluate an individual's personality. The various individual handwriting characteristics like slant, alignment, pen pressure, pen stops, speed, hooks of letters, i-dots, t-bars, etc help in giving a unique identification to the individual with the passage of time and experience. Handwriting often reveals more about a person than a thousand well-chosen words. Many researchers have shown that intelligence is not only related to success in school or college rather it has a profound effect on many aspects of individual lifestyle. There is an attempt made to identify and relate handwriting characteristics of an individual with different professional and occupational he/she is carrying in his/her life.

Keywords: Handwriting analysis, Different aspects, Personality identification, Occupational traits, Questioned Documents.

Introduction: Handwriting is a psycho-motor activity expressed as written speech of an individual with characteristics peculiar to himself intending to be different from all others.I Handwriting analysis is one of the important practices done in forensic science. Experts undergo analysis of various features of handwriting for identification, from general characteristics to individual characteristics. It has been used as a source of written speech for ages. However, there has been much research showing a link between handwriting and personality traits of humans. One such study was done where individuals' personalities were identified by stripes &amp; patterns expressed by their handwriting (need to have a reference here). As per the previous studies computer and online analysis and the use of innovative experimental procedures were not possible in the previous decade [1]. However, there have been researches where handwriting and neurological aspects of humans have been linked together. And this study shows that handwriting is an accurate mirror of an individual’s brain.in other words, handwriting is a function of the brain. Since the advent of forensic science and its use in criminal investigations, another important branch has come up with its remarkable goal of translating handwriting and the authenticity of texts [2].

Handwriting is a psyco-motor activity. The condition of the mind and the thoughts of an individual can only be manifested to other persons by gestures or by spoken or written words. The character of the writing or signature may be affected by the physical conditions that disturb the mind at the moment of writing. The greatly impaired physical condition of the writer naturally depreciates the quality of writing even though the mind is clear and fully comprehends the seriousness of action, especially that of affixing signatures to an important document.

The human handwriting - the script - and its placement on the page express different personal passions: logically, the brain sends signals to muscles to the writing process that they control. Graphology or handwriting analysis is a field of study to identify and understand people's personalities, behavior, and characters by analyzing their handwriting [3]. Professional handcraft inspectors who identify personality through handwriting samples are called graphologists (5). Through examining a handwritten sample, a graphologist can see the appropriate features of the handwriting, and how the elements fit together. The features, and the connections between them, provide details of the analysis. Forensic handwriting examiners have ample knowledge about the class and individual characters used to identify handwriting[4]. There is not a single handwriting feature that proves anything specific or complete; only one factor can point to a trend. It is a combination of features, as well as interactions that enable full and clear interpretation. Professional handicraft inspectors who identify personality through writing samples are called graphologists [5].

The comparison of handwriting is done in cases related to suicide notes found at the crime scene; in cases related to transactions of property; to determine the authenticity of any document related to property, forgery, and various circumstances where the authenticity of or parts of a document may come into question;. to prove or disprove the authenticity of any document; to determine the writer of anonymous or threatening letters; in cases where alterations or changes are made in a document to gain profit by an individual.

Apart from this, the characteristics which are to be analyzed by the experts in samples are natural variation is a variation found naturally in every individual. Data such as dynamically captured direction, stroke, size, pressure, and shape of an individual’s signature enable handwriting to be a reliable indicator of an individual’s identity [6]. It is always authentic and present in every individual’s handwriting, master- pattern normally referred to as a writer’s learned range of writing habits. Thus, writing is made up of various sub-conscious habitual acts which are part of the individual assembly of his habits or mannerisms [7]. It is a manner in which an individual writer makes a particular letter, Apart from this slant, size, alignments, stokes, line quality, pen pressure, Specific shape of letters eg:- roundness or sharpness, Regular or irregular spacing between letters, Arrhythmia (the rhythmic repetition of the elements), Pressure to the paper, Average size of letter, Upward flourish letter ‘s’, Shape of ‘r’, Consistency of ‘X’, Angle of the crossbar on letters ‘t’ and ‘f’, Flourish at the end of ‘o’ and ‘u’, Loop formation of ‘b’, ‘d’, ‘h’, Hook at the end of ‘e’, ’h’, ’u’, Hook at the start of ‘c’, Dot over ‘i’ etc[8]. This information could be tabulated for easy presentation. Therefore, this review paper aimed to examine the correlation between handwriting characteristics with different professions and occupational traits.

REVIEW OF LITERATURE:

While reviewing, it has been observed that many researchers have been done and the parameters chosen for the research are different but no work done is exactly the same. Different parameters and methodologies from the paper reviewed are discussed below [1] have given their review on research which were conducted between 1980 to 1994 in each of these areas focusing on their future aspects as well. Their study has focused on skilled performance and the developing capabilities of children, atypical development, the effectiveness of various letter forms, and instructional techniques. . Development and maturity were observed during this period in the handwriting. Computer/online analysis and the use of innovative experimental procedures were not possible in the previous decade. Certain advances remained to be made. Prospects of handwriting research within the upcoming years were promising during this period due to the
advancement in technology.

SN Srihari [2] conducted a study to confirm the notion of handwriting identity. One hundred and five thousand five hundred handwritten samples of US people were found about gender, age, ethnic group, etc. using computer algorithms to extract features from scanned images of manuscripts. The task is to provide scientific support for the acceptance of handwriting evidence in court. This research paper focuses on graphology. It shows that handwriting is done on an individual basis. discusses common problems related to graphology.

Bhavana Desai and Dr.J.L Kalyan [4] gave an approach to characterize handwriting and signatures from a forensic point of view. The characters based on which the analysis of the handwriting and signatures is done are discussed in detail. These details are essential to eliminate a suspected signature or handwriting or to prove that the forgery has been done. The alterations made in the documents are also a kind of forgery so their examination and detection also becomes a very major aspect of forensic examination and it also comes as a challenge to the forensic examiner. Forensic handwriting examiners have ample knowledge about the class and individual characters identification by handwriting analysis is a useful system for identifying personality traits. Such a system was developed using neural network communication technology where the system is previously trained to identify the characteristics of handwriting and place it in a consistent personality. It was useful in finding applications, especially in the fields of human resource management, marketing, medical and counseling, and biometric, and forensics courses.

Kedar [5] explained digital signatures and biomic. Details such as the intensity taken, the side, the distance, the size, the pressure, and the shape of the individual signature make the handwriting a reliable individual identity. "Namirial" is an Italian company that has created a biometric signature system called "GrafoCerta" (a definite signature) with a forensic field that is most suitable for research. A team of experts - computer engineers and handwriting experts are working together on this project and building a research laboratory on handwriting. This paper will disclose the research that has been done on the link between pressure and speed

Sushma Upadhyay [7] completed a study on the Estimation of Age Through Handwriting Characteristics in Women Writers. They aimed to study the age limit in handwriting Symptoms for Women Handwriting changes over time, these changes depend on a variety of factors: literacy, physical and mental health, gender, and age. Handwriting was learned on a class-by- class basis with distinctive features of selected groups. By analyzing the data it was easy to estimate to some extent that the author has taken almost a handwritten sample. Some features are found to be very important and help determine age such as inclination, alignment, spacing, skepticism, vibration, and speed. It was therefore considered as coherent evidence and it was helpful to include identification of the person.

An experiment was conducted on the determination of sex through handwriting characteristics. Two gender-based testing methods were used in male and female handwritten sample samples. Based on the result, the exclusion factor and the z-test can be attributed to two possible explanations for the use of these tests in manual manuscripts for gender identification. Those factors that show positive results in the testing of 65 male and female samples can be considered gender-sensitive factors. They concluded that there is a big difference between male and female handwriting and that is why handwriting stamps [8].

Catharina Dewi Wulansari [10] added that handwriting analysis can give a good indication of a person’s personality structure, ability to grow and develop, and integrity. Their main objective was to know the importance of handwriting analysis in daily life. They used a qualitative method. The result of their study shows handwriting analysis can be used for the selection of employees as it can describe the indicator of performance such as the competence of the employee [9].

This paper has used graphology to study the sentiments of students and teachers having different thoughts and moods. Analysis of 100 people’s data has been done using SSGBSAT algorithms to analyze the sentiments out of which 91 were students and 9 were faculty members. The seven sentiments that were taken into consideration were Contempt, Anger, Disguise, Joy, Sad, Surprise and Fear. As a result, the accuracy rate of percentage was achieved.

Samsuryadi [11] have worked on Automated handwriting using three aspects i.e data-collection and preprocessing technique, data representation (feature extraction or selection), and decision-making (classification). They suggest that this analysis is based on the pattern recognition approach. They have defined several handwriting features that are used to determine a person's personality in automated handwriting analysis such as baseline, slant, margin, spacing, letter size, pen pressure, speed of writing, etc. These features will help in determining the human personality through handwriting features.

METHODOLOGY

Research Design

This review uses a methodical strategy to find, assess, and compile pertinent research

Data Sources

Academic researches were searched for research published between 2010 and 2024 in scholarly databases like Google Scholar, PsycINFO, and PubMed. The following keywords such as "Handwriting analysis and profession" "Graphology and occupational traits" "Handwriting characteristics and career alignment" were used for the search.

Inclusion and Exclusion Criteria

Inclusion: *Empirical studies, review articles, and theoretical papers that explicitly link handwriting characteristics to professions and occupation.*

Exclusion: Studies focusing solely on forensic handwriting analysis or unrelated psychological assessments.

Data Extraction

The key information extracted during the search were study objectives, methodology (sample size, profession, handwriting features analyzed), key findings and conclusions.

The Main Findings from the Review

Cultural factors; handwriting styles are greatly influenced by cultural and educational backgrounds, which may have an effect on the reliability of graphological interpretations in a variety of demographics. The following cultural influences on handwriting traits were discovered during this review: Systems of Education: Handwriting styles are uniform among people because different locations teach handwriting in different ways. For example, European schools may emphasise angular strokes, but the Palmer technique in the United States creates round, connected letters. Handwriting characteristics in cultural standards are influenced by cultural views on hierarchy, individuality, and emotional expression. For instance: Small, clean handwriting may be a sign of precision and conformity in collectivist cultures (like China and Japan). Larger and more varied handwriting may be a sign of assertiveness and originality in individualist societies (such as Western Europe and the United States).

Handwriting is also influenced by the language and script. For example, compared to Latin scripts, Arabic and Hindi scripts may naturally form different graphological patterns because of their greater curvature. The consequences for graphology include cross-cultural generalizations of handwriting characteristics that are complicated by these cultural influences. In one culture, a quality that is seen as a sign of originality may be interpreted as formality in another. Therefore, in order to prevent prejudice or misunderstanding, handwriting interpretations should take cultural context into consideration.

Graphology as an add-on instrument; despite not being widely accepted as a stand-alone scientific field, graphology has proven useful as an adjunctive tool in personality testing, career counselling, and hiring. According to graphology, there is a vast range of features of handwriting strokes which carry psychological characteristics of the writer. In this survey, we present links between handwriting and personality psychology and examine different mechanisms for feature extraction to predict a writer’s personality. Psychologically supported handwriting features help to understand personality traits [12]. The following points are highlighted in the review: Fast personality insights especially in environments with limited resources, handwriting analysis provides a quick and non-invasive way to obtain preliminary personality insights, complementing well-established tools; graphology can enhance the comprehension of a person's characteristics and preferences when used in conjunction with standardised psychometric exams, team building and career alignment; handwriting analysis has been used by organisations to determine how well employees' characteristics match job duties, especially in leadership roles and creative industries.

Consistency in patterns; the constant association between particular handwriting qualities and professional traits across several occupations is among the review's most important findings. When handwriting traits are examined methodically, a pattern shows up despite the skepticism surrounding graphology. Among these patterns are; careers in the arts in which their handwriting features are big, asymmetrical letters with distinctive, flowing strokes. Consistency across studies, their handwriting characteristics represent inventiveness, adaptability, and receptivity to new ideas, were found in a number of studies including artists, writers, and designers. People with careers in analysis exhibit handwriting features which include exact spacing, angular strokes, and small, compact writing; these characteristics, which demonstrate logical reasoning and attention to detail, were frequently displayed by scientists and engineers [13].

Handwriting traits for leadership and management roles include firm pressure, broad word spacing, and an upright or slightly rightward slant. Managers and entrepreneurs exhibited traits such as bold, consistent handwriting that demonstrated decisiveness and strategic thinking [14]. Healthcare careers features of handwriting includes quick writing with simplified letterforms that are frequently unreadable. Consistency across these studies was due to their need for quick thinking and flexibility in high-stress situations, doctors and nurses displayed comparable characteristics across studies [15]. Handwriting Qualities for Legal and Administrative Professions are medium-sized letters, an upright slant, and distinct, well-structured baselines. Consistency throughout research shows characteristics such as neat and readable handwriting were consistently associated with positions in administration and law, indicating a need for precision and lucidity [16].

Challenges and Limitations

Analysis may be impacted by writing styles that are shaped by educational and cultural institutions due to cultural variations. Different analysts may have different interpretations, which could result in contradictory findings. Future research may be limited because handwriting is less common due to the increasing usage of digital technologies as a result of technological shift.

Conclusion and Future work

In the above reference, it can be concluded that more and maximum research is required to be done in this field. In many cases along with other evidence handwriting can not only act as a source of physical evidence but also for evolving new ideas but also related to the purpose of personal identification. Handwriting evidence is emerging as important evidence in the field of forensics. Hence, much more research should be done on the same

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