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RESEARCH ARTICLE

# Hell Traits in Handwriting of Youths Involved in Crime: Evidence from a Correctional Facility

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## ABSTRACT

This study examines the hell traits of youth inmates involved in criminal activities and detained in a correctional facility in Hail City, Saudi Arabia. Focusing on two types of crimes, fighting and robbery, it aims to show the evidence of personality traits in their handwriting. Drawing from a larger sample, the data was obtained from three youth inmates who were involved in fighting and robbery. The handwriting of the three youth inmates showed at least two or more characters of "hell traits" associated with fighting and robbery. These characters include A.M., M.F. and S.M., as revealed by the connotations in their handwriting. The study findings could be helpful to the government and its agencies to reduce and control crime, and more importantly, detect deviant traits among young people. More studies need to be done using more extensive data and multiple methods to ascertain the criminal behaviour of youths.

**Contribution/Originality:** This study originates a new formula for detecting crime through infernal traits of young inmates involved in criminal activities using (graphology); it revealed the relationship between handwriting and crime, and it also confirmed that it is possible to early detect criminal behaviour among youths through handwriting.

## 1. Introduction

Graphology-based behavioural analysis has gained significant traction recently finding applications across a wide array of fields, including medicine, education, psychology, criminal investigation, marital counselling, commerce, recruitment, and various others (Ghosh et al., 2020). That is because it is a projective technique used to infer aspects of an individual's personality based on the premise that handwriting is an expressive motor movement (Tett & Palmer, 1997). Furthermore, previous studies have proven that graphology-based handwriting unveil a person's feelings even though such characteristics are not portrayed in the person's personal behaviour (Ghosh et al., 2020). As a result, conventional approaches relying on visible facial/biometric traits or human behaviours for understanding personal behaviours might prove inadequate, particularly

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in cases where individuals are deliberately feigning certain behaviours (Ghosh et al., 2020). Moreover, most traditional methods are heavily reliant on specific contexts, situations, and datasets. Hence, the utilization of graphology-based handwriting analysis serves as an impartial tool for comprehending an individual's behaviours, free from dependence on appearance-cantered attributes. This independence spans diverse fields, datasets, genders, ages, and applications (Ghosh et al., 2020).

Judging someone is the primary characteristic of meeting or communicating with someone; it is human nature. An individual's personality is the true mirror of one's thoughts, qualifications, skills, physical strength, and personality. The identification of such a character relates to the person's handwriting. Therefore, writing is an excellent way to communicate, as a person's mind is more focused when writing. A previous study concluded that handwriting expresses the subconscious mind or the individual's mind (Joshi & Chauhan, 2020). Graphology is purported to have utility in many areas, encompassing the comprehension of health conditions, ethical values, latent skills, and psychological issues (Amend & Ruiz, 2000). Therefore, personality identification through handwriting analysis (or graphology) plays a vital role in various fields such as employee recruitment, counselling, and personality development. This is based on the fact that graphology focuses on individual writings in terms of stroke, letters, and parts of the writing's character rather than the whole character, the features of the words in the document are closely related to personal behaviours (Champa & AnandaKumar, 2010). And because Graphology reveals personality traits from someone's handwriting, the detailed analysis assists in predicting a person's personal behaviours (Ow et al., 2005). Graphology is an experimental science of handwriting that exposes a person's natural graphic movements, temperament, personality, intelligent behaviour, inner talents, professional and social abilities (Topaloglu & Ekmekci, 2017). The handwriting has been studied for almost 400 years. The first person who carried out systematic observations on the manner of handwriting was Camillo Baldi in 1622, He published the book entitled "Treated how, by a letter missive, one recognizes the writer´s nature and qualities", which is considered the first known graphological essay (Oliveira et al., 2005). The term "graphology" was introduced in 1897 by Abb Jean-Hippolyte Michon in Paris by merging two Greek words; graphing (to write) and logos (science) (Mishra, 2017)**.** He was also the founder of the Society of Graphology and the first to give scientific bases to handwriting analysis (Oliveira et al., 2005)**.** Graphology studies individual characters and personalities from manual handwriting. Its detail analysis results in a psychosocial-behavioural portrait (Chamorro-Premuzic & Furnham, 2010; Oliveira et al., 2005). Graphology has been a trusted method all over the world in criminal investigations, employment and in assisting court verdict decision. In general, graphology is the scientific method of handwriting analysis to determine an individual's personality characteristics. The method used in graphology is the identification of the handwriting sample's strokes and patterns (Joshi et al., 2015; Srihari et al., 2002).

Handwriting has continued to persist as a means of communication and recording information in day-to-day life even with the introduction of new technologies, therefore, handwriting is used to analyse a person's personality and character since handwriting is recognised as unique to everyone (Plamondon & Srihari, 2000). The medium used to create handwriting is not only confined to the hand, but it is done by the brain and not by the hand or by the feet. Hence handwriting is also known as 'brain writing'. Previous studies have confirmed that irrespective of the medium used to write, a person's handwriting will be the unique to each individual is the reason for this is because the brain does the handwriting while the hand, feet or mouth are only the medium used to

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create the handwriting (Kedar et al., 2016). Due to this, previous study by Kedar et al. (2016) had referred the term handwriting as "brainwriting". Graphology is considered a modern form of psychology that reveals personality traits because, through graphological analysis, the disclosure of personality traits can be done that reveal a person's characteristics. Among other things, disclosure of fear, emotional outlay, honesty, and defence can also be done through the graphology method (Garoot et al., 2017). However, graphology also has its limitation as there are certain features that cannot be revealed through handwriting such as the writer's race, age, gender, nationality, or religion. In other words, graphology is a method used to interpret and evaluate a person's character from the handwriting. Professional handwriting examiners are referred to as graphologists. The job scope of a graphologist is to identify the writer's character through their handwriting. Hence, the skill, experience and knowledge of a graphologist determine the accuracy of handwriting analysis (Garoot et al., 2017; Hashemi et al., 2015). Handwriting refers to an individual's unique style of writing created by hand, feet or mouth by using writing instrument such as a pencil or pen. Mudaliar et al. (2017) defined the handwriting is an acquired skill which needs a complex-perpetual-motor task. It is also categorized under neuromuscular task. In criminology, crime occurrence prediction is essential in ensuring criminal risk reduction and to improve public security. A study by Mei and Li (2019) highlighted that robbery occurrence prediction varies as all robbery events have different characteristic. Graphology has compelling "validities" which are personal validity and face validity. Ben-Shakhar et al. (1986) referred the term face validity as suitable properties in handwriting that can reflect an individual's personality. Meanwhile, Tang (2012) defined personal validation as subjective feeling conveyed by graphological analysis that is accurate that can help identify a person's characteristic and personality.

Identifying violent behaviour is essential as it is closely related to personality disorders and their associated crimes. Identifying violent behaviour in handwriting is crucial as it can prohibit future crimes. Graphology or handwriting analysis is a scientific method to identify, evaluate, and understand an individual's characteristic and personality through patterns revealed by handwriting (Nelson et al., 2001). Skilled graphologists do handwrite analysis, where, the specific features of a person's handwriting provide valuable insights into personality, including potential traits associated with criminal tendencies, therefore, this measure forms the scientific basis for graphology which can predict crime and criminal behaviour, the prediction of personality traits using handwriting depends upon how much the graphologist is efficient in doing so (Chaubey & Arjaria, 2022). This study aims to show the evidence of personality traits in the handwriting of deviant youth in a correctional facility who were involved in fighting and robbery. The paper is a descriptive and exploratory study structured into five sections. The first section introduces the background of the study. Section two reviews literature related to graphology, handwriting, and crime. Section three highlights the method used in the study. Section four reports the study's result and discusses the research's finding. Then, the last section is the conclusion of the study.

## 2. Literature Review

The handwriting identification, firearms identification, fingerprint identification, DNA analysis as well as blood grouping are known as a discriminatory process. Graphology is derived by two fundamental fields of study; firstly, as a neuromuscular activity, and skill development, while the second one is the effect of various internal and external factors (Mudaliar et al., 2017). Scientifically, graphology focuses on the interpretation of the

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"human psyche" as the brain impulses are transmitted onto paper (Mudaliar et al., 2017). The outcome creates a "written expression" of a person whether in the form of handwriting, signatures, doodles, art, printing, or numerals. An individual's character and personality are exposed by the graphic expression. For this reason, handwriting analysis is also often used in diagnosing neurological conditions, In addition, handwriting analysis can reveal an individual's personality traits and behavioural patterns as the handwriting of each person is always consistent in terms of slant, size, baseline, pressure, margins, number of breaks, spacing as well as the speed of writing (Mudaliar et al., 2017).

Previous studies by Driver et al. (1996) and McNeal (1967) had proven that handwriting traits provide information about the writer and reflect personal characteristics under the guidance of skilled graphologist. That study highlighted three-point procedures that graphologists conduct in their analysis. 1- Obtain a specimen or sample of handwriting. It is important to note that the specimen must contain variety of handwriting such as capital letters, small letters and most alphabet letters. An ideal specimen should contain 5-100 words, 2- Analysis to be conducted based on certain criteria depending on the school of thought practised by the graphologist, and 3- Interpretation of results to be done through summation and comparison of the measures obtained during the analysis.

A study by Harris-McKoy and Cui (2013) was conducted using national representative where the longitudinal sample of respondents and their parents explored the correlation between parental control in adolescence, parental control and adolescent delinquency, and young adult criminal behaviour. Findings from the study revealed that lack of parental influence had both simultaneously and longitudinally beneficial correlation with delinquency among young adults. The result from delinquency in young adulthood showed that females have lower delinquency level, with more delinquent behaviour correlated with younger age. The results of that study indicated that parental control is influential through puberty, and early parental control is found to be influential in young adulthood. The graphological studies utilize to two basic approaches: graphical analysis of the writing's structural type as well as the analysis of the type of letter or symbol.

Graphology or handwriting analysis can be classified as a subset of psychology study As it is used to assist in understanding personality traits and characteristics through the patterns and strokes in an individual's handwriting, which can reveal traits in emotional and mental instability. Hence, these traits are important to be identified to help the authority to deal with profiling serial killers, criminals, and suspect in narrowing down the search during an investigation (Mishra, 2018).

The forgery of documents can also be solved by using graphology as a person's handwriting can be identified and analysed by sufficient examination of spacing, pen pressure, formation of letters, and others as highlighted by the study of Dang and Kumar (2014). That study carried out the handwriting analysis through various characteristics to examine personality trait and human behaviour. Their research conducted performance identification and handwriting evaluation by calculating the mean square error using a Back Propagation Neural Network (BPNN) to validate and prove the accuracy of the results.

Another study by Kanchana et al. (2015) used an artificial neural network to predict personality traits by extracting features from a handwriting specimen. That research focused on handwriting characteristics such as the slant, baseline, and size of the letters

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obtained from an individual's handwriting. In this paper, a non-contact writer's independent handwriting analysis system explained how handwriting reveals personality (Kanchana et al., 2015). The author referred the handwriting as "brainwriting". Recent research in neuroscience have also classified neuromuscular movement directions as they are associated with certain observable personality traits (Kanchana et al., 2015). Each personality trait is represented by a neuro encephalic pattern, which results in a unique neuromuscular movement that is the same for each person with that personality trait. The small movements happen unconsciously when a person writes. Each written movement reveals a specific character and trait. Graphologists analyse the strokes that appear in handwriting and describe the corresponding character trait. Signature contains the richest information about an individual's different thinking styles and emotional states. Based on the arguments mentioned in this section, handwriting analysis is proven to be a very effective indicator in predicting one's personality. It tells the true personality of an individual such as anger, fear, confidence, and honesty. This can be identified with the help of features like curved start, underscores below the signature, ending strokes, the appearance of the dot on the letter, and disconnected streaks.

## 3. Methodology

This study reports from a more extensive study that looks at the relationship between handwriting and crime of youths serving time in a correctional facility in Hail, Saudi Arabia. This paper focuses on one or two types of crime which are such as fighting and robbery that was found in the study sample. This study employs qualitative research approach by using a semi-structured interview. For the purpose of this paper, the data is obtained from three respondents out of the fifteen respondents as the three of them had committed fighting and robbery crime.

The larger sample of fifteen respondents were purposively selected based on various degree of the offence committed and various times of jail term that led to the incarceration at the remand facility. The handwriting samples were collected and analysed to determine the behavioural characteristics of the two crimes committed. The study was conducted in Hail City, Saudi Arabia because it is one of the most important cities in the northern province of the country which has a social observation house and critical correction facility.

Study participants are only selected from the age group of at least 18 years old. Apart from that, the selected study participants have given their written consent to participate in this study. Ethical approval has been sought and obtained from Universiti Sains Malaysia (USM) research ethics committee with No. USM/JEPeM/21110758. The handwriting samples were collected from the respondents by asking them to write a few lines of words. The researcher used his expertise to analyse the handwriting sample taken from the respondents. The interview session took place in the correctional facility and lasted about one hour. Following interview procedures outlined by Blaikie (2010), all interviews administered were recorded using a recording device, subject to the respondent's consent (Blaikie, 2010).

As for handwriting analysis, the researcher analysed the sample collected using various instruments such as magnifying glasses, ruler, and protractor to determine the hell traits, patterns, and characteristics. Once these are determined, the researcher was able to come up with the personality of each respondent involved in two crimes which are

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fighting and robbery. Given the nature of the study population and the unavailability of a sampling frame, the researcher utilised non-probability sampling technique, namely, purposive and snowball sampling. The aim is to include as many diverse ranges of people as possible with basic knowledge of the subject matter of the research (Creswell & Poth, 2016). Data were collected in Arabic from all categories of respondents using a recording device. The interviews were transcribed in Arabic and translated into English. These transcriptions were harmonised to form coordinated notes with the supporting field notes, which had already been taken in English. The researcher coded data as a fundamental step in qualitative data analysis. Coding primarily involves analysing, synthesising, and dissecting interviews meaningfully while preserving the relationships between the pieces. As mentioned earlier, the researcher analysed the handwriting sample with instruments such as magnifying glasses that determine the hell traits, patterns, and characteristics of the respondents. After the vigorous process of handwriting analysis, the researcher came up with the personality of each respondent and related it to the two crimes. This study used content analysis procedures in analysing the data of the research. Content analysis is used as it helps to identify, analyse, and report the patterns in detail within the collected data. Further to that, content analysis also interprets various aspects in this study (Bazeley, 2009; Braun & Clarke, 2006; Brooks et al., 2015).

## 4. Result

Behavioural analysis based on graphology has proven its effectiveness compared to traditional methods that use facial features, visible biometrics, or human procedures to determine personal behaviours, as it relies on traditional methods. At the same time, handwriting expresses the subconscious or the mind of the individual, where personality identification plays through handwriting analysis. Graphics play a vital role in various fields, such as staff recruitment, counselling, and personal development. Furthermore, because graphology focuses on individual strokes, letters, and parts of a character and not the entire character, or word in a document, the features are sensitive to interpersonal behaviours, helping to predict interpersonal behaviours. This section presents the study's findings in line with the qualitative research approach and discusses the result-based handwriting and crime prediction in the past literature. Before going further, below is a short introduction to the three inmates who were involved in fighting and robbery in the study.

The first youth inmate interviewed by the researcher was A.M. who revealed that he engaged in fighting and assault to protect his image from being tarnished. According to him, he was called “a bad boy” despite warning his peers several times to stop calling him by such name. As they did not heed to his warnings, it led to a bloody armed fight that subsequently led to his arrest and detention at the remand facility for fighting. During the interview, he expressed his regrets for his action. The second youth inmate interviewed by the researcher was M.F. who committed robbery to get money to settle his debt. He also revealed that he had a huge amount of debt and as a result, received threats from his creditor. This had made his life uncomfortable. It was for this reason that he felt he had no option but to commit robbery so that he can settle his debt and have a peaceful mind. The third youth inmate interviewed by the researcher was S.M. who was detained for fighting. He revealed that he did not tolerate nonsense from his peer group. He said he was ready and up to the task of dealing with anybody who tried to underate him. This is the reason why he fought with his colleague and landed in jail. The

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background information in terms of the respondents' demographics as well as family background is shown in Table 1.

Table 1: The background for respondent's is presented.

| No | Respondent's Characteristics | A.M. (Respondent 1) | M.F. (Respondent 2) | S.M. (Respondent 3) |
|---|---|---|---|---|
| 1. | Age | 18 years | 18 years | 18 years |
| 2. | Crime Committed | Fighting | robbery with a weapon | fighting and stabbing |
| 3. | Detention Period | One year six months | Three years | Seven years |
| 4. | Recidivist? | No | Yes | No |
| 5. | Family Economic Level | Average | Average | Average |
| 6. | Father's Educational Level | Preparatory | Secondary | Primary |
| 7. | Mother's Educational Level | Primary | Primary | No formal education but can read and write |
| 8. | Father's Occupation | Deceased | Employee | School guard |
| 9. | Mother's Profession | Widow | Housewife | School worker |
| 10. | Child Ranking in the Family | Fourth | Nineth | Nineth |
| 11. | Family Social Status | One of the parents is dead | Coherent family | Deceased father and polygynous (three wives) |
| 12. | Economic Status of the Family | Weak | Week | Weak |

A.M. is a first-time offender and spent one year and seven months in the detention centre at the time of the study. As shown in Table 1, the economic level of his family is average. Although the father is already deceased, his educational level was only until preparatory centre. The mother only has primary-level education. His mother is a widow, and the child occupies the fourth position in the family. In addition, he comes from a weaker economic family background. His handwriting analysis showed graphological connotations which revealed the nature of hell. These connotations refer to several features through the analysis of handwriting, which consist of the trait of stubbornness, a trait of sharpness, trait of nervousness, the trait of violence, the trait of aggression, the trait of introversion, the trait of fear of criticism, and the trait of excessive jealousy.

The connotations of graphology revealed hell traits. It includes the connotations of the intersection of the letter S and the lengthening of its end on the body of the letter, indicating traits of stubbornness and rigidity of opinion. It also shows in the connotations that there is no margin on the side of writing, which indicates weakness in planning and making good relationships with others. Hooks in the letters in the direction of writing indicate the trait of being affected by another person. The connotations of writing letters equally indicate indifference and not thinking about consequences. There is the connotation of flying in the letters, which indicates mood and nervousness, and that the person is quick to become angry and easily provoked. Apart from that, his reactions are violent and unexpected. The presence of a dot at the beginning of the letter indicates jealousy. In summary, there are some personality traits in the handwriting, such as nervousness, excessive jealousy, violent mood swing, and being easily provoked, which

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are called hell traits that make the person unable to control himself when he is angry, and his reactions are unexpected (First Respondent).

On the other hand, M.F. who was detained for robbery with weapon has spent three years at the time of the research. He is a recidivist and comes from an economically weak family. Both parents did not receive higher education. However, the father is an employee of an organization. He is the ninth child in the family, and his social status remains coherent. So far, the economic status of the family has been weak.

An analysis of his handwriting showed the connotation that revealed hell traits which includes the connotation of the presence of a dot at the beginning of the letter, indicates the trait of excessive jealousy. The connotation of a flying stick of the letters indicates fear of criticism. The connotation of writing the letters with a circular in front indicates the trait of failure to comply with the laws and regulations. The connotation of writing the letter at the end of the word by entering the body of the letter into the previous one indicates excessive curiosity and interference in others' affairs. The connotation of writing the letters equally indicates indifference and not thinking about the consequences. The connotation of writing the letters with teeth indicates the trait of an auditory acting system. The connotation of writing letters in a circle indicates the trait of telling lies. The connotation of writing a letter with empty air loops indicates confusion of thought and lack of self-confidence. However, the researchers focused on the connotations that refer to the traits of hell in the science of graphology in analysing the handwriting of cases. It has been noted that the presence of those traits in the writer's handwriting which includes excessive jealousy, fear of criticism, noncompliance with laws and order, curiosity, lack of self-confidence, and interfering in the affair of others. Some connotations of hell traits are present in the case's handwriting analysis, which indicates that when the appropriate environment to commit the crime is provided, he may commit it without hesitation.

The next handwriting analysis is of the 18 years old (S.M.) who was detained in the remand house for fighting and stabbing. He has been detained for seven (7) years. He is also a first-time offender from an average family. Both parents had not gone far in education, yet they are government employees. He is the ninth child in the family. Although the father died, the respondent comes from a polygynous family. By implication, he possibly has other half-brothers and sisters in addition to brothers and sisters from the same mother. His father’s demise, coupled with the large size of the family, was what probably made the family’s economic status weak.

Handwriting sample analysis revealed some connotations that revealed the hell traits in his writing, including the connotation of writing the circular letters in a close or narrow way, referring to the trait of hiding the secret from others. The connotation of the dangerous tendency of letter shapes indicates the trait of creating the problem, while the connotation of the overlapping circle in the letters indicates the trait of not telling the truth or lying. Meanwhile, the connotation of writing a letter sharp with an acute angle refers to the trait of imposing himself on others by force. The connotation of a considerable distance between the lines indicates the trait of self-love. The connotation of writing in large font indicates a trait of practical inclination. The connotation of heavy line pressure indicates the trait of nervousness, and the connotation of an unstable margin on all sides indicates the trait of contradiction. The connotation of writing inclination towards 50–65 degrees refer to imbalance and aggression. The connotation of changing writing tendencies indicates personality disorder and contradictory traits. The researcher

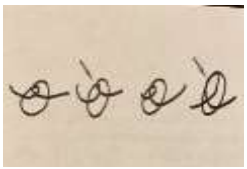
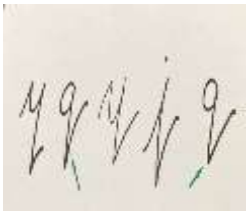
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focused on the connotation that refers to hell traits contained in the science of graphology when analysing the handwriting of cases. There is also the presence of those traits in the handwriting of the respondent which indicates the existence of dominating personality characterised by aggressiveness and tyranny, lying, and violent reactions.

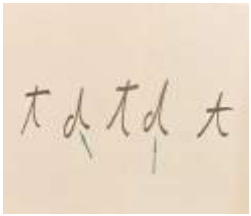
In summary, the research findings revealed hell traits in the handwriting of the three respondents in the study, who are youth inmates detained in the remand house for robbery and fighting. This is because their handwriting contained at least two or more characters of hell traits as the connotations indicate a relationship between the two crimes, which are the fighting and robbery. In this case, one can predict that the youth inmates have similar feelings and behaviour, especially in the commitment to crime and criminal tendencies.

Table 2 below shows the hell traits and graphology connotations which includes hell traits connotations, description, semantic, and graphology traits. Hell traits connotation describes the handwriting strokes, loops, slants, size, length, hooks, zone, and others. While semantics describe the prediction of a person's feelings and moods, graphology traits propose the respondents' behaviour that enables them to commit a crime, mainly when the appropriate environment for committing a crime is provided. Some of these connotations of hell traits were found in the handwriting of the respondents analysed by the researcher.

Table 2: Hell Traits and Graphology Connotation.

| S/N | Hell, Traits Connotation | Descriptions | Semantics | Graphology Traits Connotation |
|---|---|---|---|---|
| 1. |  | A set of rings on the right and left side of the lowercase letters 's' and 'o's'. These intersecting inner rings mean that the person is not telling the whole truth. The bigger the loops, the bigger the lies. | The person cannot be trusted entirely | Liar |
| 2. |  | In the same sentence of letters, a noticeable italic difference appears from left to right. This person is having difficulty making decisions due to an internal conflict. May withdraw into an introverted personality when feeling insecure. He also has unpredictable mood swings. | Unpredictable mood swings | Dual personality |
| 3. |  | It appears through strong strokes in the upper right part in addition to the lower loops. An aggressive person looks toward the future and gets physical with others. This person needs physically aggressive activity such as competing in sports or violent activity. | The person pushes into the future, asserting himself physically | Aggressiveness |

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| | | | | |
|---|---|---|---|---|
| 4. |  | It is revealed by a t and a d. Is written in the shape of a tent or an inverted V with the upper letter crossing over. The wider the letters from below, the more willing he is to defend his ideas. Stubborn people fear ideas that oppose them, and they don't want to be confused about facts after a decision has been made. | The person fears being wrong and does not easily change his mind once he decides. | Stubbornness |
| 5. |  | There is breakaway P with a high starting stroke. This person is arguing. The more analytical the writer is, the more disturbed, sarcastic, stubborn, and/or impulsive. | This person is violent | Argumentative |

## 5. Discussion

The study by Ahmed and Mathkour (2008) stated that graphologists use some handwriting features to assess personality traits. The graphologists utilise three measurement types. General Measurements that give the overall impression of handwriting specimen. Personality traits are assessed with stroke quality; a minor stroke in fine handwriting reflects good concentration, while bad handwriting shows pettiness of the writer. Fundamental Measurements that produce a primary classification of handwriting patterns. There are eight basic features used in this process. The features are slant that reflects emotions, baseline direction that shows the writer's mood, letter size that indicates power, continuity of the writing that reflects mode, handwriting form and shape that shows free choice and natural impulse, the arrangement of lines that depicts a sense of adaptation and organisation, pressure of the pen that signifies the strength, intensity, and appetites and lastly writing speed that indicates the rhythm of the writer's physical and mental activity.

Accessories Measurements which are graphic symbols that normally appear in alphabets, capital letters, 't' bars, 'i' dots, numerals, signatures, punctuation marks, covering strokes, initial and terminal strokes, flourishes, as well as upper and lower extensions or loops. Further to that, the letter 't' is used in the analysis as the most critical graphical symbol as the style of writing it signifies the writer's activeness and willpower. Apart from that, the letter 'i' is considered as the second most crucial graphic symbol as it identifies the intellects, ideas, sphere of the imagination, speed, and aspiration. In addition, the capital letter size represents vanity, pride, and desire to impress others around them. The beginning strokes reflects immaturity, consciousness, conventionality, selfishness, love of gain, and gaiety, while the ending strokes signify the writer's aspiration, practicality, and courage. Similarly, the response of participants revealed the features of hell traits in their handwriting. "*The handwriting of the first respondent shows characters which include the connotations of the intersection of the letter S and lengthening of its end on the body of the letter, indicating traits of stubbornness and rigidity of opinion. It is also shown in the connotations that there is no margin of the side of writing which indicates the traits of weakness in planning and weakness in making good relationship with others. Hooks in the letters in the direction of writing indicate the trait of being affected by another person. The connotations of writing letters indicate indifference and not thinking about consequences*" (Field study). These hell traits connotations found in the handwriting make a person

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become stubborn and engaged in fighting his peer, and this offence lands him in imprisonment and incarceration.

Another respondent interviewed by the researcher committed a similar offence as the first participant also has hell traits features in his handwriting and behaviour. "The handwriting of the second participant revealed the connotation of the flying stick of the letters, indicating the trait of fear of criticism. The connotation of writing the letters with a circular shape in front indicates the trait of failure to comply with the laws and regulations. The connotation of writing the letter at the end of the word by entering the body of the letter into the previous one indicates excessive curiosity and interference in other people's affairs. The connotation of writing the letters equally indicates indifference and not thinking about the consequences" (Field study).

The presence of these characteristics of hell traits connotations in the handwriting of the respondent made him commit the offence of violent fighting and attacking with a weapon which led to his sentence of imprisonment. Similarly, the hell traits characters that appeared in the handwriting of the third respondent convicted for robbery are related to the first and second respondents. "*The handwriting of the third participant revealed features including the connotation of writing the circular letters in a close or narrow way refers to hiding the secret from others. The connotation of the dangerous tendency of letter shapes indicates the trait of creating the problem, the connotation of the overlapping circle in the letters indicates the trait of not telling the truth (lying), the connotation of writing a letter sharp with an acute angle refers to the trait of imposing himself on others by force. The connotation of the large distance between the line indicates the trait of self-love. The connotation of writing in large font indicates the trait of practical inclination. The connotation of heavy line pressure indicates the trait of nervousness, and the connotation of unstable margin on all sides indicates the trait of contradiction. The connotation of writing inclination towards 50-65 degrees refers to the traits of imbalance and aggression*" (Field study).

Moreover, the loops in the letters also reveal personality-related information such as physical and intellectual activities, exaggeration, moderation, idealism, fluency of thoughts, ambition, aspirations, fear, spirituality, realistic, imagination, egoism, practical viewpoints, vanity, boastfulness, timidity and inhibition, and apprehension for future. This information can assist in predicting an individual's behaviour concerning criminal activity. Graphology can be classified as a subset of psychology as it helps to understand personality traits and characteristics through the patterns and strokes in an individual's handwriting. Among traits that can be identified are emotional and mental instability traits which are important to be revealed as the identification of these traits can help deal profiling serial killers, criminal suspects. By doing so, the relevant authority can narrow the search during an investigation and solve the crime (Mishra, 2017).

## 6. Conclusion

The paper explored the relationship between handwriting and crime based on the characters in the handwriting sample of three respondents. The first and second respondents were convicted and detained for fighting at the remand facility, while the third respondent committed robbery and was sentenced to serve his jail term at the remand home. The researcher interviewed them and analysed their handwriting and found a relationship between the crime and connotations in their handwriting which revealed hell traits. When such traits are found in the individual's handwriting, he may

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be liable to commit a crime, expressly, when the appropriate environment is provided. The study also found hell traits in the handwriting of the three respondents, and their interview transcripts also revealed the element of crime in their behaviour. This research has contributed to the knowledge development in criminology and other related fields in social science and humanities. This study could be helpful to the government and its agencies in controlling and addressing the menace of crime among the youths. This study used a qualitative approach to explore the relationship between handwriting and crime based on the handwriting of three respondents. Further study in a similar area using other approaches is strongly suggested.

## Ethics Approval and Consent to Participate

The researchers used the research ethics provided by the Research Ethics Committee of Universiti Sains Malaysia (USM/JEPeM/21220758). All procedures performed in this study involving human participants were conducted in accordance with the ethical standards of the institutional research committee. Informed consent was obtained from all participants.

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## Conflict of Interest

The authors declare no conflict of Interest.

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