■ **REVIEW ARTICLE**

# Gender Identification Based on Handwriting Characteristics

Aparna Panicker[1], Monika Chauhan[2], Suneet Kumar[3]

**Authors' Affiliations:**
[1] Student
[2] Associate Professor
[3] Assistant Professor, School of Basic and Applied Sciences, Galgotias University, Greater Noida, Uttar Pradesh

**Corresponding Author:**
Monika Chauhan, Associate Professor, School of Basic and Applied Sciences, Galgotias University, Greater Noida 201310, Uttar Pradesh, India.

**Email:**
monika0283@gmail.com

## ABSTRACT

In the field of criminal justice, any testimony, no matter how minor or trivial, cannot be ignored, as supplementary evidence has always turned the case around. A common form of evidence is documentary proof. Document exhibits come in a number of formats and can be handwritten, digital, or printed. Handwriting may be used as a starting point for attempting to identify uniqueness. Different people have different writing patterns, which is a natural act. Even if the person deliberately wants to alter, certain characteristics are peculiar to a single person. On the basis of class and individual characters, an attempt was made to differentiate between male and female handwriting. In a case where the investigation involves handwriting, this can be a valuable piece of supplementary evidence. It can also be used to exclude possible suspects. With the writers using the same writing instrument and surface, over 200 samples were analyzed based on 6 parameters, and many of them yielded positive results in deciding whether the writers were male or female. The observation can be used as a first step in the field of Graphology in terms of gender identity

**KEYWORDS** | Handwriting, Individual Characters, Class Character

## INTRODUCTION

Document is an object that has symbols, signs, and marks that conveys a message. Content of the documents is either partially visible or invisible. Questioned Document can be defined as a document whose authenticity or source is suspected or disputed. In 1910, Albert Osborn wrote a book on Questioned document in which he referred to the characteristics of handwriting that can be used for analysis. Any disputed document that is utilized in civil and criminal court is referred to as Questioned Document (Tripathi *et al.,* 2020).

The father of handwriting examination, Ordway Hilton, in 1956, wrote a book "*Scientific Examination of Questioned Document*", in which he mentioned some of the essential rules of handwriting examination and identification. Forty years later, William Harrison in 1996 showcased modern evolution in Questioned document and handwriting examination, used for verifying the writer of the document. Writing is an action in which the making of each word and letter is usually automatic, writers generally focus on the main matter instead of the process of writing. Writing is a combination of habitual patterns and innumerable subconscious [1]. Handwriting is a judicious procedure, which is obtained through comparing writing habits and handwriting characteristics.

Diverse elements that have an impact on handwriting are:
• Age
• Illness

- Physical or Mental disturbance
- Writing position
- Writing surface
- Writing instrument
- Lighting
- State of Drunkeness

**Various Investigators:**

Vikram Kamath et al., in his investigation, discussed the conduct of an individual was anticipated through a mechanized handwriting examination framework. The handwriting was broken down through picture handling in MATLAB. Eight qualities highlights of penmanship were gotten to evaluate the character of personality, utilizing calculations and manual investigation. The framework created could be utilized for the location of Parkinson's infection and disease. It can likewise be utilized in record credibility and untruth recognition (Kamath *et al.,* 2011).

Nazeer and Shabaz, (2019) observed in their investigation chipped away at handwriting tests of 100 individuals having various considerations and differing states of mind. SSGBSAT calculation was utilized for the examination of seven assumptions (scorn, outrage, camouflage, bliss, tragic, tear, and shock). The investigation uncovered the pace of genuineness of seven assumptions present in an individual, while he/she was composing the content. The investigation could anticipate the adverse conduct of any individual so that advising could be given in the beginning phase.

Luria and Sara (2011) found in their investigation "A mechanized multidimensional estimation of mental responsibility through penmanship examination" discussed penmanship conduct which was utilized to decide mental responsibility in an individual. Three thematic movement of various troubles were composed by 56 members on a digitizer. Contrasts in worldly, spatial, and precise separating were seen to decide low and high responsibility in the individual. [7]

Gawda and Nikitha (2015) showed in their examination discussed the connection between clinical conclusion and graphological investigation to discover the connection between character qualities and the appearances in handwriting among kids by utilizing Children's Personality Questionnaire. The writer detailed that there were no solid contrasts between the psych diagnostics evaluation of character through Children's Personality Questionnaire and the handwriting examination.

Kenshin and Ohsawa, (2015) in their examination zeroed in on discovering the relationship between reasoning time and composing time in handwriting of 50 undergrad members, by utilizing computerized pen (Hitachi Maxell, DP-201). The writer noticed two sorts of gatherings in his analysis. The first took a long time in reasoning and more limited time recorded as a hard copy and the other one took more limited time in reasoning longer time recorded as a hard copy. The gathering taking longer time recorded as a hard copy showed 'back-following' which at last brought about the expanded nature of thoughts.

Dang and Kumar (2014) utilized different boundaries for the expectation of conduct of a person by utilizing PC. The boundaries utilized are pen pressure, letter development 'I' and 'f', letter incline which were contribution to the 'Counterfeit Neural Network' which helped in forecast of human conduct. The device utilized for the assessment of tests was 'MATLAB'.

Mavrogiorgou and Jucket (2011) observed in their examination they considered hand engine execution among 44 members of which 22 were patients with over-the-top enthusiastic issues (OCD) and 22 were well-being controls. The creator identified unobtrusive engine brokenness in OCD by utilizing digitizing realistic tablet and saw that the tedious engine design execution among patients with OCD was better in contrast with the sound controls.

Frank and Rejean (1989) in their examination they learned about handwriting investigation and closed the exploration on robotized composed language acknowledgment and investigation goes back quite a few years report with straightforward designs can be perceived dependably by off the rack or programming.

## METHODOLOGY

For the comparison of samples, 100 samples of handwritings were taken which include 50 samples from males and 50 samples from females. The handwritings were taken from the age group 20-40
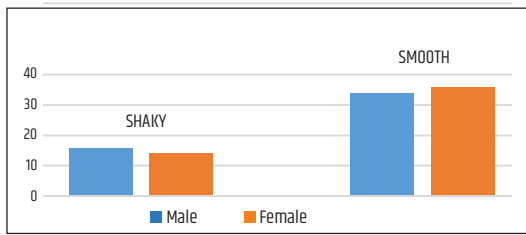
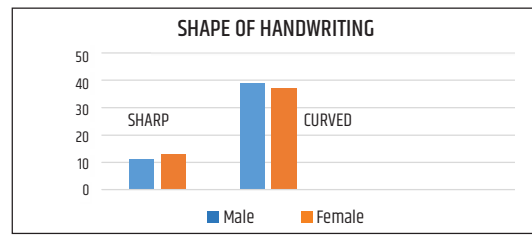**Figure 1:** Graph showing line quality in handwriting



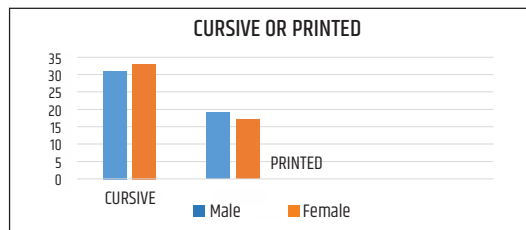**Figure 2:** Graph showing shape of handwriting



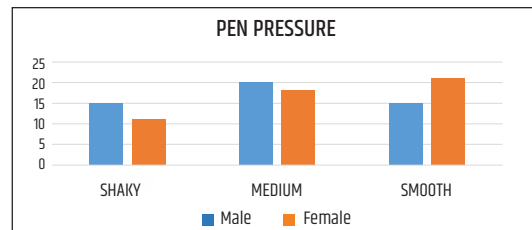**Figure 3:** Graph showing style of writing



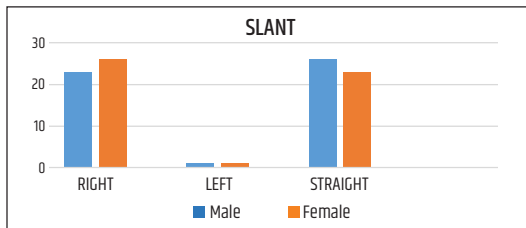**Figure 4:** Graph showing pen pressure

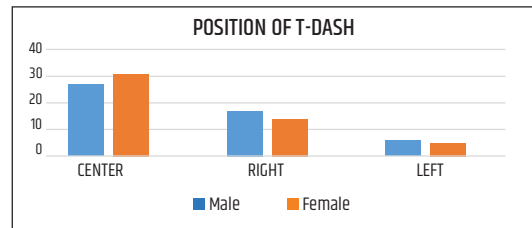

**Figure 5:** Graph showing Slant in handwriting



**Figure 6:** Graph showing T-dash position

years. All samples are written using ball pens and the same surface of writing was provided.

Before the collection of samples, all the people were briefed about the collection process and their concerns were taken. Also, no samples are taken from people with any kind of mental disease.

**Examination of samples:**

Handwriting analysis involves a comprehensive comparative analysis of the writer. Specific habits, characteristics, and individualities of both the male and female samples are examined for similarities and differences.

- Analysis - The first step is to analyze the writing sample for distinctive characteristics.
- Comparison - The sample of males and females would be compared.
- Evaluation - The final step is to look at how male and female handwritings are different from each other.
- The sample card is given below. This card has London Letter. It is a paragraph that has all the letters from A- Z. the writers wrote on this sample card.
- The second page of this sample card has the 6 characteristics on which the sample has been evaluated.

**The characteristics are as follows:**

- Line quality - line quality describes if the writing is smooth, shaky or juvenile.
- Shape - handwriting shapes can be conical or curved as shown in the figure.
- Cursive and printed letter - the type of letter the person uses.
- Pen pressure - If there are no impressions on the backside of the paper.

*Medium* – If there are light impressions on the backside of the paper.

*Heavy* – If there are clear impressions on the back of the paper. This pen pressure can be judged on a few surfaces only such as paper, leaves, etc.

- Slant - The direction of the writing. It can be a right slant, left slant, or straight.

- Diactric Placement - It defines the position T-dash.

## RESULTS AND DISUCSSION

### Line Quality

According to figure 1, in the case of males out of 50 samples, 16 males have shaky handwriting and 34 have smooth handwriting.

In the case of females out of 50 samples, 14 have shaky handwriting and 36 have smooth handwriting.

If we look into this characteristic, we can see that comparatively, males have shaky handwriting and females have smooth handwriting as shown in Figure 1.

### Shape of Handwriting

According to figure 2, in the case of males out of 50 samples, 11 males have sharp handwriting and 39 have curved handwriting.

In the case of females out of 50 samples, 13 have sharp handwriting and 37 have curved handwriting.

In this case, comparatively, females tend to have sharp handwriting and males have curved handwriting as shown in Fig. 2

### Cursive or Printed Letter-

According to figure 3, in the case of males out of 50 samples, 31 males have cursive handwriting and 19 have printed handwriting.

In the case of females out of 50 samples, 33 have cursive handwriting and 17 have printed handwriting.

According to the data females use cursive letters more and males use printed letters more as shown in Figure 3.

### Pen Pressure

According to figure 4, ivn the case of males 15 have light, 20 have medium and 15 have heavy pen pressure.

In the case of females 11 have light, 18 have medium and 21 have heavy pen pressure.

A significant difference can be seen in the case of pen pressure.

This data indicates that females apply more pen pressure than males as shown in Figure 4.

### Slant

According to figure 5

In the case of males, 23 have a right slant, 26 have straight slant and 1 have a left slant.

In the case of females, 26 have right slant, 23 have straight slant and 1 has left slant. Comparatively very few people use left slant. According to the data, females use right slant more and males have straight slant as shown in Figure 5.

### Diatric Placement

### Position of T-Dash

According to figure 6, in the case of males out of 50 17 have T-dash at right, 27 have T-dash at center and 6 have Tdash at left.

In the case of females out of 50, 14 had T-dash at right, 31 had T-dash at the centre and 5 had T-dash at left.

Not many had T-dashes at left. More females have T-dash position at the center and males have more T-dash position on the right as shown in Figure 6.

## CONCLUSION

Document is an object that has symbols, signs and marks that convey a message. They are either visible, partially visible or invisible. Questioned Document can be defined as a document whose authenticity or source is suspect, questioned or disputed. In 1910, Albert Osborn wrote a book on Questioned document in which he referred to the characteristics of handwriting that can be used for analysis. Any disputed document that is utilized in civil and criminal court is referred to as Questioned document.

Documentary evidence is one of the most important supportive evidences. In the field of Forensic Science, every minute detail counts. Handwriting is the most common documentary evidence found. Handwriting can help us identify the individual and can also tell us about the writer's mental status. This work can help us identify the gender of the writer. As each individual carry both individual and class characters of handwriting, both genders have different characteristics of writing. The samples are collected and examined carefully on the basis of individual and class characteristics of both male and female. The results have shown some positive results. The differences can be due to difference in their wrist and hand movement. Also studies prove that there are psychological factors which differentiate male and female handwriting. This study can be

used for gender identification but one can't be 100% sure. Other supplementary evidence should also be looked at. This study shows that there is a significant difference between male and female handwriting.  **IJFMP**

## REFERENCES

1. **Triparthi Diksha, Kumar Suneet, Kumar Mukul.** *Comparative study of Handwriting based on skill level of Hindi and English medium writers. International Journal of All Research Education and Scientific Methods,2020;8:1-4*

2. **Sahu Manju, Yadav Anjali, Rao Isukapatla Arjun.** *Examination of handwriting for gender identifying features. International Journal of Current Research,2014;9:10-16.*

3. **Harrison Diana, Burkes TedM, Seiger Danielle.** *Handwriting Examination: Meeting the Challenges of Science and the Law. Forensic Science Communication 2009; 1:1-10.*

4. **Kumar Suneet, SranVaibhav, VaidBikram Ashok, Gupta Ashok Kumar.** *Handwriting and gender: a statistical study. Problems of Forensic Sciences 2013,95:1-8.*

5. **Kamath Vikram, Swami Nikhil Rama, et al.,** *Development of an automated handwriting analysis system. ARPN Journal of Engineering and Applied Sciences 2011;9:1-7*

6. **Nazir Shaista Binti, Shabaz Mohammad.** *SSGBSAT- a Novel Approach to perform Sentimental Analysis using Graphology. International Journal of Innovative Technology and Exploring Engineering,2019;8:10-15.*

7. **Luria Gil, Rosenblum Sara.** *A computerized multidimensional measurement of mental workload via handwriting analysis Springer Link2011;1-7*

8. **Gawda Mahesh Ramania, et al.,** *Handprints of the Mind: Decoding Personality Traits and Handwritings. Indian J Psychol Med. 2015; 37:1-8*

9. **IkigamiKenshin, Ohsawa Yukio.** *Model of Creative Thinking Process on Analysis of Handwriting by Digital Pen. Open Journal of Information Systems (OJIS) 2015; 2:1-13.*

10. **Dang Sandeep, Kumar Mahesh.** *Handwriting Analysis of Human Behavior Based on Neural Network. International Journal of Advanced Research in Computer Science and Software Engineering 2014; 4:1-6*