

Comparative Study of Handwriting in Sitting as Well as Standing Position

Aatika Mansoori¹, Abhaya Bhople^{2*}, Samruddhi Patha¹, Aaifaz Pappuwale¹

Abstract

Handwriting is a complex motor activity influenced by posture, muscle coordination, balance, and environmental conditions. Handwriting analysis is very important in forensic science to determine authenticity of documents in various criminal cases. This comparative study examines the characteristics of handwriting produced in sitting and standing positions to determine the effect of body posture on writing performance and handwriting quality. The study focuses on parameters such as letter formation, alignment, spacing, pen pressure, writing speed, and overall legibility. It is characterized in two types. Class characteristics, Individual characteristics. In present study We had made a sample paragraph for sample collection. We had collected handwriting samples from 200 individuals in both sitting and standing position from age group 15 to 30 years in both male and female category with the consent of subject. We have Analyzed the sample based on class and individual characteristics. Based on above methodology, it is observed that there are more significant changes in class characteristics than individual characteristics of handwriting in both standing and sitting positions. The posture is affected by handwriting.

Keywords: Motor skills, class and individual characteristics, strokes, embellishments, pen pressure

INTRODUCTION

“Document” means any matter expressed or described upon any substance by mean of letter, (Figure 1), or marks or more than one of those means used or which may be used for the purpose of recording that matter. A “questioned document” is any signature, handwriting, typewriting or other mark whose source or authenticity is in dispute. Handwriting is often described as a fingerprint of the mind just like fingerprint of individual [1–4]. It is unique and shaped by neuromuscular coordination, habits and personal style. Forensic handwriting is also known as forensic document examination, a special field of forensic science that analyzes handwriting, signature, and related document features to determine authenticity, detect forgery and provide expert opinion in legal disputes. Handwriting examination is important in forgery cases, Fraud investigation, criminal Investigation and Archival work, Civil dispute. Handwriting is a complex motor skill expressed individually because of learned symbols that are stored in long term memory. It is classified as Cursive, Natural, Disguised [5–8].

*Author for Correspondence

Abhaya Bhople

E-mail: abhaya.bhople@ghru.edu.in

¹Researcher, Department of Forensic Science, G H Raison University, Amravati, Maharashtra, India

²Assistant Professor, Department of Forensic Science, G H Raison University, Amravati, Maharashtra, India

Received Date: May 05, 2026

Accepted Date: May 15, 2026

Published Date: August 31, 2026

Citation: Aatika Mansoori, Abhaya Bhople, Samruddhi Patha, Aaifaz Pappuwale. Comparative Study of Handwriting in Sitting as Well as Standing Position. Research & Reviews: A Journal of Neuroscience. 2026; 16(2): 15–21p.

CHARACTERISTICS OF HANDWRITING

Every person has unique style and handwriting, whether it is everyday writing or the signature. Even two identical twins do have the same handwriting as fingerprint. It is characterized in two types [9]:

- Class characteristics.
- Individual characteristics.

Class Characteristics

Class characteristics of handwriting are common features of handwriting that can be used to identify a group of people.

- *Size*: The size of handwriting may vary from person to person. The size of handwriting may vary due to internal as well as external circumstances at the time of writing. The size may classify as long, medium, small or irregular.
- *Spacing*: The spacing of writer in the signature and handwriting can be studied in three manners, e.g., space between letters, space between words, space between lines. It is useful in the detection of forgery. The spacing is classified as intra-spacing, inter-spacing.
- *Shading*: The variation in the width of strokes is known as shading. Shading is considered to be visual record of the manner in which the pen moved on the paper. The shading classified as smooth, graduate, rough, irregular, heavy, explosive and bunched, rare and accidental.
- *Alignment*: The relation of the letter of word, signature, or written line to an actual or imaginary base line is known as alignment. The alignment is classified as ascending (uphill), descending (downhill), even, arched, garlanded and irregular.
- *Arrangement*: The arrangement of words, sentences, and paragraphs in writing is the outcome of several reasons such as artistic ability, education, environment and the degree of expression of certain mental traits. It is important characteristics in studying the peculiarity of one's habits writing.

Individual Characteristics

The individual characteristics are unique to each person. These characteristics include:

- *Pen Pressure*: pen pressure is defined as the force, or pressure is applied on the writing instrument during writing. These are most important characteristics that infuse life to writing. Pen pressures are classified as light pen pressure, heavy pen pressure, medium pen pressure.
- *Strokes*: It is series of lines or curves written in a single letter or words. the strokes are classified as Starting strokes, connecting strokes, Ending strokes
- *Pen Lift*: Lifting of pen from the paper, it may be natural for a specific writer to lift the pen at usual point.

Embellishment

Embellishments are most often located at the beginning of a letter but may be throughout the written material. They usually take the form of an added movement that decorates the writing such as swirls, added loops, concentric circles, flourishes, etc.

METHODOLOGY

In the present study, we have analyzed the handwriting samples on basis of their individual and class characteristics. Also, analysis of the various aspects of handwriting. In this method we have analyzed the variation in handwriting in two positions like standing and sitting. We collected samples from different regions of Maharashtra those regions are Amravati, Nagpur, Yavatmal, Wardha. Here individual and class characteristics are shown in Table 1 [10–13].

Table 1. Individual and class characteristics.

S. N.	Individual characteristics	Class characteristics
1	Pen pressure	Size.
2	Pen lift	Spacing.
3	Embellishment	Alignment.
4	Strokes	Arrangement.
5	Abbreviation	Shading.
6	Hesitation	Movement.
7	Pen pause	Line quality.
8	Placing	Speed.

COLLECTION OF SAMPLES

- We have made a sample paragraph in printed form on A4 size sheet.

- We have selected age group of 15 to 30 years as a sample population from both male and female category.
- We gave brief information about our research project to the individual and asked them to write the sample paragraph in sitting as well as standing position with blue and black pen with their consent.
- All individuals had written the same paragraph.
- Total 200 sample handwritings were collected they were grouped into different groups according to their age.

ANALYSIS OF SAMPLE

- All sample handwriting is separate compared in sitting as well as standing position based on their class and individual characteristics.
- Here we are 4 individuals and 5 class characteristics for handwriting samples.
- Here individual and class characteristics of handwriting are shown in Table 2.

Table 2. Individual and class characteristics of handwriting.

S. N.	Individual characteristics	Class characteristics
1	Pen pressure	Size.
2	Pen lift	Spacing.
3	Embellishment	Alignment.
4	Strokes	Shading.
5	-	Arrangement.

The character Sherlock Holmes first appeared in print in 1887's *A Study in Scarlet*. His popularity became widespread with the first series of short stories in *The Strand Magazine*, beginning with "A Scandal in Bohemia" in 1891 additional tales appeared from then until 1927, eventually totaling four novels and 56 short stories. All but one is set in the Victorian or Edwardian eras between 1880 and 1914. Most are narrated by the character of Holmes's friend and biographer, Dr. John H. Watson, who usually accompanies Holmes during his investigations and often shares quarters with him at the address of 221B Baker Street, London, where many of the stories begin. Though not the first fictional detective, Sherlock Holmes is arguably the best-known. By the 1990s, over 25,000 stage adaptations, films, television productions, and publications were already featuring the detective, and Guinness World Records lists him as the most portrayed human literary character in film and television history. Holmes's popularity and fame are such that many have believed him to be not a fictional character but an actual individual numerous literary and fan societies have been founded on this pretense. Avid readers of the Holmes stories helped create the modern practice of fandom. The character and stories have had a profound and lasting effect on mystery writing and popular culture as a whole, with the original tales, as well as thousands written by authors other than Conan Doyle, being adapted into stage and radio plays, television, films, video games, and other media for over one hundred years.

Figure 1. Sample paragraph of handwriting sample.

RESULTS AND DISCUSSION

On the above Figure 2 it is seen that there are more changes observed in class characteristics than individual characteristics of handwriting in both standing as well as sitting position [14, 15].

Class characteristics include size, spacing, shading, alignment and arrangement were:

- 27.17% of the population show change in size.
- 9.48% of the population show change in inter spacing.
- 86.66% of the population show change in intra spacing.
- 6.66% of the population show change in shading.
- 42.56% of the population show change in alignment

Individual characteristics include embellishment, pen pressure, pen lift, stroke (starting, connecting, ending) were:

- 14.35% of the population showed change in embellishment.

- 22.05% of the population show change in pen pressure.
- 10.25% of the population show change in pen lift.
- 5.64% of the population show change in starting strokes.
- 6.15% of the population show change in connecting strokes.
- 6.15% of the population show change in ending strokes.

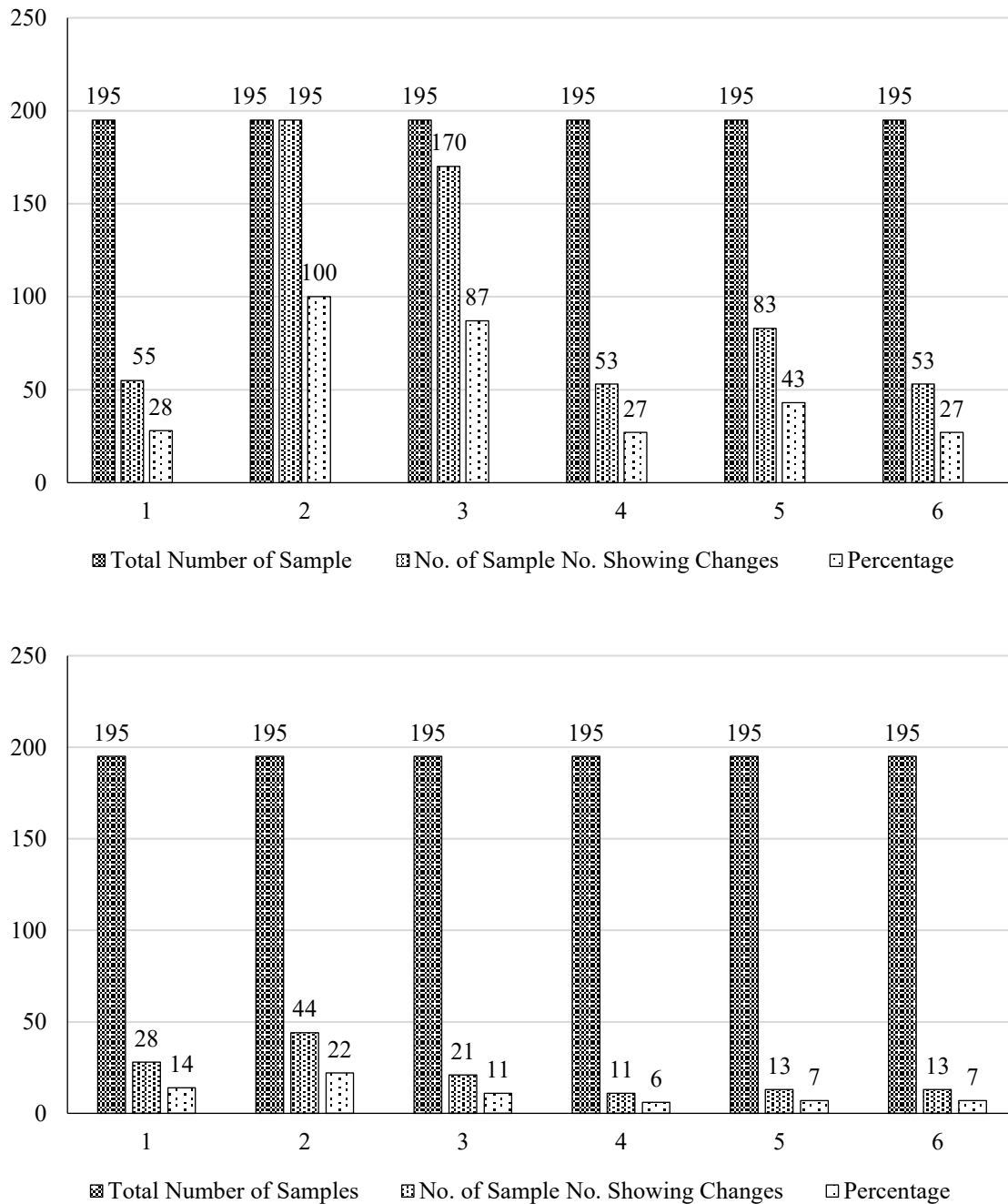


Figure 2. Percentage of handwriting samples showing changes in class as well as individual characteristics.

As per Figure 3 it is observed that number of populations has not shown changes in both individual and class characteristics of handwriting. But the No. of population has not shown the changes in individual characteristics as compared to class characteristics [16, 17].

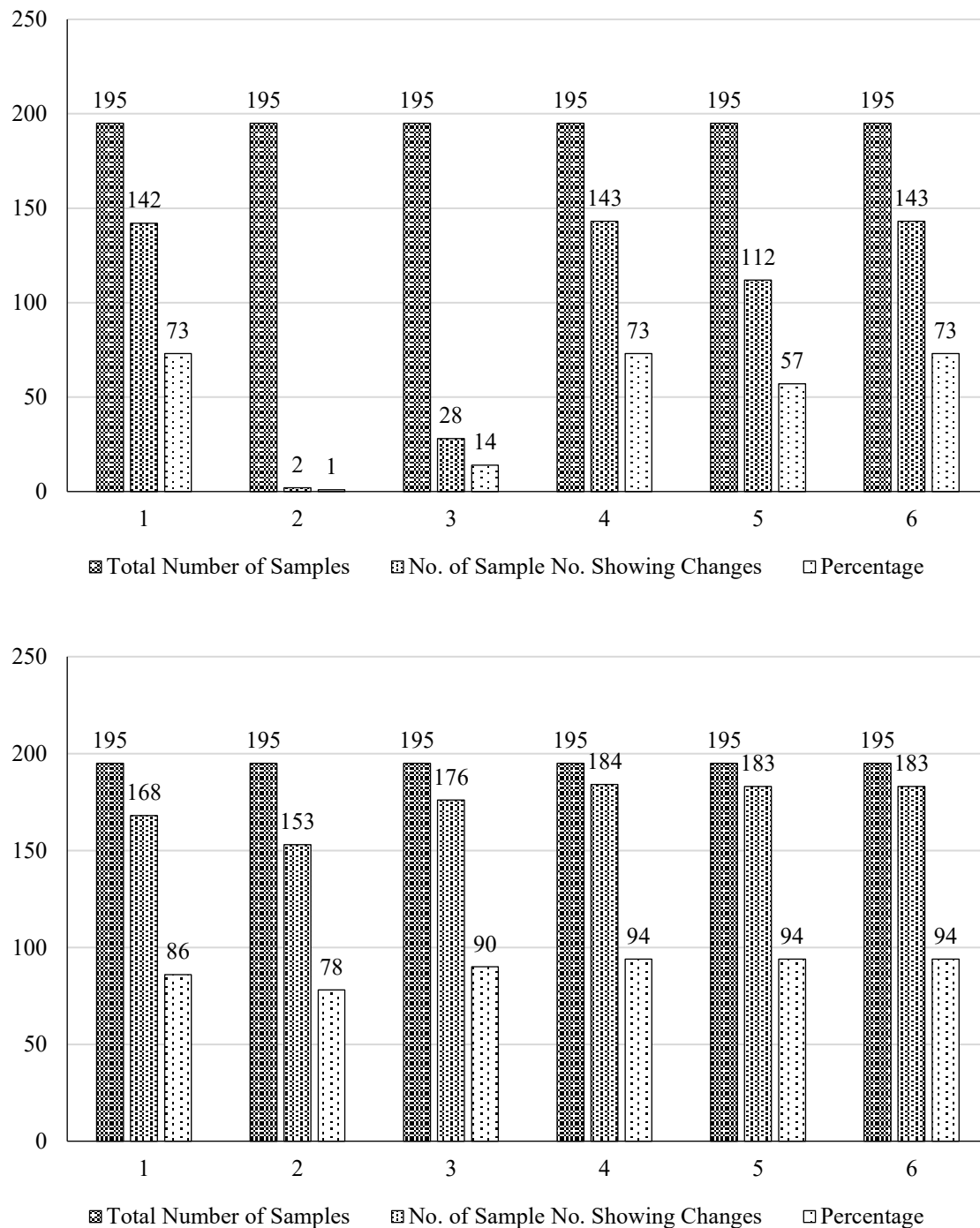


Figure 3. Percentage of handwriting samples show no changes in individual as well as class characteristics.

Class characteristics include size, spacing, shading, alignment and arrangement were:

- 72.82% of the population have shown no change in size.
- 0.51% of the population have shown no change in inter spacing.
- 13.33% of the population have shown no change in intra spacing.
- 73.33% of the population have shown no change in shading.
- 57.43% of the population have shown no change in alignment.
- 73.33% of the population have shown no change in arrangement.

Individual characteristics include embellishment, pen pressure, pen lift, stroke (starting, connecting, ending) were:

- 85.64% of the population have shown no change in embellishments.
- 7.94% of the population have shown no change in pen pressure.
- 89.74% of the population have shown no change in pen lift.
- 94.35% of the population have shown no change in starting strokes.
- 93.84% of the population have shown no change in connecting strokes.
- 93.84% of the population have shown no change in ending strokes.

Here are the simple factors affecting handwriting characteristics in both sitting and standing positions:

Sitting Position

- *Seat Height*: Affects writing posture and hand positioning.
- *Table or Desk Height*: Affects writing posture and hand positioning.
- *Back Support*: Affects writing posture and comfort.
- *Foot Position*: Affects balance and stability.

Standing Position

- *Surface Height*: Affects writing posture and hand positioning.
- *Body Alignment*: Affects balance and stability.
- *Hand Positioning*: Affects handwriting characteristics such as letter size and slant.
- *Fatigue*: Affects handwriting characteristics, such as letter size and consistency.

Common Factors

- *Grip Style*: Affects handwriting characteristics, such as letter size and slant.
- *Writing Instrument*: Affects handwriting characteristics, such as line quality and consistency.
- *Paper Quality*: Affects handwriting characteristics, such as line quality and consistency.
- *Lighting*: Affects visibility and comfort while writing.

CONCLUSIONS

As per present study, In the given population more significant changes observed in class characteristics of handwriting than individual characteristics in both standing as well as sitting position. Spacing, which is class characteristics, majorly changes with sitting and standing position. Handwriting is affected by writing posture of individual. More specifically class characteristics such as spacing and alignment arrangement are influenced by writing posture. Handwriting is influenced by writing posture. In future perspective we will collect more samples so result will be more accurate and we will add other types of questioned document.

REFERENCES

1. Osborn AS. Questioned documents. 1st ed. Rochester (NY): Lawyers Co-operative Publishing Co.; 1910.
2. Huber RA, Headrick AM. Handwriting Identification: Facts and Fundamentals. Boca Raton (FL): CRC Press; 1999.
3. Hilton O. Scientific Examination of Questioned Documents. Rev ed. Boca Raton (FL): CRC Press; 1982.
4. Nabar BS. Forensic science in criminal investigation. 3rd ed. Hyderabad: Asia Law House; 2001.
5. C DK. Medico-legal importance of questioned document in crime investigation. Int J Trend Sci Res Dev. 2020;4(4):437–440.
6. Srihari SN, Cha SH, Arora H, Lee S. Individuality of handwriting. J Forensic Sci. 2002;47(4):856–872.
7. Found B, Rogers D. The probative character of forensic handwriting examiners' identification and elimination opinions on questioned signatures. Forensic Sci Int. 2008;178(1):54–60. doi: [10.1016/j.forsciint.2008.01.017](https://doi.org/10.1016/j.forsciint.2008.01.017).

8. Hardy HJJ, Fagel W. Methodological aspects of handwriting identification. *J Forensic Doc Exam.* 2018;28:125–147.
9. Kalyan JL, D B. Forensic examination of handwriting and signature. *Int J Innov Res Dev.* 2013;2(5):514–518.
10. Kam M, Wetstein J, Conn R, Janssen M. Proficiency of professional document examiners in writer identification. *J Forensic Sci.* 1997;42(5):778–786.
11. Khajuria AP. Forensic handwriting examination. *Santosh Univ J Health Sci.* 2023;9(2):223–228.
12. Krishnamurthy D. Introduction to forensic science in criminal investigation. 3rd ed. New Delhi: Bharat Law House; 2021.
13. Found B. Deciphering the human condition: the rise of cognitive forensics. *Aust J Forensic Sci.* 2015;47(4):386–401. doi: [10.1080/00450618.2014.965997](https://doi.org/10.1080/00450618.2014.965997).
14. Sita J, Found B, Rogers D. Forensic handwriting examiners' expertise for signature comparison. *J Forensic Sci.* 2002;47(5):1117–1124.
15. Pontart V, Bidet-Ildei C, Lambert E, Morisset P, Flouret L, Alamargot D. Influence of handwriting skills during spelling in primary and lower secondary grades. *Front Psychol.* 2013;4:818. doi: [10.3389/fpsyg.2013.00818](https://doi.org/10.3389/fpsyg.2013.00818).
16. Found B, Bird C, Rogers D. The development of a program for characterizing forensic handwriting examiner expertise. *J Forensic Doc Exam.* 2011;22:1–12.
17. Morris RN. Forensic Handwriting Identification: Fundamental Concepts and Principles. San Diego (CA): Academic Press; 2000.