Quest Journals
Journal of Education, Arts, Law and Multidisplinary
Volume 15 ~ Issue 5 (Sep. – Oct. 2025) pp: 11-17
ISSN(Online): 2347-2895
www.questjournals.org

Research Paper

Individual Characteristics Variations in Handwriting as Writing Surface Changes

Ms.S. GOUSALYA
(B.SC Forensic Science, Jeppiaar University Chennai-119)
Corresponding Author: Ms Sreya Dharan
(Assistant Professor, Department of Forensic Science, Jeppiaar University)

ABSTRACT: *The present study investigates how handwriting characteristics vary across different surfaces (paper, glass, cloth). 100 samples were collected from 50 female and 50 male participants aged 17–20. Class characteristics (size, pen pressure, line quality, alignment) and individual characteristics (connecting strokes, initial strokes, loop formation, and i-dotting) were analysed. The findings indicate that non-porous surfaces like glass significantly affect connecting strokes, pen pressure, and tremors, while porous surfaces like cloth show moderate influence. The study highlights challenges faced in forensic document examination when handwriting is present on unconventional surfaces.*

KEYWORDS: *Handwriting Analysis; Class Characteristics; Individual Characteristics; Glass Surface; Cloth Surface; Forensic Document Examination.*

R*eceived 05 Sep., 2025;* ***R****evised 12 Sep., 2025;* ***A****ccepted 15 Sep., 2025* © *The author(s) 2025.*
P*ublished with open access at* ***www.questjournas.org***

I.INTRODUCTION

A questioned document is any material whose authenticity is disputed. Handwriting, being a behavioural biometric, shows variations due to neuromuscular coordination and is influenced by the surface on which it is written. Unusual surfaces like glass and cloth pose challenges to forensic analysis. Class characteristics refer to features shared by groups, whereas individual characteristics uniquely identify the writer.

Review of Literature Singh (2023) examined handwriting on mirrors, walls, and skin and noted significant challenges on unusual surfaces. Chavan (2023) emphasized that individual handwriting traits largely withstand changes in writing surfaces. Tarannum (2015) highlighted reliable forensic handwriting examination even on unconventional surfaces. Shekhawat (2023) and Tripathy (2020) detailed complications arising due to surface texture and writing conditions. Other case reports (Totty, Swain, Dogan) described unusual cases like handwriting on skin, showcasing forensic challenges.

II.AIM AND OBJECTIVE

Aim: To analyse variations in handwriting features across different writing surfaces.
Objectives:

- Identify and distinguish class and individual characteristics.
- Investigate the effects of writing surfaces.
- Explore forensic challenges posed by unconventional surfaces.

III.MATERIALS AND METHODOLOGY MATERIALS

- Surfaces: A4 Paper (JK Brand), Toughened Glass, Pure Cotton Cloth
- Instruments: Flair 1mm Ballpoint Pen, Green Whiteboard Marker
- Camera: Redmi A3-4p Lens, f/2.0

Sample: 100 participants (50 males, 50 females), aged 17–20 years.
Procedure: Participants provided handwriting samples on standard A4 sheets, glass, and cloth. Each participant copied a standardized text. Samples were analysed for both class and individual characteristics.
Method: Qualitative and Quantitative Analysis.

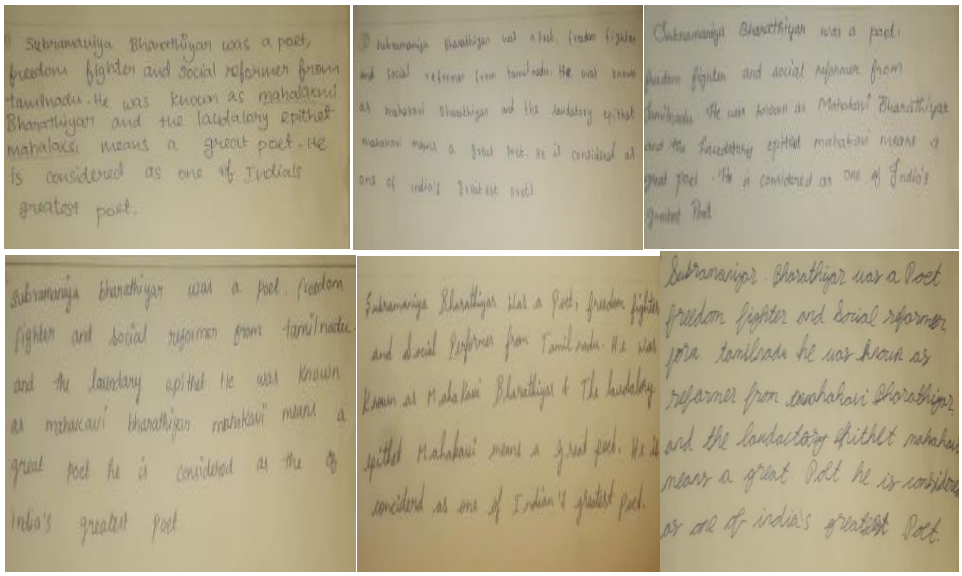


IMAGE 1: *Standard sample collected in A4 sheet. From top left to bottom right –GS1,GS2,GS3,BS1,BS2,BS3.*

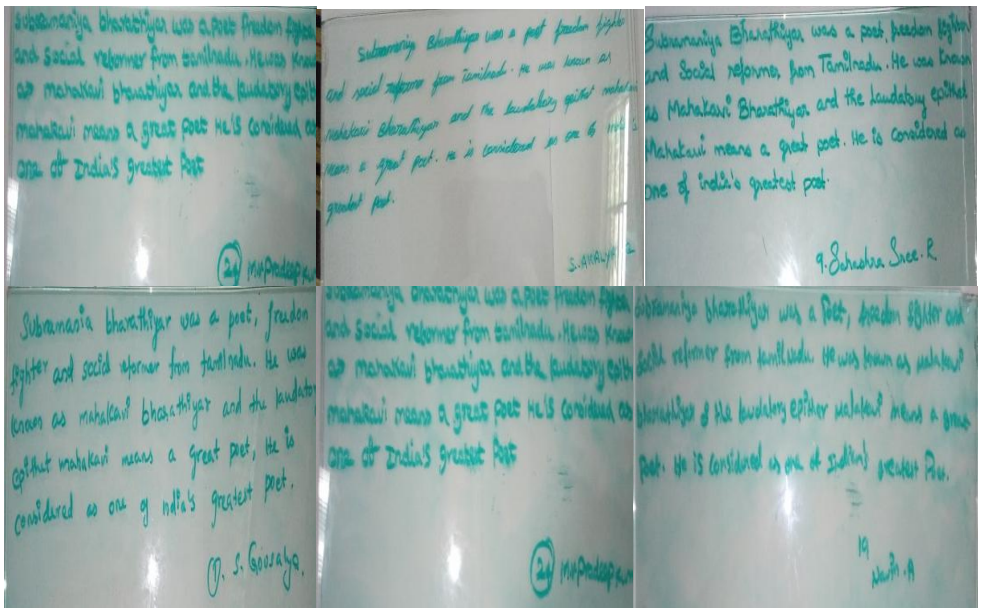


IMAGE 2: *sample collected in glass surface. From top left to bottom right –GS1,GS2,GS3,BS1,BS2,BS3.*

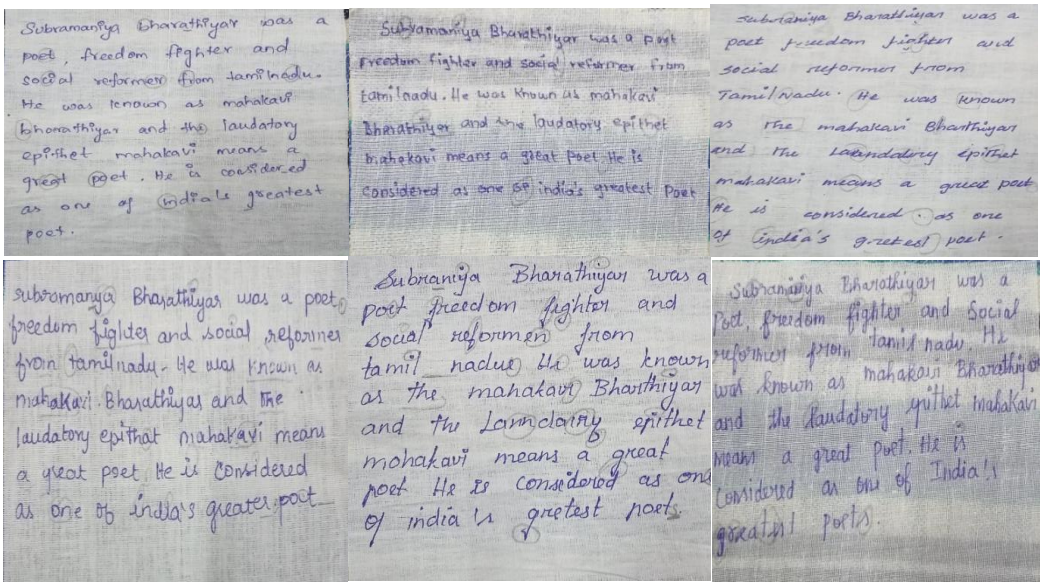


IMAGE 3: *sample collected in cloth surface. From top left to bottom right –GS1,GS2,GS3,BS1,BS2,BS3.*

IV.RESULTS AND OBSERVATION

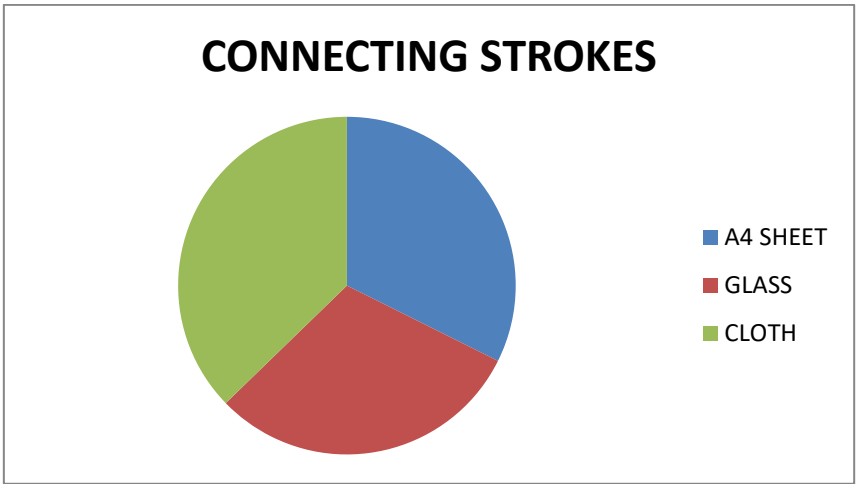
Individual Characteristics:

- **Connecting Strokes:** Significant decrease on glass surfaces.
- **Initial Strokes:** Increased variability on glass and cloth.
- **Loop Formation:** Tendency towards upper loops on glass, lower loops on cloth and paper.
- **"i" Dot Size:** Slightly larger on cloth and glass.

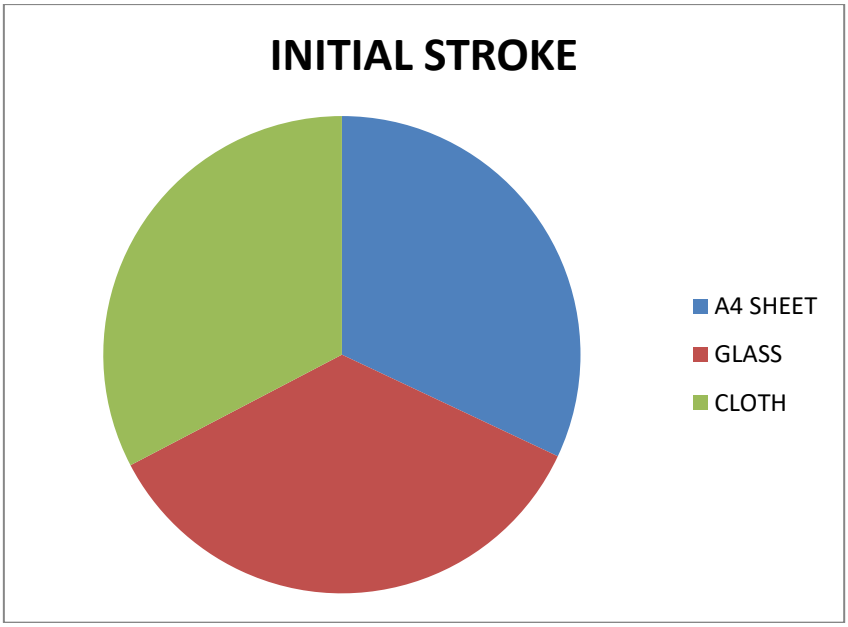
Class Characteristics:

- **Pen Pressure:** Increased on glass.
- **Line Quality:** More tremors on glass; smoother on paper and cloth.
- **Alignment:** More uneven on glass; ascending tendency on cloth.
- **Size:** Generally medium on paper, larger on glass, and medium to small on cloth.

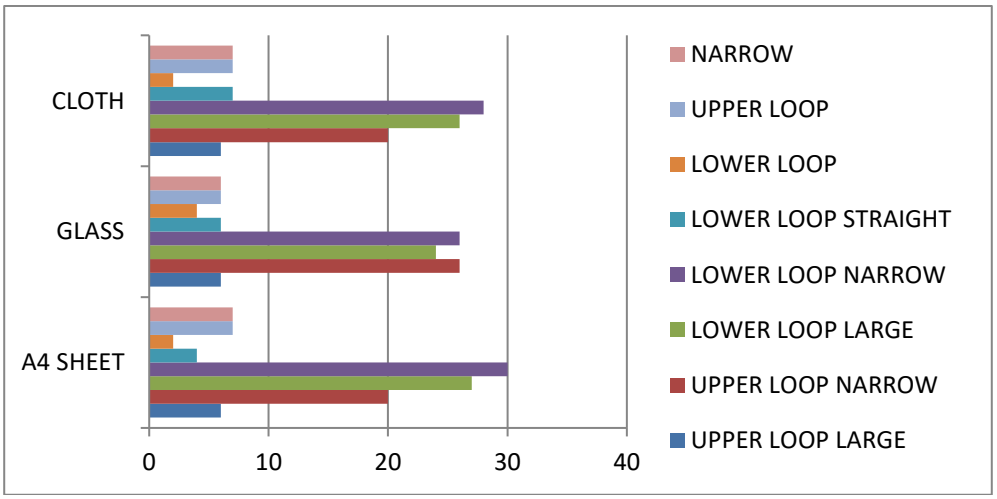
Feature	Girls - A4 Sheet	Girls - Glass	Girls - Cloth	Boys - A4 Sheet	Boys - Glass	Boys - Cloth
Connecting Strokes	36 Present, 14 Absent	22 Present, 28 Absent	30 Present, 20 Absent	39 Present, 11 Absent	32 Present, 18 Absent	32 Present, 18 Absent
Initial Strokes Presence	24 Present, 26 Absent	30 Present, 20 Absent	24 Present, 26 Absent	25 Present, 25 Absent	30 Present, 20 Absent	24 Present, 26 Absent
Loop Formation Trend	Mostly Lower Loops Large (Standard), Upper Loops Narrow (Glass/Cloth)	Shift toward Upper Loops, Narrow/Variable	Lower Loops remain but more variability	Lower Loops Large Dominant	Shift toward Upper Loops on Glass	Mixed Upper/Lower Loops
"i" Dot Size	Mostly Small or Medium	Small to Medium	Small to Medium	Mostly Small	Small to Medium	Small to Medium
Pen Pressure	Moderate to Low	Increased (Higher Pressure)	Moderate	Moderate	Increased (Higher Pressure)	Moderate
Alignment	Even or Slightly Uneven	More Uneven or Descending	Frequently Ascending	Even or Slightly Uneven	More Uneven or Descending	Frequently Ascending
Size of Letters	Mostly Medium, Some Large	Slightly Larger than Standard	Similar to Standard, Slight Shrinking	Medium to Large	Slightly Smaller or Medium	Medium
Line Quality	Smooth, Few Tremors	Significant Increase in Tremors	Minor Tremors with Smoothness Retained	Smooth, Few Tremors	Significant Increase in Tremors	Minor Tremors with Smoothness Retained



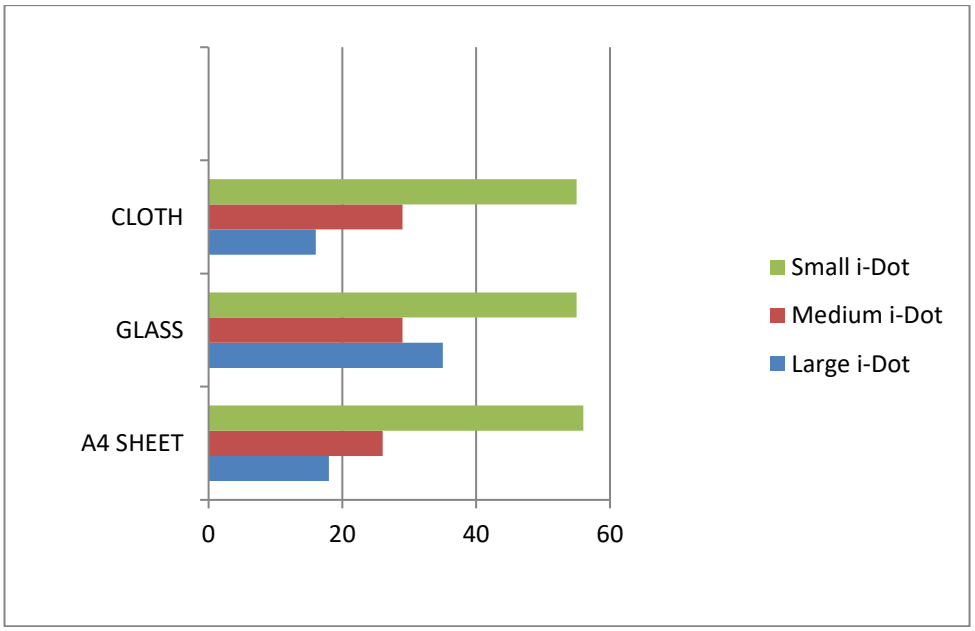
GRAPH 1: Number of connecting strokes present in total samples



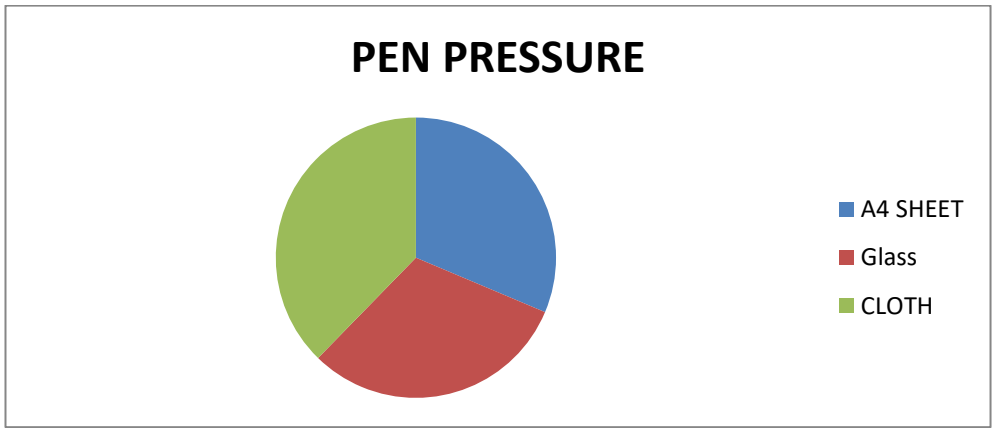
GRAPH 2: Number of Inital strokes present in total samples



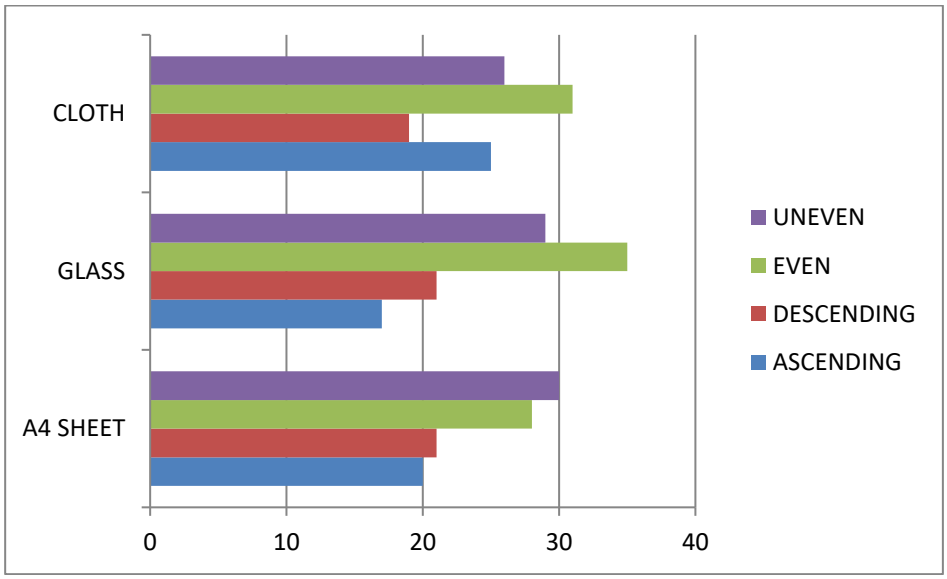
GRAPH 3: LOOP FORMATION



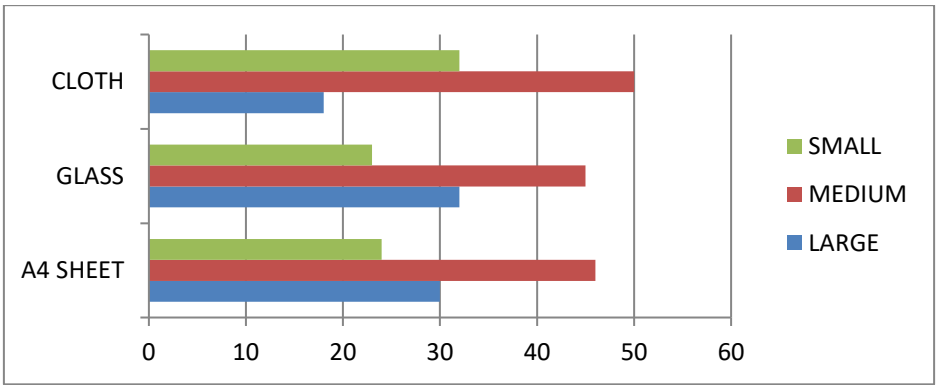
GRAPH 4: i DOT



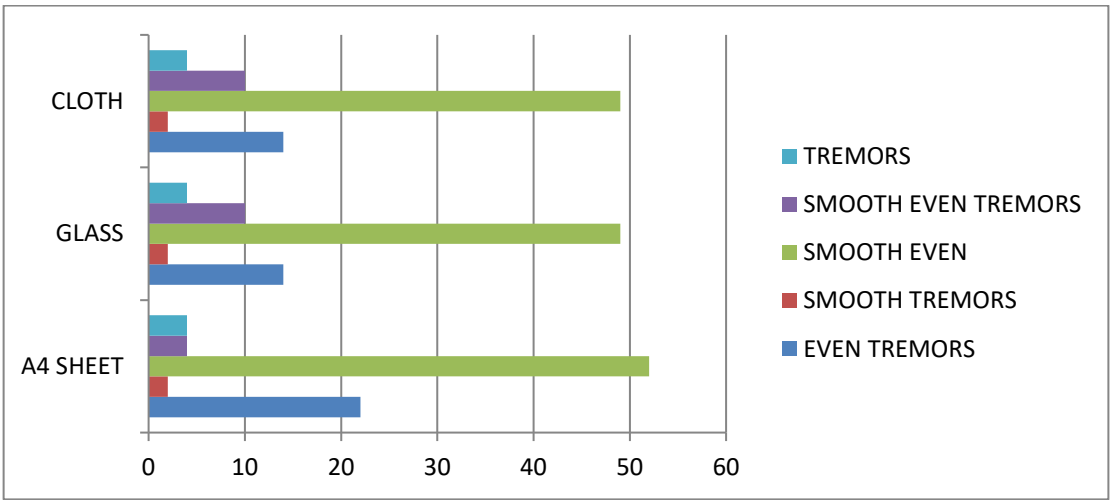
GRAPH 5: Number of pen pressure present in total samples



GRAPH 6: ALLIGNMENT



GRAPH 7: SIZE



GRAPH 8: LINE QUALITY

V.DISCUSSION

Surface texture significantly influences handwriting. Glass, being smooth and non-porous, caused loss of connecting strokes, increased tremors, and uneven alignment. Cloth, although porous, introduced moderate variability without severely affecting line quality. Individual characteristics remained identifiable despite variations, supporting forensic handwriting analysis's reliability.

VI.CONCLUSION

Handwriting undergoes noticeable alterations across different surfaces, particularly on non-porous glass. However, individual traits such as loop formation, connecting strokes, and i-dot placement largely remain consistent, affirming their value in forensic investigations. Further research is needed to develop standardized techniques for analysing handwriting on unconventional surfaces.

REFERENCES

[1]. Houck, M. M. (december 2015). Fundamentals of Forensic Science (pp.519-544). 2.abdi, k. m. (2009). Handwriting identification: a direction review. 2009 IEEE International Conference on Signal and Image Processing Applicationsz.
[2]. Mr. Bhupeshkumar Nan he. (n.d). Questioned document 2023
[3]. abdi, k. m. (2009). Handwriting identification: a direction review. 2009 IEEE International Conference on Signal and Image Processing Applicationsz.
[4]. Shikha singh, (2023). Review on handwriting examination on unusual surface. IP International Journal of Forensic Medicine and.
[5]. Chavan, P. V. (MAY 2023). | IRE Journals |. Handwriting Analysis Written on Paper Using Different.
[6]. Huber RA, Headrick AM .Writing identification: Facts and fundamentals. 2nd ed. New York: CRC Press; 1999. P .444.
[7]. McMahon. (2008). Handwriting analysis.
[8]. Levinson J. Questioned documents: A lawyer's handbook. 1st ed. San Diego; San Francisco, New York, London, Boston, Sydney, Tokyo: Academic Press; 2000. p. 250.
[9]. Tarannum, Afreen & Singh, Vinay & Sharma, Nidhi & Saran, Vaibhav. (2015). Suicide Notes on Unconventional Surface: A Trending Challenge.

[10]. Bhattacharya. (2022, June 17). Class characteristics
[11]. Bhattacharya. (2022, June 17). Individual characteristics
[12]. Singh, N. (2023). Review on handwriting examining on unusual surface.
[13]. Chavan, P. V. (MAY 2023). | IRE Journals |. Handwriting Analysis Written on Paper Using Different.
[14]. Tarannum, Afreen & Singh, Vinay & Sharma, Nidhi & Saran, Vaibhav. (2015). Suicide Notes on Unconventional Surface: A Trending Challenge.
[15]. Shekhawat, H., Ramani, A. V., & Shenoy, S. (2023). A review of handwriting characteristics analysis on various surfaces: Implications for forensic document examination.
[16]. Shenoy, S., Shekhawat, H., & Ramani, A. V. (2023). A review of handwriting characteristics analysis on various surfaces: Implications for forensic document examination. Journal of Forensic Research, 14(4), Article 557.
[17]. Swain, R., Bhardwaj, D. N., Millo, T., & Behera, C. (2016). A suicide note inked with mehndi (henna) on the skin.
[18]. Panday. (2023, December 12). A comparative analysis of handwriting variation in athletes.
[19]. Totty, R. N. (1981). A case of handwriting on an unusual surface. Journal of the Forensic Science Society, 21(4), 349–352.
[20]. Austin, A. E., & Byard, R. W. (2013). Skin messages in suicide – An unusual occurrence. Journal of Forensic and Legal Medicine, 20(6), 618–620.
[21]. Bhandari, D. (2024). Forensic examination of questioned document.
[22]. Krishna, K. (2013). Suicide note on the palm: Three case reports and discussion of medico-legal aspects.
[23]. Demirci, S., Dogan, K. H., Errol, Z., & Gunaydin, G. (2009). Unusual suicide note written on the body: Two case reports. The American Journal of Forensic Medicine and Pathology, 30(3), 276–279.
[24]. Tripathy, D. B., Khushboo, & Singh, V. (2020, October). Handwriting examination on unusual surfaces: A review.
[25]. Joshi MC, Garg RK. Examination of writing on an unusual surface in a suicide case: Dead persons do tell tales - conduct a forensic investigation for the cause of humanity and justice. Probl Forensic Sci. 2015;101:50–9