

A Comparative Study of Tamil Handwriting to Estimate the Age of An Individual by Analysing the Class Characteristics

Kipsiga

B.Sc. Forensic Science, Vinayaka Mission's Research foundation – DU _

ABSTRACT:

A branch of forensic science that works with questioned documents is handwriting analysis. In this study is to identify an individual's age using handwriting analysis, so the total number of 124 samples were collected from 62 (20-30 years) and 62 (30-40 years) Tamil handwriting samples in the age group of 20 to 40 both male and female (Indian) on A4 sheets without any impression marks on paper and everyone need to use a ball pen while writing. The age is separate ten years different for easy identification. All the samples are collected from Aarupadai Veedu Medical College and hospital, SAHS Campus, Kirumbapakkam, Pondicherry. To determine the age of an individual with the Class Characteristics include alignment, spacing, slant, line quality, pen pressure, movement, size, and speed. Samples are analysed and determined the Class Characteristic between the two different age group (20-30) and (30-40) with the help of a 10X Mini Three-Folding micrometre, hand holding 4x Pro illuminated magnifier, pencil, Scale and protractor. Class Characteristic are entered in the coding technique. Data are entered in percentage method. When it comes to determining the age of an individual, it would be beneficial for document examiners to move forward and take interest. By the end of this study, the age can be analysed to determined in Tamil Handwriting.

Keywords: Tamil handwriting, Questioned Documents, Class Characteristics.

1. INTRODUCTION:

Questioned document is a branch of Forensic Science that deals with origin and authenticity. Questioned document can be used as evidence in investigation. It involves handwriting analysis. Handwriting is also known as "Graphology". All the individual having a different writing patterns like letters, number, characters and symbols. Because handwriting is different, a person doesn't perfectly copy their individual handwriting. Handwriting will change in physical illness and their moods. Male and female are having different handwriting style and also age group may differ the handwriting.

1.1 Background of handwriting analysis:

- Camillo Baldi is the father of handwriting analysis. For more than four centuries, experts have been studying handwriting analysis. The first person that conducted systematic, useful handwriting examinations was Camillo Baldi in 1622. He authored "Treated How, By A Letter Missive, One Recognizes The Writer's Nature And Qualities," the first graphological article ever published.
- Jean Michon, a French minister, introduced the term "Graphology", wrote and published his deep research on handwriting analysis.

- Handwriting Analysis: To analyzes a person's writing style to identify people for investigation in the forensic field.

1.2 Handwriting analysis have two major characteristics:

- Class characteristics
- Individual characteristics

In this study, mainly in class Characteristics. The class characteristics common Characteristics of group handwriting such as alignment, spacing, slant, line quality, pen pressure, movement, size, and speed.

1.2.1 Alignment:

Alignment refers as words that are printed at the same angles as some letters, but in a straight line. It can be:

- Ascending
- Descending
- Vertical
- Irregular

1.2.2 Spacing:

The distance between words says the amount of division you need to maintain with others within you. Spacing can be:

- Equal
- Narrow
- Wide
- Normal
- Mix

1.2.3 Slant:

In handwriting based on Latin script, slant is the most common angle of the downward stroke. In addition to showing the copybook which is taught, the slant of an example of writing is a characteristic of various local handwriting changes.

- Right
- Left
- Vertical

1.2.4 Line Quality:

The most important part of handwriting analysis will be line quality. The line quality can be:

- Smooth
- Poor
- Desperate

1.2.5 Pen Pressure:

The weight or power that is unintentionally applied to the writing instrument. device when writing. The effects of applying different levels of force to the writing instrument as it moves across the paper show up in writing developed with a nib pen. The nib points separate as the hand and fingers use extra force. It can be:

- High
- Low
- Medium

1.2.6. Base line:

The imaginary phrase under handwriting words that may reveal characteristics of a person's behaviour and unconscious. It can be:

- On
- Above
- Below
- Mixed

1.2.7. Movement:

Writing method works in pair with the hand's movement on the written surface. It can be:

- Finger movement
- Wrist movement
- Forearm movement
- Whole movement

1.2.8. Size:

It is the examination of letter sizes. The conditions in which handwriting is written can affect its size. A letter's length and height are both considered aspects of relative size. It can be:

- Small
- Medium
- Large
- Mixed

1.2.9. Speed:

The amount of time it takes the writer to complete an essay of handwriting. The maximum number of words a person can write in a minute. It can be:

- Slow
- Medium
- Fast

2. Aim and Objectives:**2.1 Aim:**

To a comparative study of Tamil Handwriting to determine the age of an individual analysed by a Class Characteristics. These results can help detect problems in criminal and civil cases, resulting in more clear and fair decisions.

2.2 Objectives:

Identifying the letter characteristics of written documents using 10X Mini Three- Folding micrometre, hand holding 4x Pro illuminated magnifier, pencil, Scale and protractor. 3. 3. **3. Materials and Methodology:**

- In this study, total 124 samples were collected.
- From 20-40 years in two separate group of 62 (20-30) years and 62(30-40) years both Male and Female.
- Samples are collected on A-4 sheet in separate sheet without any impression mark.
- The life history of Jhansi of Rani was taken and its total 36 words.
- All the samples are manually examined.

- Class Characteristic are entered in the coding technique.
- A person well known in read and write tamil handwriting and healthy individual only.
- Exclusion Factors are below 20 years and more than 40 years and unknown tamil language are exclude.

3.1.Coding technique in handwriting analysis:

3.1.1 Alignment: The coding technique of Alignment is 4 styles

- Ascending-1
- Descending-2
- Vertical-3
- Irregular- 4

3.1.2.Spacing: The coding technique of Spacing is 5 styles

- Equal-1
- Narrow-2
- Wide-3
- Normal-4
- Mixed-5

3.1.3.Slant: The coding technique of Slant is 3 styles

- Right-1
- Left-2
- Vertical-3

3.1.4.Line quality: The coding technique of Line Quality is 3styles

- Smooth-1
- Poor-2
- Desperate-3

3.1.5.Pen pressure: The coding technique of Pen Pressure is 3 styles

- High-1
- Low-2
- Medium-3

3.1.6.Base: The coding technique of Base is 3styles

- On-1
- Above-2
- Below-3
- Mixed-4

3.1.7.Movement: The coding technique of Movement is 4 styles

- Finger movement-1
- Wrist movement-2
- Forearm movement-3
- Whole arm movement-4

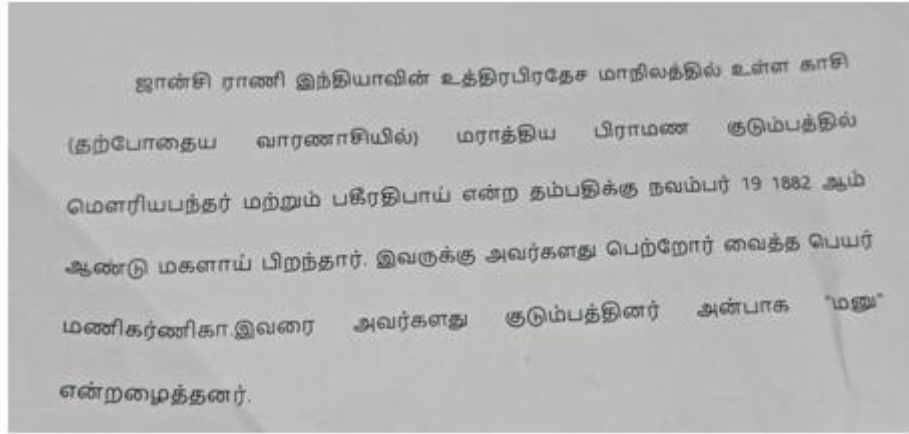
3.1.8.Size: The coding technique of Size is 4 styles

- Small-1
- Medium-2

- Large-3
- Mixed-4

3.1.9.Speed: The coding technique of speed is 3 styles

- Slow-1
- Medium-2
- Fast-3



Every participant is given a sample copy.

4.Ratio and proportion is given to all of the handwriting characteristics:

4.1. Age group 20-30:

- Alignment:40.3% is Ascending, 14.5% is descending, 12.9% is vertical and 32.3% is irregular in the age group of 20-30 years.
- Spacing: 3.2% is equal, 32.3% is Narrow, 32.25% is wide and 32.2% is Mixed in the age group of 20-30 years.
- Slant: 21% is right, 4.8% is left and 74.2% is vertical in the age group of 20-30 years.
- Line Quality: 17.7% is smooth, 6.5% is poor and 75.8% is desperate in the age group of 20 – 30 years
- Pen Pressure: 12.9% is high, 38.7% is low and 48.4% is Medium in the age group of 20-30 years
- Base line: 14.5% is on, 41.9% is above, 14.5% is below and 29% is Mixed in the age group of 20-30 years
- Movement: 100% in wrist movement in the age group of 20-30 years
- Size: 50% is small and 50% is medium in the age group of 20-30 years
- Speed: 37.1% is slow, 51.6% is medium and 11.3% is fast in the age group of 20-30 years

Table 1: Class Characteristics coding for the (20-30) years old age group:

Sample no.	Alignment	Spacing	Slant	Line quality	Pen Pressure	Base Line	Movement	Size	Speed
Sample 1	2	3	1	3	3	3	2	2	3
Sample 2	4	3	3	3	3	4	2	2	3

Sample 3	4	2	3	1	3	4	2	2	2
Sample 4	1	5	1	3	2	2	2	1	2
Sample 5	1	2	2	3	1	2	2	2	1
Sample 6	4	3	3	3	3	4	2	1	2
Sample 7	2	3	3	3	3	3	2	2	2
Sample 8	1	2	3	3	3	2	2	2	2
Sample 9	2	2	1	3	1	3	2	2	1
Sample10	4	3	3	3	3	4	2	1	1
Sample11	3	2	3	3	2	1	2	1	2
Sample12	3	5	1	3	2	1	2	1	2
Sample13	1	3	3	3	2	2	2	2	2
Sample14	1	5	3	2	3	2	2	2	3
Sample15	2	2	1	3	2	3	2	1	2
Sample16	1	1	2	3	2	2	2	2	3
Sample17	2	1	2	3	2	3	2	1	2
Sample18	1	3	3	2	3	2	2	1	2
Sample19	1	5	3	3	2	2	2	1	2
Sample20	3	2	3	3	2	1	2	1	1
Sample21	1	5	3	3	2	2	2	1	2
Sample22	1	3	3	3	2	2	2	2	1
Sample23	1	3	3	3	3	2	2	2	2
Sample24	4	3	3	3	2	4	2	2	2
Sample25	1	5	3	3	3	2	2	1	2
Sample26	4	3	3	2	2	4	2	2	3
Sample27	1	3	1	3	2	2	2	2	3
Sample28	1	2	3	1	2	2	2	1	1
Sample29	1	3	3	3	2	2	2	1	2
Sample30	1	2	3	3	3	2	2	1	1
Sample31	2	5	3	3	3	3	2	2	2
Sample32	4	2	3	3	3	1	2	2	2
Sample33	1	5	3	1	2	2	2	1	1
Sample34	2	3	1	3	2	3	2	2	2
Sample35	4	3	3	3	3	4	2	2	1
Sample36	4	5	3	3	3	4	2	1	2
Sample37	1	5	1	1	3	2	2	1	1

Sample38	1	2	3	3	3	2	2	1	1
Sample39	1	2	3	3	3	2	2	2	1
Sample40	1	2	3	1	2	2	2	1	1
Sample41	4	5	1	3	2	4	2	2	3
Sample42	1	2	3	1	2	2	2	1	2
Sample43	4	5	1	3	3	2	2	2	2
Sample44	4	5	3	3	3	4	2	1	2
Sample45	2	3	3	3	3	3	2	2	1
Sample46	4	3	3	3	3	4	2	1	1
Sample47	4	5	3	3	3	4	2	1	1
Sample48	4	5	3	3	1	4	2	2	2
Sample49	1	2	3	1	3	2	2	2	1
Sample50	3	2	3	3	3	1	2	1	2
Sample51	3	5	3	1	2	1	2	2	1
Sample52	4	2	3	1	2	4	2	1	1
Sample53	3	5	3	3	3	1	2	1	1
Sample54	2	2	3	3	3	3	2	2	2
Sample55	4	3	3	2	1	4	2	1	2
Sample56	4	2	3	3	1	4	2	1	1
Sample57	3	5	1	3	1	1	2	1	2
Sample58	1	3	1	3	3	2	2	2	1
Sample59	4	3	3	3	1	4	2	2	2
Sample60	4	5	3	1	2	4	2	2	1
Sample61	1	2	3	1	3	2	2	1	2
Sample62	3	5	1	3	1	1	2	1	2

4.2.Age group of 30-40 years:

- Alignment: 30.6% is Ascending, 16.1% is descending, 9.7% is vertical and 43.5% isirregular in the age group of 30-40 years.
- Spacing: 46.8% is Narrow, 11.3% is wide and 41.9% is Mixed in the age group of 30-40 years.
- Slant: 19.4% is right, 24.2% is left and 56.5% is vertical in the age group of 30-40 years.
- Line Quality: 12.9% is smooth, 6.5% is poor and 80.6% is desperate in the age group of 30-40 years
- Pen Pressure: 33.9% is high, 21% is low and 45.2% is Medium in the age group of 30-40 years
- Base line: 9.7% is on, 33.9% is above, 16.1% is below and 40.3% is Mixed in the age group of 30-40 years
- Movement: 100% in wrist movement in the age group of 30-40 years
- Size: 40.3% is small and 59.7% is medium in the age group of 30-40 years

- Speed: 37.1% is slow, 45.2% is medium and 17.7% is fast in the age group of 20-30 years.

Table 2: Class Characteristics coding for the (30-40) years old age group:

Sample no.	Alignment	Spacing	Slant	Line Quality	Pen Pressure	Base Line	Movement	Size	Speed
Sample1	3	2	3	3	3	1	2	2	1
Sample2	3	5	3	3	3	1	2	1	1
Sample3	4	5	3	3	1	4	2	1	3
Sample4	1	2	3	3	1	2	2	1	2
Sample5	1	2	3	1	1	2	2	2	1
Sample6	4	5	2	3	1	4	2	1	3
Sample7	2	2	2	3	1	3	2	2	3
Sample8	4	2	3	3	3	4	2	2	3
Sample9	2	2	3	3	3	3	2	1	2
Sample10	4	5	3	3	3	4	2	2	2
Sample11	1	5	3	3	2	2	2	2	3
Sample12	4	3	1	3	3	4	2	2	2
Sample13	4	3	2	2	3	4	2	2	2
Sample14	2	5	2	3	1	3	2	1	2
Sample15	2	5	1	3	3	3	2	2	1
Sample16	1	5	1	3	2	2	2	1	2
Sample17	4	5	3	3	3	4	2	1	3
Sample18	4	5	2	3	1	4	2	2	3
Sample19	1	2	1	3	1	2	2	2	2
Sample20	4	2	3	3	3	4	2	1	2
Sample21	1	5	2	3	1	2	2	1	2
Sample22	1	2	2	3	1	2	2	2	2
Sample23	1	5	1	3	3	2	2	2	3
Sample24	2	5	2	3	3	3	2	2	3
Sample25	2	5	2	3	3	3	2	2	2
Sample26	4	5	3	3	1	4	2	1	2
Sample27	4	2	2	2	2	4	2	2	2
Sample28	4	2	1	3	2	4	2	2	1
Sample29	1	5	3	3	1	2	2	1	1
Sample30	1	2	2	2	2	2	2	1	2
Sample31	3	3	3	2	3	1	2	1	1
Sample32	4	5	3	3	2	4	2	1	2
Sample33	1	2	3	1	3	2	2	1	1
Sample34	1	5	2	3	3	2	2	2	1
Sample35	1	5	2	3	3	2	2	2	1
Sample36	3	2	1	1	3	1	2	2	1
Sample37	1	2	3	3	1	2	2	2	2

Sample38	2	5	3	1	3	3	2	2	2
Sample39	3	2	1	3	2	1	2	2	1
Sample40	2	5	3	3	1	3	2	2	2
Sample41	4	3	3	1	2	4	2	1	1
Sample42	1	2	3	3	2	2	2	1	1
Sample43	3	5	3	3	3	1	2	2	1
Sample44	4	2	3	1	2	4	2	1	1
Sample45	1	2	3	1	2	2	2	1	1
Sample46	4	5	3	3	2	4	2	2	1
Sample47	4	2	3	3	3	4	2	1	2
Sample48	4	2	3	3	3	4	2	1	2
Sample49	4	3	1	3	3	2	2	2	2
Sample50	4	3	3	3	3	4	2	2	2
Sample51	4	2	3	3	1	3	2	2	2
Sample52	4	5	2	3	3	4	2	1	2
Sample53	4	2	1	3	3	4	2	2	2
Sample54	2	2	1	3	1	3	2	2	1
Sample55	2	3	3	3	1	2	2	2	3
Sample56	4	2	3	3	3	4	2	2	2
Sample57	1	2	2	3	1	2	2	1	1
Sample58	4	2	1	3	3	4	2	2	2
Sample59	1	2	3	3	1	2	2	2	3
Sample60	1	2	3	1	1	2	2	1	1
Sample61	4	5	3	3	2	4	2	2	1
Sample62	4	5	3	3	1	4	2	2	1

5. Discussion:

5.1. For group (20-30) years:

According to the results, 40.3% of all samples show ascending alignment, indicating both a balanced mental state and proper control over hand muscle movement. People are intensely focused on achieving their individual objectives. The fact that 32.3% of them showed even spacing suggests that they are mentally balanced and have high control of their bodies. When it comes to slant, 74.2% of the 62 samples in total had a vertical slant, which indicates that they are highly knowledgeable, focused, and self-assured. Line quality of this age group is Smooth and Desperate. 100% wrist movement also indicates their level of focus and motivation to succeed. One major characteristic of this group is speed, which stands at medium speed, indicating that they are quickly developing their unique traits while avoiding their class traits. Since individual traits a majority over class traits in this age group, the identification value is strong. All ratios are shown in Table 1.

5.2. For group (30-40) years:

Individuals have skills and work belong to the majority of this group's population. According to the statistics, 43.5% of them had irregular alignment, which indicates that they are seasoned and committed to their task. Their openness to new concepts demonstrates their capacity for learning. Given that 46.8%

of them had narrow spacing, this suggests that they are extremely busy, overworked, and time-constrained. Slant proportion, which is 56.5% of vertical slant, supports this fact and once more indicates a balanced mental state and strong control over muscle activity. Slant ratio makes it clearly shown that they won't be in the mood for anything in comparison to previous age groups. This age group's 100% wrist movement and 45.2% Medium speed indicate their knowledge, attention, and elevated amount of confidence. They act with a great deal of confidence. All ratios are shown in table 2.

6. Conclusion:

It is simple to determine the writer's determined age from the handwriting samples by examining that information. It has been established that certain features, such as Alignment, Spacing, Slant, Line quality, Pen pressure, Base line, movement, size and speed are extremely useful and valuable for determining age. These handwriting traits indicated a strong relationship with the author's age; hence, they can be used as supporting evidence in a contested document and are useful for identifying an individual.

7. REFERENCES:

1. Sushma Upadhyay, J. S. (April 2017). Estimation of age through handwriting characteristics in female writers. *Indian Journal of Science and Technology*, 8.
2. Sushma Upadhyay, J. S. (July 2017). Determination of sex through handwriting characteristics. *IJCRR*, 8.
3. Lamis Nader, Arafa Mohamed, Muhammad Nazir, Mohamed Awadalla. (October 2018). Identification of Writer's Gender using Handwriting Analysis. *IJSRP*, 8.
4. Shruti Gupta, Parveen Kumar, BK Sharma, VC Misra. (September 2015). Age Determination of male writers through certain handwriting characteristics. *IJMRD*, 2.
5. Fahimeh Alaei, Alireza Alaei. (September 2023). Review of age and gender detection methods based on handwriting analysis. *NCA SA*
6. Santhya M. A Comparative Study of Tamil Handwriting to determine the Sex of an Individual by analyzing the Class Characteristics.
7. AL-Qawasmeh Najla, Muna Khayyat, Ching Y Suen. (March 2023). Age detection from handwriting using different feature classification models. *ScienceDirect*, 167.