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Dr. Shruti Gupta

Assistant Professor, Amity
Institute of Forensic Science,
Amity University, Noida.

Parveen Kumar

Senior Research Fellow,
Department of Forensic
Science, Punjabi University,
Patiala.

BK Sharma

Assistant Professor, Amity
Institute of Forensic Science,
Amity University, Noida.

VC Misra

Assistant Professor, Amity
Institute of Forensic Science,
Amity University, Noida.

Correspondence

Dr. Shruti Gupta

Assistant Professor, Amity
Institute of Forensic Science,
Amity University, Noida.

Age determination of male writers through certain handwriting characteristics

Shruti Gupta, Parveen Kumar, BK Sharma, VC Misra

Abstract

The handwriting of all persons changes progressively and steadily with the passage of time. The extent of the change will depend on a number of factors: the amount of writing experience, the state of the physical and mental health of the writer, and the growing age of an individual. In the present study a total of 90 handwriting samples from 6 different age groups ranging from 10 to 50 years above were collected from males (Indian). The subjects were asked to write London letter on Blank A-4 sheet. The handwriting samples were analyzed to extract out the specific class and individual characteristics selected for the study. A coding has been formulated for class characteristics for the research for simplification and conveying results. Handwriting samples have been coded for class characteristics. Subsequently, percentage proportions of the class characteristics have been calculated. For each class characteristic category coding has been performed and results in the form of percentage have been calculated. The result individually for each age group has been discussed. The class characteristics such as slant, alignment, speed, spacing and tremors has varied in percentage for different age groups by making a fine demarcation between the age groups. Not conclusively with full surety but probable assessment can be done of age from the findings of this research. By considering the findings of present study one can form a rough idea regarding the age of writer (male) so as to proceed and take initiative in a case. This research work can also be used as to escape out the innocent with the help of other corroborative evidences.

Keywords: Handwriting, class characteristics, London letter, alignment, corroborative evidence.

Introduction

The handwriting of an individual is considered as the written speech which is particular and specific to an individual. It is an acquired skill and a complex perceptual motor task, sometimes referred to as a neuromuscular task. Each individual has its own peculiarity in Handwriting formation, such characteristics are: type of movement, line quality, speed and skill, rhythm, spacing between letters, word and line, slant, alignment, connecting strokes, size and proportions of letters, pen pressure, pen hold, pen position and pen shading and coordination of writing muscles.

Handwriting is a continuous or flowing task, not one of discrete or separated actions. The writing of all persons changes progressively and steadily with the passage of time during their life. The extent of the change will depend on a number of factors: the amount of writing done within the particular time lapse and during life time, the state of the health of the writer (whether suffering from any disease that can affect the neuromuscular coordination or intoxication of alcohol or any drug), and the particular stage in the life of the individual. The extent of change in signature may differ from that in extended writings of the same individual. For these reasons, writing standards obtained for comparison purposes must be as comparable and contemporaneous as possible.

It is a fact that the handwriting is controlled by the muscular movement of the hand which in turn is controlled by neuromuscular coordination of the brain. Therefore, in this way handwriting is controlled by the brain and its power of muscular co-ordination. On the basis of this fact, it is clear that the two extremes of life i.e., the childhood and old age of an individual, will show different handwriting pattern according to the fluency of their muscular movement correlated with brain. Therefore, the features of the handwriting which are not permanent in support to the age, counters more value in the detection of age of the writer.

Material and Methods

In the present study the male subjects were considered for sample collection. Sample of handwriting is taken on A-4 sheet London Letter. Total 90 samples were collected from six different age groups as:- 10 to 15 years, 15 to 20 years, 20 to 30 years, 30 to 40 years, 40 to 50 years and 50 above.

Exclusive factors in this study were: Females were excluded to avoid the differences brought due to the gender, none of the illiterate population was included in the study, and people suffering from any type of neurotic disease were excluded. Extraction of characteristics has been conducted and comparison is made. Then features were coded and their proportions are estimated and mentioned in tabulation form.

A coding was done find out the ratio and proportion is given to each of the handwriting characteristics as follows:-

1. **Slant:** For slant coding was - Forward – 1, Backward – 2, Vertical – 3 and Irregular – 4.
2. **Alignment:** For alignment coding was - Ascending – 1, Descending – 2, Straight – 3 and Arched – 4.
3. **Line Quality:** For line quality coding was - Less smooth & perfect – 1, Smooth & perfect – 2 and More smooth & perfect – 3.
4. **Movement:** For movement coding was - Finger cum wrist movement – 1, Wrist movement – 2 and Wrist cum forearm movement – 3.
5. **Spacing between The Words:** For spacing coding was - Narrow – 1, Even – 2, Wider – 3 and Inconsistent – 4.
6. **Speed:** For speed coding was - Slow – 1, Medium – 2 and Fast – 3.
7. **Skill:** For skill coding was - Poor – 1, Medium – 2 and Superior – 3.

8. **Size & Proportion Of The Letters:** For size & proportion coding was - Block letter small & small letter comparatively half of it – 1:2, Block letter small & small letter comparatively less than half of it – 1:1, Block letter small & small letter comparatively more than half of it – 1:3, Block letter normal & small letter comparatively half of it – 2:2, Block letter normal & small letter comparatively less than half of it – 2:1, Block letter normal & small letter comparatively more than half of it – 2:3, Block letter big & small letter comparatively half of it – 3:2, Block letter big & small letter comparatively less than half of it – 3:1 and Block letter big & small letter comparatively more than half of it – 3:3.
9. **Connection & Strokes between The Letters:** For connection & strokes between the letters coding was - Arched – 1, Garlanded – 2 and Angular – 3.
10. **Hesitation Marks:** For hesitation marks coding was - Absent – 1 and Present – 2.
11. **Margin:** For margins coding was - Irregular – 1 and Even – 2.

Results

According to the class and individual characteristics features extraction and analysis, the results for coding for each age group has been drawn in the form of tables. One of the table of age group 20-30 years has been shown in Table 1 as an exemplar as the similar methodology and format for table of coding has been adopted for rest of the age groups.

Table 1: Showing the coding for the class characteristics for age group 20-30 years.

| Class Characteristcs Samples | Slant | Alignment | Line Quality | Movement | Spacing Between Words | Speed | Skill | Size & Proportion | Connection & Strokes Btw Letters | Tremor Marks | Margin |
|------------------------------|-------|-----------|--------------|----------|-----------------------|-------|-------|-------------------|----------------------------------|--------------|--------|
| Sample 1 | 1 | 3 | 2 | 3 | 2 | 3 | 2 | 1.5 | 2 | 1 | 2 |
| Sample 2 | 1 | 3 | 2 | 3 | 2 | 3 | 2 | 0.5 | 1 | 1 | 1 |
| Sample 3 | 1 | 3 | 2 | 3 | 2 | 3 | 2 | 1.5 | 2 | 1 | 1 |
| Sample 4 | 1 | 3 | 2 | 3 | 2 | 3 | 2 | 1.5 | 1 | 1 | 1 |
| Sample 5 | 3 | 3 | 2 | 3 | 2 | 3 | 2 | 3 | 1 | 1 | 1 |
| Sample 6 | 1 | 3 | 2 | 3 | 2 | 3 | 3 | 3 | 1 | 1 | 1 |
| Sample 7 | 1 | 3 | 2 | 3 | 2 | 3 | 3 | 1 | 1 | 1 | 1 |
| Sample 8 | 3 | 3 | 2 | 3 | 2 | 3 | 3 | 1 | 3 | 1 | 1 |
| Sample 9 | 3 | 3 | 2 | 3 | 2 | 3 | 2 | 1 | 1 | 1 | 1 |
| Sample 10 | 1 | 2 | 2 | 3 | 1 | 3 | 2 | 1.5 | 1 | 1 | 1 |
| Sample 11 | 1 | 3 | 2 | 3 | 2 | 3 | 2 | 1.5 | 1 | 1 | 1 |
| Sample 12 | 1 | 1 | 2 | 3 | 2 | 3 | 2 | 1.5 | 3 | 1 | 1 |
| Sample 13 | 1 | 3 | 2 | 3 | 1 | 3 | 2 | 0.5 | 1 | 1 | 2 |
| Sample 14 | 1 | 3 | 2 | 3 | 2 | 3 | 3 | 1.5 | 2 | 1 | 1 |
| Sample 15 | 3 | 3 | 2 | 3 | 1 | 3 | 2 | 1 | 1 | 1 | 1 |

Observations: On the basis of the coding for each category of handwriting characteristic the following observations in terms of percentage has been made for different age groups –

A) Age Group 10-15:

- 1) **Slant:** Out of total 15 samples 93.33% were having vertical slant where as only 6.66% were having forward slant.
- 2) **Alignment:** Out of total 15 samples 53.33% were having straight alignment where as only 46.66% were having descending alignment.
- 3) **Line Quality:** All 15 samples were having 100% smooth & perfect line quality.
- 4) **Movement:** Out of total 15 samples 80% were having wrist movement where as only 20% were having finger cum wrist movement

- 5) **Spacing Between The Words:** Out of total 15 samples 43.33% were having even & 33.33% were having narrow movement where as only 6.66% were having wider.
- 6) **Speed:** Out of total 15 samples 73.33% were having medium speed where as only 6.66% were having fast speed.
- 7) **Skill:** All 15 samples were 100% having medium skill.
- 8) **Size & Proportion Between The Letters:** Out of total 15 samples 40% were having block small & small comparatively less than half of it, 26.66% were having block small & small comparatively half of it where as only 13.33% were having block small & small comparatively more than half of it.
- 9) **Connection & Strokes between The Letters:** Out of total 15 samples 53.33% were having arched where as only 20% were having garlanded.

- 10) **Tremor:** All 15 samples were having 100% tremor absent.
- 11) **Margin:** Out of total 15 samples 80% were having irregular margins and only 20% were having the even margins.

B) Age Range 15-20:

- 1) **Slant:** Out of total 15 samples 60% were having vertical slant & 33.33% were having forward slant, where as only 6.66% were having backward.
- 2) **Alignment:** Out of total 15 samples 80% were having straight alignment, where as only 6.66% were having ascending alignment.
- 3) **Line Quality:** Out of total 15 samples 93.33% were having smooth & perfect line quality, where as only 6.66% were having less smooth & perfect.
- 4) **Movement:** Out of total 15 samples 53.33% were having wrist cum forearm movement, where as only 46.66% were having wrist movement.
- 5) **Spacing Between The Words:** Out of total 15 samples 46.66% were having even & 33.33% are having narrow movement, where as only 20% were having wider.
- 6) **Speed:** Out of total 15 samples 53.33% were having medium speed, where as only 46.66% were having fast speed.
- 7) **Skill:** Put of total 15 samples 86% were having medium skill, where as only 13.33% were having superior skill.
- 8) **Size & Proportion between The Letters:** Out of total 15 samples 53.33% were having block small & small comparatively less than half of it, where as only 6.66% were having block normal & small comparatively more than half of it.
- 9) **Connection & Strokes between The Letters:** Out of total 15 samples 53.33% were having garlanded, 33.33% were having arched, where as only 13.33% were having angular.
- 10) **Tremor:** All 15 samples were having 100% tremor absent.
- 11) **Margin:** Out of total 15 samples 80% were having irregular margins, where as only 20% were having even.

C) Age Group 20-30

- 1) **Slant:** Out of total 15 samples 73.33% were having forward slant, where as only 26.66% were having vertical slant.
- 2) **Alignment:** Out of total 15 samples 86.66% were having straight alignment, where as only 6.66% were having ascending & descending alignment.
- 3) **Line Quality:** All 15 samples were having 100% smooth & perfect line quality.
- 4) **Movement:** All 15 samples were having 100% wrist cum forearm movement.
- 5) **Spacing between The Words:** Out of total 15 samples 80% were having even, where as only 20% were having narrow.
- 6) **Speed:** All 15 samples were having 100% fast speed.
- 7) **Skill:** Put of total 15 samples 73.33% were having medium skill, where as only 26.66% were having superior skill.
- 8) **Size & Proportion between The Letters:** Out of total 15 samples 46.66% were having block big & small comparatively half of it, where as only 13.33% were having block small & small comparatively half of it and block big & small comparatively less than half of it.

- 9) **Connection & Strokes between The Letters:** Out of total 15 samples 66.66% were having arched, where as only 13.33% were having angular.

- 10) **Tremor:** All 15 samples were having 100% tremor absent.

- 11) **Margin:** Out of total 15 samples 86.66% were having irregular margins, where as only 13.33% were having even.

D) Age Group 30-40:-

- 1) **Slant:** Out of total 15 samples 66.66% were having vertical slant, where as only 6.66% were having backward slant.
- 2) **Alignment:** Out of total 15 samples 66.66% were having straight alignment, where as only 6.66% were having descending alignment.
- 3) **Line Quality:** Out of total 15 samples 93.33% were having smooth & perfect line quality, where as only 6.66% were having less smooth & perfect line quality
- 4) **Movement:** All 15 samples were having 100% wrist cum forearm movement.
- 5) **Spacing Between The Words:** Out of total 15 samples 60% were having narrow, where as only 6.66% were having inconsistent spacing.
- 6) **Speed:** All 15 samples were having 100% fast speed.
- 7) **Skill:** Put of total 15 samples 73.33% were having superior skill, where as only 26.66% were having medium.
- 8) **Size & Proportion between The Letters:** Out of total 15 samples 33.33% were having block small & small comparatively half of it, 33.33% were having block big & small comparatively half of it, where as only 6.66% were having block normal & small comparatively more than half of it and block normal & small comparatively less than half of it.
- 9) **Connection & Strokes between The Letters:** Out of total 15 samples 46.66% were having arched, where as only 26.66% were having garlanded & angular.
- 10) **Tremor:** All 15 samples were having 100% tremor absent.
- 11) **Margin:** Out of total 15 samples 93.33% were having irregular margins, where as only 6.66% were even margins.

E) Age Group 40-50:-

- 1) **Slant:** Out of total 15 samples 60% were having vertical slant & 33.33% were having forward slant, where as only 6.66% were having backward slant.
- 2) **Alignment:** Out of total 15 samples 73.33% were having straight alignment, where as only 6.66% were having ascending alignment.
- 3) **Line Quality:** All 15 samples were having 100% smooth & perfect line quality.
- 4) **Movement:** All 15 samples were having 100% wrist cum forearm movement.
- 5) **Spacing Between The Words:** Out of total 15 samples 46.66% were having narrow & 46.66% were having inconsistent movement, where as only 6.66% were having even.
- 6) **Speed:** All 15 samples were having 100% fast speed.
- 7) **Skill:** Put of total 15 samples 53.33% were having medium skill, where as only 46.66% were having superior skill.
- 8) **Size & Proportion between The Letters:** Out of total 15 samples 33.33% were having block small & small

comparatively less than half of it, 26.66% were having block big, small comparatively half of it, where as only 6.66% were having block normal & small less than half of it.

- 9) **Connection & Strokes between The Letters:** Out of total 15 samples 86.66% were having arched, where as only 6.66% were having garlanded & angular.
- 10) **Tremor:** Out of total 15 samples 53.33% were having tremor present, where as only 46.66% were having tremor absent.
- 11) **Margin:** Out of total 15 samples 86.66% were having irregular, where as only 13.33% were having even margins.

F) Age Group above 50

- 1) **Slant:** Out of total 15 samples 46.66% were having vertical slant & 40% were having forward slant, where as only 13.33% were having backward slant.
- 2) **Alignment:** Out of total 15 samples 53.33% were having ascending alignment, where as only 46.66% were having straight alignment.
- 3) **Line Quality:** Out of total 15 samples 100% were having smooth & perfect line quality.
- 4) **Movement:** Out of total 15 samples 93.33% were having wrist cum forearm movement, where as only 6.66% were having wrist movement.
- 5) **Spacing Between The Words:** Out of total 15 samples 53.33% were having wider, where as only 46.66% were having even movement.
- 6) **Speed:** Out of total 15 samples 93.33% were having fast speed, where as only 6.66% were having medium speed.
- 7) **Skill:** Out of total 15 samples 53.33% were having superior skill, where as only 46.66% were having medium skill.
- 8) **Size & Proportion Between The Letters:** Out of total 15 samples 46.66% were having block small & small comparatively half of it, 33.33% were having block small, small comparatively less than half of it, where as only 6.66% were having block big & small half of it.
- 9) **Connection & Strokes Between The Letters:** Out of total 15 samples 73.33% were having arched, where as only 13.33% were having garlanded & angular movement.
- 10) **Tremor:** Out of total 15 samples 73.33% were having tremor absent, where as only 26.66% were having tremor present.
- 11) **Margin:** Out of total 15 samples 93.33% were having irregular margins, where as only 6.66% were having even margins.

On the basis of the observations made and analysis done for different age groups, keeping in the mind the different parameters taken for the study, following results are obtained

A) For Age Group 10-15 Years: The majority of population falls in this group are children studying in 5th – 8th standards. Here in this group the noticeable thing is the slant that is 93.33% have vertical slant which shows that they are having learning state of mind, usually following the copy – book pattern of writing. They are more concern to write in good handwriting rather than writing speedily. This is very strongly proofed by speed which is 73.33% of medium speed, which again support the learning state of mind.

As important feature in this group is alignment which is having two proportions more or less equal i.e. 53.33% of straight alignment and 46.66% of descending alignment

reflects poor control over muscular movement of hand and unfocussed mind. In their handwriting class characteristics are dominant over individual characteristics. Clearly denotes that individuality in writing is very less.

Movements out of 15 samples 80% have wrist movement, again shows less muscular coordination and learning mental status.

B) For Age Group 15-20 Years: The majority of population falls in this group are youths studying in 9th – 12th standards. Here in this group the noticeable thing is the alignment. As the result shows that 80% of the total sample have straight alignment which shows a good control over the muscular movement of the hand and a focused mind. If we come to the speed than we will able to find that 53.33% possess the medium speed where as only 46.66% possess the fast speed which shows that the youths are still in learning position they are about to acquire their individual characteristics.

As an important feature in this age group is the “skill” which shows that out of total 15 samples only 13.33% have the superior writing skill that is again the learning state of mind is reflected.

Connecting strokes which changes during various stages of life, here in this group majority of the people possess garlanded strokes which shows that the person is about to acquire the individual characteristics and to leave the old copy – book pattern as only 13.33% are having angular strokes.

C) For Age Group 20-30 Years: The majority of population falls in this group are of young adults, who were very much focused on their work. As the result shows that 86.66% of the total samples have straight alignment which shows a good control over the muscular movement of the hand & a balance in the mind set up. Individuals are very much focused to their respective goals. If we come to the slant out of total 15 samples 73.33% have forward slant shows that they are very much focused, very confident and knowledgeable. As 80% were having even spacing indicates again balanced state of mind and good muscular coordination.

An important feature in this group is speed which is 100% fast speed, reflects that they are speedily acquiring their individual characteristics and avoiding their class characteristics. As 100% wrist cum forearm movement also denotes their focused mind and eagerness to achieve their goals. In this age group identification value is high, as individual characteristics are predominant over class characteristics.

D) For Age Group 30-40 Years: The majority of population falls in this group are individuals who are working and are experienced. As the results shows 66.66% were having straight alignment reflects as they are experienced and dedicated to their work. They welcome new ideas shows their learning behavior. This fact is supported by slant proportion which is 66.66% of vertical slant, again shows a balanced state of mind and a good control over muscular movement. They are not in hurry for anything as compared to earlier age group this is very much clear from slant ratio. As 60% were having narrow spacing that indicates that they are very busy, over burdened due to work, has lack of time.

This age group possess 100% wrist cum forearm movement as well as 100% fast speed denotes their focused mind, good confidence level and they are experienced. Out of total 15 samples 73.33% were having superior skill reflects that they possess vast knowledge of every field as well as they are experienced. They are very much confident about their actions.

E) For Age Group 40-50 Years: The majority of population falls in this group have very much similarity with the previous group, in terms of slant which is 60% vertical slant and alignment which is 73.33% straight alignment this is more or less similar, reflects focused mind and good control over muscular coordination.

Considering movement, 100% of the population of the collected samples were having wrist cum forearm movement as well as in speed all 100% were having fast speed shows that they are focused, contains good confidence level and they are experienced. As 46.66% were having narrow spacing that indicates that they are very busy, over burdened due to work, has lack of time. As well as 46.66% were having inconsistent spacing this indicates that they are not very much over burdened but yet they are not focused due to other priorities in personal life as compared to professional life.

The only different and important feature of this age group than previous one is skill in which 53.33% have medium skill shows that a little deterioration is taking place in handwriting due to growing age, by which it is becoming worse in upcoming period of time due to the reduction in motor skills. This fact is very much supported by hesitation marks which is 53.33% present shows the effect of age on handwriting.

F) For Age Group 50 and Above: In this age group individuals are highly experienced, qualified and confidence level is high. In this age group handwriting is very much affected by growing age as in due course of time more erratic and tremorlar strokes were developed. Deterioration in handwriting can be seen clearly. As 53.33% were having wider spacing which indicates that they take work in a limited amount but when comes under work load they are unable to handle it, they need breaks between long duration work.

In case of slant 46.66% were having vertical slant shows a reduction in number comparatively. Speed is also reduced from previous group that is 93.33% of fast speed. In case of skill it is combination of 53.33% of superior skill as well as 46.66% of medium skill. These all contributes in tremor in handwriting and less control over muscular movement, very much reduction in motor skills, as mind is not focused makes difficult to gain concentration because of this their thoughts get disturbed very easily. In this age group most important feature are hesitation marks, which are 73.33% present, again contributes in above findings. People under this age group are old ones and their handwriting is very much affected by their growing age results in tremorlar handwriting.

Conclusion

On the cumulative effect of above study and findings an advantage can be taken to estimate the approximate age of the writer from the handwriting sample available. Certain characteristics as found really valuable during study such as slant, alignment, spacing, tremor and speed showed a significant correlation with the age of the writer, therefore can be considered as a corroborative evidence and point of inclusion to identify an individual.

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