

DOES HANDWRITING REVEAL SCHOLASTIC ABILITY?

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Abstract

Writing is a complex process since it involves cognitive, perceptive and motor interaction. This study discovered the relationship of the fractal dimensions of the selected 15 students' handwriting styles and their scholastic ability based on the OLSAT examination result. These students are made to write a sample sentence which is scanned using Canon Cano Scan Flatbed Scanner. Results reveal that there is a significant correlation on the students' handwriting styles and their scholastic ability. Result indicates further that the higher is students' entrance exam score, the higher also is the fractal dimension of their handwriting. Likewise, the lower is their test score, the lower is the fractal dimension of their handwriting.

Keywords: *intelligence quotient, handwriting, fractal dimension, correlation*

1.0 Introduction

Each writer has his own particular handwriting characteristics that reflect one's manner and style. It is associated with conscious and unconscious pattern that lead to a series of spontaneous movement. However, it is the brain that is responsible for guiding the hand. Whatever written in the paper is the result of brain and muscle reflexes of the hand (Brossard et al., 2008). This study deals with a fractal analysis of students' handwriting technique in relation to their scholastic ability.

Fractal dimension, as defined by Mandelbrot (1975), is a number that measures the degree of irregularity of fragmentation of a set or the measure of the complexity of the studied set. The application of fractal geometry applied to handwriting provides images a qualitative and quantitative description of North American from French, Arabic or Asiatic signatures, adaptation of the authentication process as an approach on the study of fractal behavior (Vincent, 1995). A fractal construction based on the study of Seropian & Vincent (2003) considered invariant elements on geometrical (loops, straight

vertical lines, etc.) and topological (crossing points, extreme points). On the other hand, Bounds (2010) stated that hands have a unique relationship with the brain because it requires executing sequential strokes to form a letter; thus, point a picture of the person behind the pen. The writing images itself have fractal behavior considering its invariant patterns. These invariant elements are features among writers despite the similarity patterns. Handwriting is a similar technique used in the work of graphology, a science that tells the characteristics of a person.

While there are existing studies conducted investigating the relationship of the brain and handwriting characteristics, no study yet explores the concept of fractal that embodies the key features of self-organization, self-similarity and dynamism. The use of handwriting in a fractal dimension is authentic method to detect students' level of scholastic ability.

The handwriting style would help the doctor to study the mental ability of their patients. It is also an easy reference on the intellectual pattern of a person (Brossard et

al., 2008). This study may be used by the teachers in scaling the IQ level of their students and in classifying them into homogeneous groupings.

2.0 Research Methodology

This paper used correlation method of research applying the concept of fractal analysis to determine the relationship of handwriting to the level of scholastic ability. In order to attain the objective, the researcher identified 15 freshmen college students who took up entrance test using OTIS-LENNON Scholastic Test Instrument. The results of the test were computed and categorized into below average, average and above average. The researcher considered five (5) samples who obtained above average, five (5) samples for average and five (5) below average classifications. The selected

students were made to write a sample sentence and their handwriting samples were scanned using Canon Cano Scan *Flatbed Scanner*. The scanned handwritings were fed in the frackout software to generate their fractal dimensions. The index of relationship between the scholastic ability and the handwriting fractal dimension was established through Pearson Product Coefficient of Correlation.

Figure 1 shows that handwriting has wavy or curly lines that cannot be considered as mere line that contains one (1) dimension. Thereby, the space occupied is two (2) dimensions. Padua, et. al (2013) identified the following writing features: form, angles, proportion, line quality, retracing, connections, size, slant, spacing, strokes and others as features of roughness and ruggedness of handwriting.

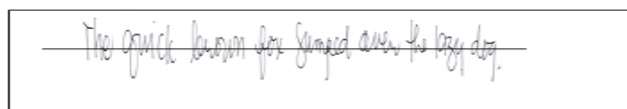


Figure 1. Sample of fractal handwriting in a plane

3.0 Results and Discussions

Respondents who were made to write a sentence have different handwriting styles (figure 2). It may be characterized as badly formed writings, separated writings, very

legible writings, small writings and highly cursive writings. The researcher hypothesized that the student's handwriting style reveals their scholastic ability.

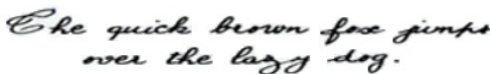


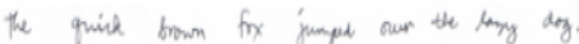
Sample Handwriting	Description
	Highly cursive writings
	Very legible writings
	Separated writings
	Small writings

Figure 2. Sample handwriting styles and its corresponding descriptions

Table 1. Fractal dimensions of student's handwriting

Sample	Handwriting Fractal Dimension
S1	1.9328
S2	1.9338
S3	1.9363
S4	1.9565
S5	1.9408
S6	1.9628
S7	1.9299
S8	1.9564
S9	1.9414
S10	1.9516
S11	1.9639
S12	1.9568
S13	1.9487
S14	1.9653
S15	1.9647

The data in table 1 shows that the handwriting styles of the students have varied fractal dimensions. The result implies that students have different writing styles although the fractal dimension has a slight difference with each other. Seropian & Vincent (2003) concealed that each writer has a set of characteristics extracted and they are specific to a writer.

Handwriting and IQ Percentage Score

The percentage score were gathered through the result of the entrance test of the selected 15 incoming college freshmen students using the Otis Lennon School Ability Test (OLSAT). The classification of the percentage scores in the entrance exam and the result of the fractal dimension of the handwriting are presented in table 2.

The tabular values reveal that the students who fall in the below average

category have handwriting with lower fractal dimensions while students in the above average class have higher fractal dimensions in their handwriting.

The result of the study appeals to support the idea that "highly intellectual people tend to have bad handwriting". In the present case, it shows that students considered as above average (based solely on the result of their entrance examination) have more rugged handwriting which suggests higher dimensions. Likewise, those in the below average group also have less rugged handwriting which generates lower fractal dimensions.

Corollary, scholastic ability cannot be measured based solely on the result of the entrance examination. Scholastic ability as a manifestation of a person's reasoning ability which consists of spatial, mathematical, language and memory abilities cannot be calculated using a single

Table 2. Handwritten fractal dimensions and percentage score of student's entrance examination

Percentage Score	Handwriting Fractal Dimension
79	1.9328
79	1.9338
78	1.9363
79	1.9565
78	1.9408
88	1.9628
83	1.9299
87	1.9564
87	1.9414
89	1.9516
94	1.9639
90	1.9568
90	1.9487
93	1.9653
92	1.9647

test. This highlights a need to determine a valid IQ assessment to guide decision making in the future. The graph below shows an upward movement of fractal handwriting towards IQ level of students

where Y= Intelligence Quotient (IQ) and X= Fractal Handwriting Dimension. It shows that the computed value of r is 0.759 and has a p-value of 0.001 less than the level of significance at .05.

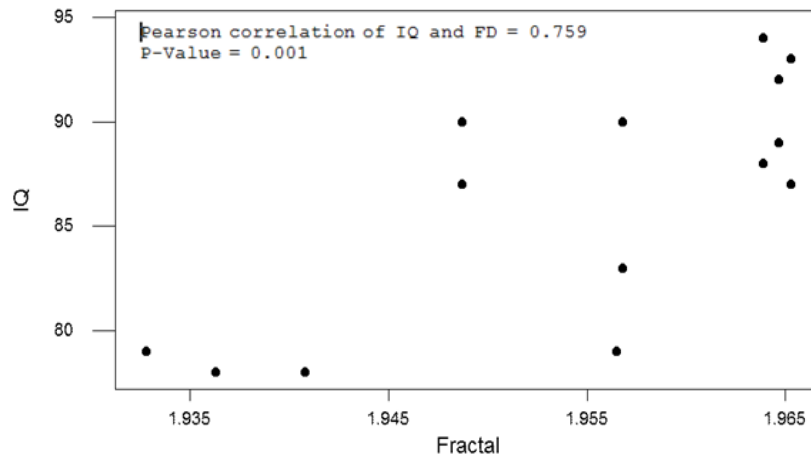


Figure 3. Plot of handwriting style against percentage score of entrance examination

The result implies that intelligence and handwriting have significant correlation. In this group of students, the higher is their entrance exam score, the higher also is the fractal dimension of their handwriting, vice versa. Brain guides the hand and whatever written on the paper is the result of a two-way circuit between the brain and the motor reflex muscles of the hand (Bounds, 2010).

4.0 Conclusion

The study concluded that the pattern of handwriting somehow reveals Intelligence Quotient. This study may be used by the teachers in scaling the IQ level of their students and in classifying them into homogeneous groupings.

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