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Does Fingerprint Patterns Reveal Dominant Multiple Intelligences:? A Case in Cantilan, Surigao del Sur, Philippines

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Abstract

Prints on hands are said to be a snapshot of the brain. Hence, the forms and patterns on fingerprint can be used to determine one's intrinsic potential. This study aimed to investigate the association between fingerprint patterns and multiple intelligences (MI) of the secondary students in Cantilan, Surigao del Sur, Philippines. Fingerprints of each respondent were collected through an electronic fingerprint scanner coupled with imaging software and were identified using identification guide by Hoover. MI scores were obtained using McKenzie's standardized questionnaire. Results of the study revealed that respondents possess different profiles of MI. Most common fingerprint patterns observed in the left hand were loops>whorls>arches while whorls>loops>arches in the right hand. Radial loop pattern on the left middle finger and left little finger were significantly associated with musical and natural intelligence respectively.

Keywords: association, fingerprint patterns, musical intelligence, natural intelligence

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1.0 Introduction

The prints on hands are a snapshot of the brain. The link between the two has been attributed to the development of neo-cortex and volar pad that happened simultaneously during week 13 to week 21 of the gestation period (The Institute of Multiple Intelligence, 2012) and the fact that both arise from the common ectodermal origin (Najati, 2009; Cesarik et al., 1996). Moreover, Garret (2014) reports that the inception of various intelligences occurs within the brain during the gestation stage, closely associating intelligence and brain development. Specific fingerprint patterns have been reported to be associated with certain congenital disorders having mental retardation/learning disability (Singh, 1975).

Dermatoglyphics patterns of hand have been recognized as an important tool in the diagnosis of various medical, psychological and genetic conditions (Burute et al., 2013; Weinstein et al., 1999), but they are meagerly studied in the education sector. Although there are several studies that has been conducted by several author (Adekoya et al., 2013; Nanakorn et al., 2012) on the positive association of fingerprint patterns and multiple intelligences, but this remains a very big question as weak correlation between MI types and fingerprint patterns was established by Paswan et al., 2017. This further recommends more studies to be conducted to look into association of fingerprint patterns and multiple intelligences in other population. Hence, this study was conducted to determine if association can be observed in Cantilan, Surigao del Sur and establish trends of fingerprint patterns and multiple intelligences possess among this group.

2.0 Research Methodology

A cross-sectional study was conducted at Cantilan National High School. Students from five sections in the fourth year level were chosen through stratified random sampling. Through Sloven's Formula, the number of sample per section were determined and were picked randomly using the fish-bowl technique.

Prior to data gathering, the researcher explained the purpose of the study to the respondents. The respondents' expectation with regards to their participation in the study was also considered. Since the study involved getting fingerprints, consent letters informing of the purpose of the study were sent to the parents or guardians. Only those respondents with signed consents were allowed to participate in the study. During the data gathering, the participants were clearly oriented about the nature of the participation and its confidentiality. Furthermore, the respondents were informed of their right to discontinue from participating in the study for some reasons, without fear of any negative consequences thereof. Furthermore, the respondents were informed how to complete questionnaires, how the fingerprint data were taken, and for how long it might take the data gathering to be completed. Students with ridges obscured by injury to hand were excluded from the study.

Evaluation of Multiple Intelligences

For multiple intelligences assessment, the students were asked to answer a 90-item Multiple Intelligence survey tool by McKenzie (1999) with counterpart Filipino tool as subtitles, found in the K-12 Grade 7 Learner's Module for Edukasyong Pagpapakatao. In order to avoid the possibility of bias due to exhaustion, the student-respondents were given two separate class periods to complete the survey tool. For each item of the survey tool, they gave a corresponding rate as the statement applied to them. The following were the 5-point Likert scale with corresponding legend was considered by each respondent: 5 – Always (Palagi), 4 – Usually (Madalas), 3 – Sometimes (Paminsan-minsan), 2 –

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Rarely (Bihira), 1– Never (Hindi). Along with the tool is a summary scheme used to determine the student's final score for each of the nine multiple intelligences, consultations through personal interview with the class adviser, school guidance counselor and the school head was carried out. Moreover, if association was observed, academic performance of the students was also used to affirm possible association observed.

Evaluation of Fingerprint Patterns

In obtaining the fingerprint patterns of the respondents, a biometric apparatus connected to a PC, along with its imaging software called Zk Finger Demo, was used to obtain the fingerprints of the respondents (figure 1).

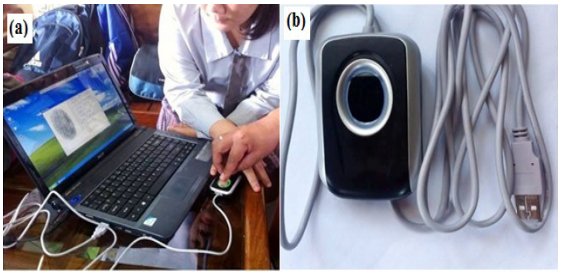

Figure 1. Photograph in gathering fingerprint data to respondents with the aid of biometric apparatus and imaging software Zk Finger Demo

Following Adekoya et al., (2013) and Nanakorn et al., (2011) fingertips were scanned using Zk Finger Demo fingerprint sensor coupled with its imaging software (figure 1b). The ten fingertips of each respondent were directed on the touchpad of the fingerprint sensor (figure 1a) starting from the right fingers of the thumb, index, middle, ring, and the little finger, followed by the left fingers of the thumb, index, middle, ring, and the little finger. The fingerprint images were stored in a file. The respondents' fingerprint patterns were then coded similar as to the codes given during the multiple intelligences assessment. Identification and classification of fingerprint patterns were based on the guide used by Hoover and FBI (2006) (figure 2). Identification were then confirmed by three experts.

Data Analysis

For to the analyses of data, descriptive and inferential statistics were used in the study. Descriptive statistics including percentages, means and standard deviation were used to present data on fingerprint patterns and multiple intelligences. Analysis of Variance (ANOVA) and t-tests were used to establish relationships between fingerprint patterns and multiple intelligences. All statistical tests were performed using SPSS version 21.0.

3.0 Results and Discussion

Multiple Intelligences of the Respondents

Percentage and mean scores of the multiple intelligences of the respondents are presented in Table 1. Results reveal that interpersonal and existential intelligence have the highest means score (31.04 ± 4.25; 31.04 ± 4.30 respectively), followed by logical-mathematical intelligence score (28.94 ± 3.96). Intrapersonal intelligence had the lowest score (25.52 ± 4.73).

Table 1. Descriptive Statistics of the Multiple Intelligence (MI) scores of the respondents

Multiple Intelligences	Percentage of Respondents	Mean Score	Std. Deviation
Logical-Mathematical	10.6	28.94	3.96
Linguistic	2.1	26.66	4.72
Spatial	7.1	27.57	4.69
Musical	7.1	28.21	4.70
Bodily-Kinesthetic	12.1	28.72	4.66
Intrapersonal	1.4	25.52	4.73
Interpersonal	27.0	31.04	4.25
Natural	8.5	28.06	4.25
Existential	24.1	31.04	4.30

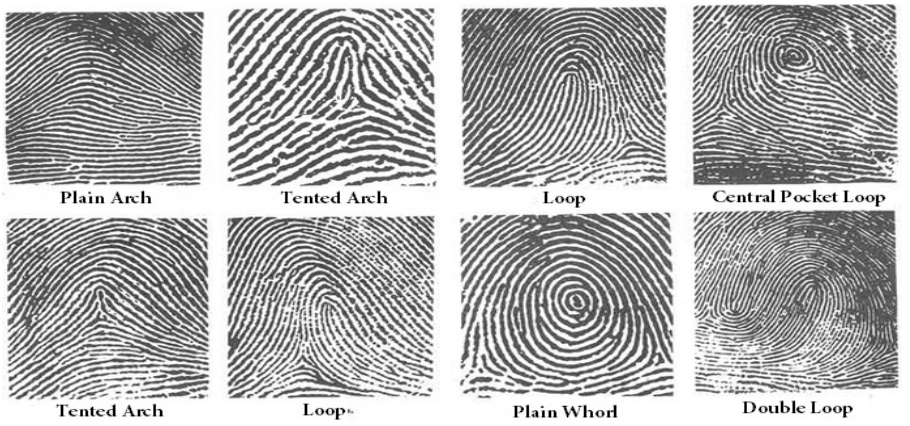

Figure 2. Types of fingerprint patterns described by Hoover (2006)

Table shows that respondents possess different MI profile. This finding is different from the study of Adekoya et al. (2013) and Nanakorn et al., (2011). This is supported by one of the arguments of Gardner's theory, as cited by Lane (2005), that students, and perhaps the society as a whole, have their own unique ways of learning. The reason for high scores in interpersonal intelligences could be attributed to the fact that students in this stage preferred to be with their peers. They are friendly and can get on well with others so they can easily take part in social activities. Cooperative and collaborative surroundings are best for their learning. They like studying in groups and exchanging information with others (Teele, 2000). This is further supported by the work of Gogebakan (2003) which states that middle and high school students are strongest in interpersonal, bodily-kinesthetic, spatial and musical intelligences.

The respondents are also found to have equally high existential intelligence mean score. According to Fose (2005), the existential learner often ponders questions about life, death, and ultimate realities. In addition, "those with existential intelligence see their role in the big picture more easily than others and this is very important to them. They question the meaning of life and seek the answers; most of the time this is done through some form of religion" (Snyder, 2010). Also according to Logsdon (2014), "the existentialists enjoy managing their own learning and in most cases are good at evaluating their own performance. The typically work well independently and are motivated to do well. On the negative side, however, they may have difficulty accepting their own mistakes and conforming to others' expectations."

Intrapersonal intelligence involves the abilities of the individual to assess them self objectively, being aware of their emotions, needs and goals, self-discipline and feeling confident (Aslan, 2016). Lower mean scores for intrapersonal intelligences could be attributed with the fact that respondents at this stage are not yet mature enough and are not capable of identifying their strengths and weaknesses. Another multiple intelligence that possesses lower mean scores is linguistic intelligence. Hence, respondents need to improve their ability to read, write, listen, speak and link information.

Distributions of Fingerprint Patterns

Data on Table 2 shows the left and right hand fingerprint patterns of the respondents. Results reveal that the frequent pattern observed on the left hand is plain whorl on the index and ring fingers while radial loop on the little and middle fingers. The table also shows that radial loop and plain whorl tie as the most frequent patterns on the left thumb of the respondents. On the other hand, the most frequent pattern observed in the right hand of the respondents is plain whorl found at the index, ring and thumb finger and ulnar loop at the little and middle fingers.

Most common fingerprint patterns observed in the left hand were loops>whorls>arches while whorls>loops>arches in the right hand. Respective to individual digits, preponderance of loops on the little and middle finger, whorls on the thumb and ring finger in both hands, which is in accordance with the study conducted by Kanchan and Chattopadhyay (2006) in medical students in India. However, when compared with the fingerprint patterns on both hands of the respondents in Nigerian population by Adekoya et al., (2013) and Thailand population by Nanakorn et al., (2012), results revealed contrasting results in the left hand only. Despite the fact that the frequencies of the digital patterns in the normal population differ around the world, it has also been reported that loops and whorls are the most common finger patterns (Reed and Opitz, 1981), which confirms the results of our study. This result would only mean that differences of fingerprint pattern distributions reported in various studies could be attributed group population variations (Fourneir and Ross, 2015; Cummins 1935).

If fingerprint patterns used in this study are

Table 2. Percentage frequency distribution of fingerprint patterns on the left and right hand of the respondents

Fingerprint Pattern	Left Hand					Right Hand				
	Index	Little	Middle	Ring	Thumb	Index	Little	Middle	Ring	Thumb
Plain Arch	0.71	0.00	1.42	0.00	0.71	1.42	0.00	0.71	0.00	0.00
Tented Arch	3.55	0.00	2.13	1.42	1.42	6.38	0.00	2.84	1.42	0.71
Radial Loop	28.37	57.45	43.97	31.91	36.88	14.89	14.89	14.89	11.35	8.51
Ulnar Loop	15.60	14.89	13.48	14.18	9.22	24.82	51.06	44.68	23.40	33.33
Plain Whorl	40.43	19.86	33.33	46.10	36.88	36.88	28.37	28.37	57.45	42.55
Central Pocket Loop	2.84	3.55	2.13	2.84	0.71	1.42	2.13	2.84	4.26	0.71
Double Loop	7.80	4.26	2.84	2.84	13.48	14.18	3.55	5.67	1.42	14.18
Accidental Whorl	0.71	0.00	0.71	0.71	0.71	0.00	0.00	0.00	0.71	0.00
Total	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0

grouped in accordance to the grouping schemes used by Adekoya et al., (2013) and Nanakorn et al., (2011) (Table 3) it is revealed that the left hand percentage frequency distribution of the current study is nearly similar on worldwide average distribution of loops, whorls and arches (Kapoor and Badiye, 2015; Nandy, 2001; Thurstone, 1938) of which radial loops has the highest percentage distribution followed by whorls and arches. On the other hand, percentage distribution of finger print patterns on the right hand is in contrast to the findings above, where whorl pattern has the highest percentage distribution followed by ulnar, radial loops and arches. Similar to the study of Kanchan and Chattopadhyay (2006) frequency of arches in the current study was lower to worldwide average.

Table 3. Percentage of fingerprint patterns on the left and right hand of the respondents used by other authors (Adekoya et al., 2013 and Nanakorn et al., 2011)

Fingerprint Pattern used in this study	Grouping Scheme by other authors	Left Hand					Right Hand				
		Index	Little	Middle	Ring	Thumb	Index	Little	Middle	Ring	Thumb
Plain Arch Tented Arch	Arch	4.26	0.00	3.55	1.42	2.13	7.80	0.00	3.55	1.42	0.71
Radial Loop	Radial Loop	28.37	57.45	43.97	31.91	36.88	14.89	14.89	14.89	11.35	8.51
Ulnar Loop	Ulnar Loop	15.60	14.89	13.48	14.18	9.22	24.82	51.06	44.68	23.40	33.33
Whorl	Whorl	51.77	27.66	39.01	52.48	51.77	52.48	34.04	36.88	63.83	57.45

Association of Multiple Intelligence Scores and Fingerprint Patterns

The Analysis of Variance (ANOVA) of the Multiple Intelligences vis-à-vis Fingerprint Patterns with significant p-values are presented in Table 4-7. Those MI with no apparent significance on the subsequent tests are no longer shown here. Out of 9 multiple intelligences, only three showed significant association with fingerprint patterns, these were the musical, interpersonal and natural intelligences on the fingerprint patterns of the left little finger (Table 4). Subsequent tests reveal significantly on the two highly occurring fingerprint patterns namely the radial loop and plain whorl. Since the significance value of the t-test for natural intelligence (.007) (Table 5) is the smallest, this may associate radial loop pattern on the left little finger with natural intelligence. On the other hand, fingerprint patterns on the left middle finger reveal that there was a significant association on musical intelligence (table 6). Subsequent test further revealed, radial loop pattern on the left middle finger maybe be associated

Table 4. ANOVA table of the mean scores of Multiple Intelligences that are significant among the patterns on the left little finger

Multiple Intelligences	Fingerprint Patterns	N	Mean MI Score	Std. Deviation	*F*	*p value*	Interpretation
Musical Intelligences	Radial Loop	81	29.28	4.67	2.87	.025	Significant
	Ulnar Loop	21	26.62	4.98			
	Plain Whorl	28	27.07	4.40			
	Central Pocket Loop	5	25.00	3.00			
	Double Loop	6	27.27	3.19			
	TOTAL	141					
Natural Intelligences	Radial Loop	81	28.78	4.51	3.79	.006	Significant
	Ulnar Loop	21	28.57	2.89			
	Plain Whorl	28	26.39	3.67			
	Central Pocket Loop	5	23.00	4.30			
	Double Loop	6	28.50	3.02			
	TOTAL	141					
Interpersonal Intelligences	Radial Loop	81	31.62	4.15	2.58	.040	Significant
	Ulnar Loop	21	30.90	4.09			
	Plain Whorl	28	30.00	4.35			
	Central Pocket Loop	5	26.40	4.93			
	Double Loop	6	32.50	2.43			
	TOTAL	141					

with musical intelligence (table 7).

These findings are different from the result of the previous studies. Adekoya et al., (2013) identifies ulnar loop pattern on the second digit of both right and left hands could indicate high logic intelligence while high frequency of arches is an indication of musical intelligence. Yohannes and Bekel (2015) was able to associate linguistic intelligences with loops and whorls while spatial intelligence is associated with arch patterns. Furthermore in the study of Nanakorn et al., (2011) whorl pattern on the right middle finger suggests logical-mathematical intelligence. Results obtain from the current study and when compared with other trends to other population would mean that association may vary to different groups of population. Differences on the results is attributed to group population variations (Fourneir and Ross, 2015; Cummins 1935). As mentioned earlier, affirmations with the possible association were also carried out with the aid of their academic performance and consultations with the class advisers. Since, radial loop of the left little finger is associated to natural intelligence, academic performance of the students in Science having this pattern was gathered. Secondary data further revealed that out of 81 students possess radial loop on the left little finger, 40 or 49% were Outstanding, 37 or 46% were very satisfactory and the remaining 4 or 5% were satisfactory in Science. This further affirms possible association of fingerprint patterns with this type of multiple intelligences.

Similar thing was done to affirm the association of musical intelligence with radial loop on the left middle finger. Results reveal that academic performance of the respondents in their MAPEH subject showed that out of 62 respondents, 46 or 74% were outstanding, 15 or 24% were very satisfactory and 2% had satisfactory grades. Therefore, this is another affirmation of the relationship with radial loop on the left middle finger and musical intelligences.

4.0 Conclusion

The study provided additional findings that suggested association of fingerprint patterns to multiple intelligences particularly radial loop on the

Table 5. T-test of the difference in the mean score of multiple intelligences on the two high-frequency fingerprint patterns of the left little finger of the respondents

Multiple Intelligences	Fingerprint Patterns	*t Stat*	*t critical* (one tail)	*p* value (one tail)	Interpretation
Musical Intelligences	Radial Loop Plain Whorl	-2.19	1.66	.015	Significant
Natural Intelligences	Radial Loop Plain Whorl	-2.52	1.66	.007	Significant
Interpersonal Intelligences	Radial Loop Plain Whorl	-1.76	1.66	.041	Significant

Table 6. ANOVA table of the mean scores of musical intelligence signified among the patterns on the left middle finger of the respondents

Multiple Intelligences	Fingerprint Patterns	N	Mean MI Score	Std. Deviation	F	*p* value	Interpretation
Musical Intelligences	Plain Arch	2	26.00	4.24	3.15	.006	Significant
	Tented Arch	3	26.33	1.53			
	Radial Loop	62	30.00	4.57			
	Ulnar Loop	19	26.63	5.26			
	Plain Whorl	47	26.96	4.38			
	Central Pocket Loop	3	27.33	3.21			
	Double Loop	4	25.00	0.82			
	Accidental Whorl	1	25.02	-			
		141					

Table 7. T-test of the difference in the mean score of musical intelligence on the two high-frequency fingerprint patterns of the left middle fingerof the respondents.

Fingerprint Patterns	t Stat	t Critical (one-tail)	*p* value (one-tail)	Interpretation
Radial Loop Plain Whorl	-3.50	1.66	.000	Significant

left little finger and left middle finger with natural and musical intelligences. Trends of fingerprint patterns of the current population are nearly similar to the worldwide average distribution on the left hand. Differences on this findings compared to other studied population could be attributed to group population variations. Further this study, confirms that every individual has different profile of multiple intelligences and this knowledge may help individuals identify their strong and weak areas with respect to the various intelligence types. Equipped with this invaluable information, educators and parents could probably have competitive edge in identifying and enhancing the multiple intelligences possessed by their students or children.

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