

Identification and Correlation of the Multiple Intelligences and Finger Print Patterns

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ABSTRACT

Introduction: The most popular theory of Multiple Intelligences (MIs) was developed by Howard Gardner. Gardner initially identified seven intelligences i.e., logical, spatial, linguistic, kinaesthetic, musical, interpersonal and intrapersonal. Through decades of scientific research, dermatoglyphic pattern in the hand has come to be recognized as a powerful tool in the diagnosis of psychological, medical and genetic conditions.

Aim: The present study was undertaken to identify the dermatoglyphic pattern and MI in students of Sharda University from different streams and to find if there is any correlation between dermatoglyphic pattern and MIs.

Materials and Methods: The study was conducted at Sharda University, Greater Noida on 300 students, consisting of four groups of 75 students each from Medical, Engineering, Law and Journalism and Mass Communication courses. MI profile of the students was determined based on MI theory of Gardner. Finger Print Patterns (FPP) of the students were obtained by the ink print method.

Results: Intrapersonal intelligence had highest mean score (74.5 ± 22.93) followed by interpersonal intelligence (69.59 ± 30.83) and spatial intelligence (65.69 ± 26.45). Linguistic intelligence had the lowest score (52.45 ± 28.55). Ulnar loop pattern (61%) was the most common followed by whorls (33.2%), arches (3.3%) and radial loops (2.8%). The percentage of ulnar loop was the highest in students with high score for kinaesthetic and that of whorl was in students with logical intelligence. Highest percentage of arches was seen in students with high score in linguistic intelligence, whereas high performers in logical intelligence had the lowest number of arches. No significant correlation was observed between the MI types with any of the FPPs, except for logical intelligence, which showed a significant negative correlation with prevalence of arches.

Conclusion: The results of the study confirm that every individual has different types of intelligences with different level. However, the results on correlation between the MI types and FPPs showed weak correlation and were not conclusive.

Keywords: Dermatoglyphic, Kinaesthetic, Naturalistic intelligence

INTRODUCTION

Intelligence is a term that is difficult to define, one of the most commonly accepted and agreed upon definitions of intelligence is given as "a very general mental capability that involves the ability to reason, plan, solve problems, think abstractly, comprehend complex ideas, learn quickly and learn from experience"[1].

Researchers have proposed different theories to explain the nature of intelligence. The two opposing concepts of intelligence include the general intelligence and the MIs theory. According to general intelligence theory there is one factor from which all intelligence is derived and the MIs theory states that there are different kinds of intelligences [2]. The most popular theory of MIs was developed by Howard Gardner

(1983) [3]. Initially seven types of intelligences were identified by Gardner i.e. logical, spatial, linguistic, kinaesthetic, logical, musical, interpersonal and intrapersonal. Later on eighth intelligence (naturalistic intelligence) was introduced by Gardner. According to MI theory everyone possesses all types of intelligences with different levels of aptitude, giving each person a unique profile.

Since 1823, scientists have reported that fingerprint patterns and intelligence are related to each other. Plausible explanations given for linking fingerprint patterns to intelligence have been attributed to the development of neo-cortex and volar pad at the same prenatal time frames and the fact that both the brain and the volar pads from which dermatoglyphics arise have the common ectodermal origin [4,5]. Specific dermatoglyphic

patterns have been reported to be associated with certain congenital disorders having mental retardation/learning disability [6].

Dermatoglyphic patterns of hand have been recognised as an important tool in the diagnosis of various medical, psychological and genetic conditions [7,8]. Although, dermatoglyphics has been linked with various aspects of human mental dimensions [4], very few studies are available on correlation between dermatoglyphic patterns and MIs. Adekoya et al., studied the correlation between MI and dermatoglyphics in Nigerian population and reported that ulnar loop pattern on the second digit could indicate high logic intelligence, whereas high frequency of arch pattern especially on the index finger is indicative of high musical intelligence [9]. To the best of our knowledge no literature is available on such studies being conducted in India. Therefore, the present study was undertaken to study the dermatoglyphic pattern and MI in students of Sharda University from different streams and to find if there is any correlation between dermatoglyphic pattern and MIs.

MATERIALS AND METHODS

A cross-sectional study was conducted at Sharda University, Greater Noida, India. Over a period of one year (2015-16) 300 students, consisting of four groups of 75 students each from Medical (MBBS), Engineering (B.Tech), Law (LLB) and Journalism and Mass Communication (BJMC) courses were randomly selected. The age group of the students ranged from 18-22 years. Approval for the study was obtained from the Institutional Ethics Committee.

Students with ridges obscured by injury to hand, ridges apalsia/hypoplasia, deformities of hand and family history of mental illness/mental retardation/learning disability were excluded from the study. Written informed consent was taken from the students prior to participation in the study.

Evaluation of multiple intelligence: MI profile of the students was evaluated using questionnaire by Kirsi T et al., [10]. The questionnaire has 28 statements in total related to the seven intelligences proposed by Gardner H [3]. Each student was required to complete the questionnaire by placing number one or zero next to each statement which they felt accurately described them or not respectively. Students were scored on each of the MI type and the scores were transformed to percentage and recorded in excel sheet for statistical analysis.

Evaluation of dermatoglyphic pattern: FPP of students were obtained by the ink print method by Cummin and Midlo [11]. The finger print pattern was identified with the help of a magnifying lens and classified according to the standard classification into four types i.e., arches, loops (radial and ulnar) and whorls [Table/Fig-1]. The data was recorded in



[Table/Fig-1a-d]: Types of FPPs (arch, whorl and ulnar and radial loop). a. Ulnar; b. Radial Loops; c. Arch; d. Whorl.

excel sheet for further analysis.

STATISTICAL ANALYSIS

Excel and SPSS software (version 17) were used for the statistical analysis of data. Mean, standard deviation for MI scores and frequency (%) for FPP distribution were calculated. One-way-ANOVA was applied to analyse variation between the mean scores of MI types in students of various courses. Pearson's correlation coefficient between different MI types and FPP were computed and tested for their statistical significance.

RESULTS

Mean score of MI types in students of all courses: The results of MI test revealed that intrapersonal intelligence had highest mean score (74.5 ± 22.93) followed by interpersonal intelligence (69.59 ± 30.83) and spatial intelligence (65.69 ± 26.45). Linguistic intelligence had the lowest score (52.45 ± 28.55) [Table/Fig-2].

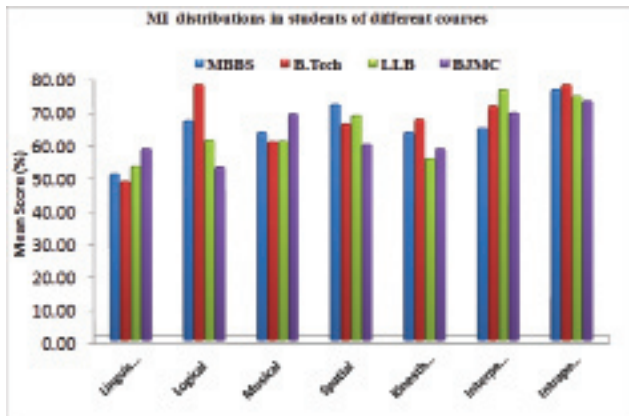
Comparison of mean scores of multiple intelligence types between students of MBBS, B.Tech, LLB and BJMC courses: The present study showed the linguistic intelligence had the lowest mean score in students of all the courses except BJMC. BJMC students had the lowest score for logical intelligence. One-way-ANOVA showed significant variation in the average scores of logical, spatial and kinaesthetic types of MI among the students from the four different courses. Engineering students had the highest average scores for logical ($p < 0.001$) and kinaesthetic intelligence ($p < 0.05$) as compared to students from other courses whereas medical students showed a significantly higher mean value for spatial

Multiple Intelligence	Mean Score (%)	Standard Deviation
Intrapersonal	74.50	22.93
Interpersonal	69.59	30.83
Spatial	65.69	26.45
Logical	63.72	28.17
Musical	62.57	31.31
Kinaesthetic	60.32	25.53
Linguistic	52.45	28.55

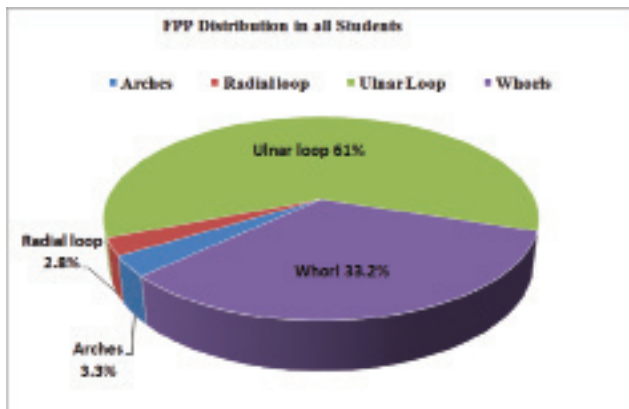
[Table/Fig-2]: Shows mean score (%) of Multiple Intelligence types in students of all courses (n=300).

intelligence ($p < 0.05$). No significant variation was seen in the average scores of linguistic, musical, interpersonal and intrapersonal types of MI [Table/Fig-3].

Distribution of Finger Print Patterns (FPP): Ulnar loop pattern (61%) was the most common followed by whorls (33.2%), arches (3.3%) and radial loops (2.8%). Average number of whorls was significantly higher on right hand digits (2.3 ± 1.3) as compared to left hand digits (1.9 ± 1.4) ($p < 0.001$).



[Table/Fig-3]: Shows the comparison of distribution of multiple intelligences between MBBS, B.Tech, LLB and BJMC students.



[Table/Fig-4]: Pie-chart showing the frequency (%) of different FPPs in all students ($n=300$).

Ulnar loops were significantly higher on left hand digits as compared to right hand digits ($p < 0.05$) [Table/Fig-4].

Distribution of FPP in students with MI score $\geq 75\%$ for different MI: The percentage of ulnar loop was highest in students with high scores for kinaesthetic, students with high scores for logical intelligence showed highest percentage of whorls whereas, arches were found to be maximum in students with high score in linguistic intelligence. Radial loop distribution did not show much variation among the different groups [Table/Fig-5].

Correlation between MI type and FPPs: The results of Pearson's correlation analysis showed that there was no

significant correlation between the multiple intelligence types with any of the FPPs, except for logical intelligence which

MI	W (%)	A (%)	RL (%)	UL (%)
Linguistic ($n=110$)	33.5	4.2	2.0	60.3
Logical ($n=167$)	37.5	1.3	2.6	58.6
Musical ($n=164$)	34.1	3.1	2.5	60.2
Spatial ($n=170$)	33.9	2.3	2.9	60.7
Kinaesthetic ($n=142$)	31.1	2.8	2.8	63.2
Interpersonal ($n=189$)	32.0	3.4	2.9	61.6
Intrapersonal ($n=220$)	33.1	3.0	2.8	60.9

[Table/Fig-5]: Finger print patterns in students with multiple intelligence score $\geq 75\%$.

Multiple Intelligence		Whorls	Arches	Radial loop	Ulnar loop
Linguistic	Pearson Correlation	-0.045	0.059	0.020	0.015
	Sig. (2-tailed)	0.441	0.307	0.736	0.799
	N	300	300	300	300
Logical	Pearson Correlation	0.061	** -0.229	0.012	0.012
	Sig. (2-tailed)	0.292	0.000	0.830	0.836
	N	300	300	300	300
Musical	Pearson Correlation	-0.032	0.025	-0.001	0.027
	Sig. (2-tailed)	0.581	0.670	0.982	0.643
	N	300	300	300	300
Spatial	Pearson Correlation	-0.028	-0.097	0.082	0.038
	Sig. (2-tailed)	0.631	0.094	0.155	0.517
	N	300	300	300	300
Kinaesthetic	Pearson Correlation	-0.018	0.010	-0.060	0.031
	Sig. (2-tailed)	0.753	0.870	0.300	0.593
	N	300	300	300	300
Interpersonal	Pearson Correlation	-0.021	0.039	0.035	-0.001
	Sig. (2-tailed)	0.715	0.496	0.544	0.980
	N	300	300	300	300
Intra-personal	Pearson Correlation	0.003	-0.007	0.002	-0.006
	Sig. (2-tailed)	0.957	0.902	0.979	0.922
	N	300	300	300	300

[Table/Fig-6]: Correlation between multiple intelligence type and finger print patterns.

** Correlation is significant at the 0.01 level (2-tailed).

showed a significant negative correlation with prevalence of arches ($r = -0.229$, $p < 0.001$) [Table/Fig-6].

DISCUSSION

The results of the present study showed that students have different MI profiles. The intrapersonal intelligence scores were consistently high across students of all the courses whereas linguistic intelligence had the low score. Similar findings were

reported by Johnson White among criminal justice students [12]. Katzowitz EC and Morajees JG also reported that intrapersonal intelligence was one of the three highest scorers in students of allied health sciences and hotel management respectively [13,14]. Intrapersonal intelligence involves abilities of the individual to assess the self objectively, being aware of their emotions, needs and goals, self-disciplining, and feeling confident [15]. The reason for high scores in intrapersonal intelligence in the present study may be attributed to the fact that the study was conducted on students at the university level who are mature and are therefore capable of identifying their strengths and weaknesses. Linguistic intelligence is about effective use of words in speaking or in writing. It is about the efficient use of language as frequently demonstrated by a politician, a poet, a writer or a journalist [16]. Lower scores for linguistic intelligence in the current study indicate that the respondents need to improve their ability to read, write, listen, speak, and link information.

In the present study, it was observed that there were differences in the MI profiles of students perusing different courses. The engineering students had the highest average scores for logical and kinaesthetic intelligence as compared to students from other courses where as medical students showed a significantly higher value for spatial intelligence. Law students scored higher in interpersonal intelligence and the students of journalism and mass communication had higher scores for linguistic intelligence and lowest for logical intelligence. Ahmad S et al., also reported significant difference in MI scores of students from science and humanities colleges. They found higher mean scores for logical, spatial, and naturalistic intelligences in students of science colleges and on the other hand students of humanity colleges had higher average scores for the rest of the intelligences, i.e., linguistic, musical and interpersonal intelligences [17]. Many researchers emphasise the importance of identifying the MI profiles of the students so as to empower them with identification of their intelligence strengths and weaknesses [18]. The knowledge of MI profile may be of benefit to students for career selection by matching their actual abilities (MI profiles) with career option.

The most frequent finger print pattern seen was ulnar loop followed by whorl, arches and radial loop. The findings are similar to the worldwide average percentage distribution of loops, whorls, arches which is approximately 65%, 25%, 7% respectively [19,20]. However, the results of this study are in contrast to some of the studies that reported whorls to be the most common pattern, followed by loops and arches [21,22]. Kandil M et al., reported highest incidence of arches as compared to other patterns as the most remarkable characteristic of Arab population [23]. The differences in finger print pattern distribution reported in various studies could be due to racial variations or difference in size of population samples.

The correlation between dermatoglyphic manifestations and intelligence has been a topic of research. Numerous researchers have reported association between dermatoglyphic pattern and various aspects of human mental dimensions in normal as well as in disease conditions [4].

One of the factors that affects the development of MI type is genetic or hereditary factor. FPPs are of great value for genetic studies due to the fact that once they are formed during prenatal life, they do not show any change and are not influenced by age, postnatal environmental factors [24]. The present study therefore explored the existence of association between the FPP and MI types. On comparing the distribution of FPP patterns in students with high MI scores (MI score ≥ 75) for different MI types, it was observed that highest frequency of ulnar loop was observed in students with kinaesthetic intelligence, whorl in students with logical intelligence and arches in students with linguistic intelligence. However, the only statistically significant correlation was seen between the logical intelligence and low prevalence of arches. The results of present study are different from those reported in previous studies. According to Adekoya KO et al., ulnar loop pattern on the second digit of both right and left hands could indicate high logic intelligence while high frequency of arch pattern especially on index finger is indicative of high musical intelligence [9]. Yohannes S et al., reported that loops and whorls are associated with linguistic intelligence whereas, spatial intelligence is associated with arch patterns. The differences observed in the results of these studies could be due to the racial differences as previous studies were done on college students of Nigerian and Ethiopian origin [25].

LIMITATIONS

The limitation of the present study was small sample size and lack of diverse population as the sampling population was limited to subjects with university level educational background. Therefore, more studies are needed to be conducted with larger sample size and diverse population in terms of educational and cultural backgrounds, and economical status are needed to reach some conclusive deductions regarding association between MIs and FPPs. However, the present study confirms that every individual has different profile of MIs. This knowledge may help individuals identify their strong and weak areas with respect to the various intelligence types. Application of this knowledge of MI types can have both pedagogical and curricular implications also.

CONCLUSION

It can be concluded that the usefulness of finger print pattern to predict MI profile of an individual remains a very big question as weak correlation between the MI types and FPP was established. The factors other than heredity such as culture, educational background and economic status may play a much bigger role in development of MI.

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