



HAND PREFERENCE AND COGNITIVE ABILITY OF STUDENTS OF UNIVERSITY OF PORT HARCOURT, CHOBA, RIVERS STATE

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INTRODUCTION

Handedness is the natural or biological preference for using one hand more than the other in performing special tasks depending on which hemisphere is dominance for the task (Rice, 1998). People are said to be left-handed if they use right most of the time, and right-handed if they prefer left hand. People are referred to be ambidextrous, if they both hands are equally used perfectly and approximately on equal amount of the time. Correlation of biological traits with the handedness proves the relationship between handedness and biology (Jaffe, 1998). Cerebral cortex of the forebrain, which controls intellectual, motor and sensory functions, is divided into two hemisphere of the brain each performs specialized functions. Lateralization is the preference for using one side of the body more than the other in performing special tasks depending upon, which hemisphere is dominant. The reason why lateralization occurs is not yet clear (Rice, 1998).

Lateralization biologically programmed from the day a baby is born. This dominance and preference of one of the two hemispheres is directly connected with the body's preference of handedness and it is immutable (Cardwell, 2003).

As handedness is biologically and genetically linked so it has various effects on one's behavior and abilities. There are different points of views about it effects. Popular culture has become fond of the idea that people and their native abilities maybe described as earlier right or left brained. No doubt left handedness is associated with a lot of disadvantages but various studies have shown that left-handedness is also associated with enhanced abilities. Increase in ratio of left-hander's can produce a corresponding intellectual advance and leap in the number of mathematical sporting or artistic geniuses. The reason is that right hander's have genes that force their brains into a slightly more one sided structure but brains of left hander's are more symmetric where the two sides are more equal which enhances person's abilities (McMamus,1997).

Left-handedness is also more common among musicians, mathematicians, professional baseball and cricket players, architects and artists (Rice,1998). Typically left handed people are seen to be more creative, more likely, to notice the size, shape and form of things, more likely to see the whole picture or concept. All these in amalgamated form show that left-handers have more power of perception as compared to right-handers. McManus (2002) also worked on the power of

perception of left and right-hander's. Different studies indicate that various qualities of the left-hander's show the tendency of high IQ level and it is also assumed that handedness have some relationship with the intelligence level. Many researchers have tried to study the brain functioning of intelligent people. These studies suggest that brains of highly skilled and intelligent people require less glucose energy while performing certain cognitive task. Highly intelligent people also tend to take in information more quickly and to show faster brain wave response to simple stimuli such as Flash light (Papilia, 1993).

There are some studies in which speed of processing information has been directly linked to central nervous system functioning and to intelligence (Vernon, and Mori 1992). Intelligence, reaction times and peripheral nerve conduction velocity as cited in (Bee, 2002). Research shows that the speed with which people with higher IQ scores react quickly on the information processing and perceptual task (Hunt.1997). Studies have shown that during perceptual tasks, right hemisphere is more activated so intelligent people may have more specialized right hemisphere (Barlow, 2001). Intelligent is not a consistent construct from birth till death. There are different factors, which contribute to the inconsistent nature of IQ.

It is considered that left-handers are more intelligent than right-handers because of different abilities which naturally exist in them but some studies proved that the average intelligence of left handers is fractionally lower

than that of right handers; though at the top end of the intellectual spectrum they do better (McManus, 1997). Some researchers have been working on this subject and are convinced that the proportion of left handers is rising and left handed people are above average in the quota of high achievers (McManus,2002). Left-hander's brain is constructed differently in a way that widens their range of abilities and the genes which determine that left-handedness also govern development of the language centers of the brain. According to McManus 1997, the increase in the population of left-handedness could produce a corresponding intellectual advance and a leap in the number of mathematical, sporting or artistic geniuses.

There has been cases where people argued that right-handers are more intelligent than left-handers, that is why they would prefer to change their children's handedness. Some other persons believe in the other school of thought, that left-handers are more intelligent than right-handers. This research was aimed at finding out the truth of such argument.

In Africa, people see the act of using the left hand for doing normal tasks as disrespectful. For instance, in Nigeria, it is seen as an act of disrespect for a person to greet or give another person (especially an adult) something with the left hand. Further making or causing the left handers to learn to use the right hand for most of his activities or tasks which is usually difficult and unfavorable for left-handers, since it is not where the individual's strength lies.

In Nigeria, most parents, guidance, teachers usually try to change left handers into right-handers because they feel it is not of culture or a sign of disrespect which in most cases lead to poor handwriting, slow reasoning etc. this creates a lot of difficulties for left-handers in our society in terms of their physiological, educational and social functioning. Sometimes, government facilities and equipment are designed to favour the use of the right hand only, forcing the user (if left-handed) to learn to use the right hand with the equipment or facility hence reducing efficiency.

This study evaluates and highlights the effect of handedness on the intelligence of students of the University of Port Harcourt, Choba. This research generate data that served as a baseline study for determining handedness and intelligence in University of Port Harcourt.

The study is of great importance to the field of psychology and neuroanatomy as it unseats the effects of handedness on intelligence and this serves as a guide to the psychologist during counseling. To the society, hands preference will not be a problem if its effect is understood with respect to cognitive ability.

MATERIALS AND METHOD

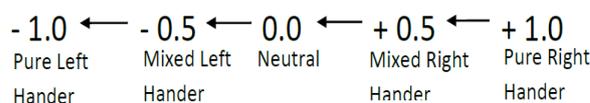
The study was carried out with the use of questionnaires. The questionnaire was structured into three different sections namely; **Section A:** That consist of demographic variables such as age, gender, department and level of students. **Section B:** That consist of an IQ test derived from Cognitive Ability Test (CogAT), which is in line with Raven Progressive Matrices (RPM). This was used to determine the student IQ ability. Participants were graded according to their IQ level. From this test, the intellectual ability of the students was determined. **Section C:** Which consist of Scale that measures handedness. Questions in each item were asked for the awareness of hand dominance.

Research Design: A sample size of 200 students without equal number of right-handed and left-handed students was gotten randomly from the following faculties, Humanities, Sciences, College of Health Sciences, Engineering and Management, all in the University of Port Harcourt. (N = 200, mean). The sample was gender free and was divided into four groups with respect to age difference.

Group1 (16–19 years), Group 2 (20–23 years), Group 3 (24–27 years) and Group 4 (28–above). All participants were treated in accordance with National Health Research Ethics Committee of Nigeria (NHREC). The survey design was adopted for this research, to collect information/data through the use of questionnaire. This design was chosen basically to access handedness and intelligence among University of Port Harcourt students.

The subjects for this study was personally contacted and assessed at their own will. They were identified as students of University of Port Harcourt with their student's identification cards. Personal information was obtained through the demographical sheet and the confidentiality of their information was ensured. They were given a briefed explanation regarding the aim and objectives of the study.

The subjects were given a scale that measures handedness; this handedness questionnaire was adopted from the Edinburg Handedness Inventory, which gave the subjects laterality. The formula below was used to calculate the inventory.



The handedness score was calculated using this formula

$$\left(\frac{\text{right} - \text{left}}{\text{right} + \text{left}} \right)$$

right–left:right+left - 1.0 - 0.5 0.0 + 0.5 + 1.0 Pure Left
 Hander Mixed Left Hander Neutral Mixed Right Hander
 Pure Right Hander An IQ test comprising of 15 questions

was given to the subjects in accordance with the cognitive Abilities Test (CogAT) within a time frame of 10 – 15 minutes. This test comprises of general knowledge without any field specificity. The result gotten from the test was used to determine the student cognitive or intelligence ability.

The data were analyzed using chi square, anova and t-test in IBM SPSS Statistics 22, and presented in tables and bar chart.

Study Location: This research took place in the University of Port Harcourt.

University of Port Harcourt is a Federal University located along the East-west road, in Choba, a community in Obio-Akpor Local Government Area of Rivers State, Nigeria. It was established in 1975 as University

College. The university is bordered in the east by Alakahia Village, in the west by Emohua Village, in the North by Rumualogu village and in the south by Aluu village. It also has it pioneer campus situated at Choba which house the pioneer Engineering Department. University of Port Harcourt is situated in the Sub – urban area of the city of Port-Harcourt. It is estimated to have a population of about 30,000 – 40,000 students.

RESULTS OF FINDINGS AND DISCUSSION

Relationship Between Handedness And Intelligence Among Uniport Students

Table 1 shows the relationship between handedness and intelligence among Uniport students. It was observed that there was significance difference with respect to right-handed, left-handed and ambidextrous subjects and intelligence among Uniport students.

Table 1. Relationship Between Handedness and Intelligence Among Uniport Students.

Handedness	N	Mean	Standard Deviation	Significant	Inference
Ambidextrous	4	12.50	1.29	0.015	Significant
Left Handed subjects	6	11.67	0.82		
Right Handed subjects	190	9.34	2.88		

$P < 0.05$ = significant

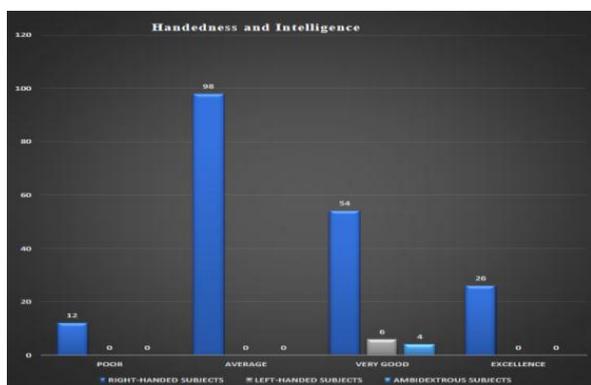


Figure. 1: Bar chart showing the distribution of intelligence with respect to handedness among Uniport students.

Table 2. shows the relationship between sex and intelligence among Uniport students. From the table, it was deduced that there was no significant difference between sex and intelligence among Uniport students.

Table 2. Relationship Between Sex and Intelligence Among Uniport Students.

Sex	N	Mean	Standard Deviation	Significant	Inference
Female	103	9.59	2.85	.594	Not Significant
Male	97	9.35	2.90		

$P < 0.05$ = significant

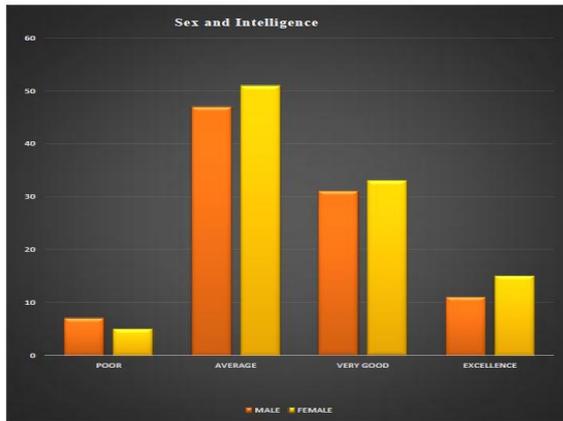


Figure. 2: Bar chart showing the distribution of intelligence among Uniport students with respect to sex.

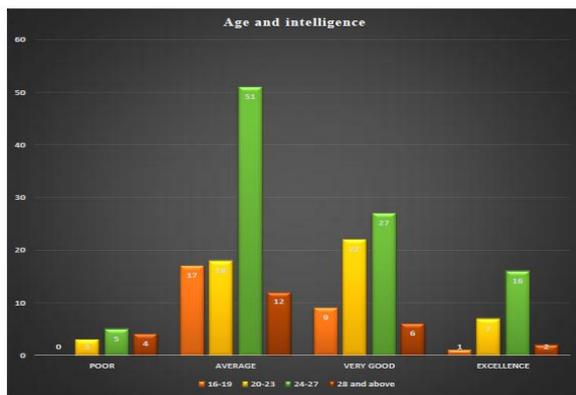


Figure. 3: Bar chart showing the distribution of intelligence among Uniport students with respect to age.

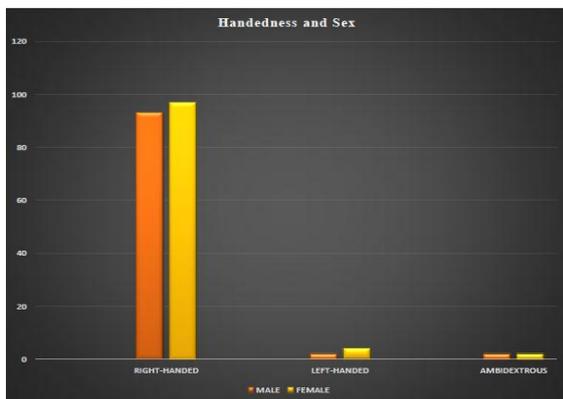


Figure. 4: Bar chart showing the distribution of handedness with respect to sex among Uniport students.

This study aimed at determining the significance between handedness and intelligence among university of Port Harcourt students through the administration of a handedness test (Edinburg handedness inventory) and an IQ test (cogAT).

In order to determine the differences between intelligence level and handedness of the participants,

Anova statistical analysis was applied on the scores of left-handed, right-handed and ambidextral subjects. The results of the present study with respect to handedness and intelligence are not in consistent with earlier work by Cole (1997) and Needleman (2001). Cole (1997) concluded that there was no consistent link between handedness and intelligence quotient (IQ). As a whole left-handed people are not more or less intelligent than right-handed ones. (Needleman, 2001).

Findings from researchers have shown that IQ test performance is with respect to the educational level, health and mood states. Factor analysis revealed that IQ test performance was dependent primarily on education and to a lesser degree health and mode. (Gunther *et al.*, 1981).

From this study, it was deduced that the right-handed subjects, 98 of them got average, 54 very good, 26 excellence and 12 poor. While for the left-handed subjects, 6 averages and 4 averages for ambidextral subjects.

From table 2, it was deduced that there was no significant difference between sex and intelligence. As the female subjects were not more or less intelligent than the male subjects. Also from figure 2, it was observed that majority of the male and female subjects of Uniport had average intelligence level.

Using chi-square test, it was deduced that there is a significant difference between age and intelligence among Uniport students. As subjects that fell between the age range of 24–27 tend to do better in relation to those of 16 – 19, 20 – 23 and 28 and above age range.

The current research shows that majority of the right-handed subjects among Uniport students were female, the same observation was visible as the female subjects occupied majority of the left-handed subjects among Uniport students. The results of the present study suggest a confident step for the future research on handedness. The common attitude of people towards the left-handedness is somewhat negative that is why the traits of left-handers are underestimated. It can safely be argued that a great deal of research is needed to be done on the relationship of intelligence and handedness. The accumulated research findings will go a long way in improving our understanding about left-handedness and its consequences. Different ergonomic inventions should be designed to facilitate the participation of left-handers in the right-handers dominated world. The future research should focus upon the relationship that may exist in different types of intelligence as proposed by modern theories and handedness to generate more interesting and deep insight into the topic, which will cover that of the very minute number ambidextral individuals in our society.

A study was done on Annett's theory that left-handedness is maintained by a balanced polymorphism and left-handers are intellectually more advantaged. In their study (N=429) undergraduates were given tasks assessing hand preferences, hand skill, skill asymmetry, and intellectual ability. Results showed no evidence to support Annett and Mariam contention that handedness is maintained as a balanced Polymorphism by the intellectual advantage shown by heterozygous relative to homozygous (Annett and Mariam, 1993).

It has been proposed that perception has direct relationship with intelligence of a person and studies have indicated that perceptual power of left-handers is more specialized than that of right-handers because of the dominance of right-hemisphere (Myers, 2001).

Educational experiences are positively correlated with scores on IQ tests and information processing task. Nevertheless most IQ differences that are of concern are those that are well within the normal range and might be systematically modified by optimal structuring of the learning environment (Murphy, 1998). Different studies acknowledge a crucial role for environment in the development of intelligence and it is further supported that IQ can be improved by training. It is stated that IQ influence by the length of time person passed in school so indirectly. It means that education affects the level of intelligence (Steinberg, 1990).

Researchers investigated IQ test performance with respect to the educational level, health, and mood states. Factor analysis revealed that IQ test performance was dependent primarily on education and to a lesser degree health and mood. At post-test education become an even more significant factor and health and mood more non-significant factor (Gunther *et al.*, 1981).

Handedness and Cognitive Outcomes

One common argument suggests that the larger corpus callosum and greater bilateral activation exhibited by the left-hander allows for faster connection between ideas and thus more creativity. According to this theory, the left-hander should excel at tasks requiring divergent thinking, where the individual begins from prior knowledge and works outwards toward new concepts, as opposed to convergent thinking, where the individual applies knowledge and rules toward discovering a unique solution to a problem. In a series of experiments, Coren (1995) found that left-handed males performed better on some divergent thinking tasks. The effect was however, neither consistent across tasks nor significant for left-handed females. The empirical evidence for greater creativity among the left-handed is, it turns out, fairly weak.

Also fairly weak is the evidence that the left-handed are disproportionately represented at the high end of the cognitive spectrum. Evidence purporting to show that left-handed individuals suffer from one or more serious

problems such as selection bias, small sample size, or mixed results (Benbow, 1986; Halpern, Haviland and Killian, 1998; Perelle and Ehrman, 2005).

Much clearer is evidence that the left-handed are disproportionately represented at the low end of the cognitive spectrum. The rate of the left-handedness among those considered mentally retarded is between 20% and 28%, roughly twice the rate in the general population (Perelle and Ehrman, 2005). This may be as a result of discrimination that left-handed people experience daily in school, home and workplace. Discrimination leads to low self-esteem and low self-esteem causes drastic reduction in cognitive ability. Early in life, parents forced left handed children to use right hand, which in turn affect their cognitive ability. This is mostly practice in Africa. Such cultural practice should not continue as our study shows that left-handed people are more intelligence than predominantly right handedness and they do well in politics and society at large. Examples of left-handed former U.S presidents are: James A. Garfield (1831-1881) 20th, Herbert Hoover (1874-1964) 31st, Harry S. Truman (1884-1972) 33rd, Gerald Ford (1913-) 38th, Ronald Reagan (1911 -) 40th, George H.W. Bush (1924-) 41st, Bill Clinton (1946-) 42nd, Barack Obama (1961-) 44th. On average, left-handers seems to have an edge when solving demanding mathematical tasks. Also, being strongly right-handed may represent a disadvantage for mathematics. Taken together, these findings shows that handedness, is an indicator or rather influencer of cognition to some extent.

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