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A review on Handedness and its role in cognitive functioning

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Abstract: ***Homo sapiens, i.e., human beings, are considered unique from other species because we possess higher mental abilities, which other species do not. This uniqueness is the reason why life on earth is witnessing technological advancements in every aspect. Even if our mental capacities know no limits, there exists a difference between each individual on almost every factor. One such factor of difference is Handedness.***

Key Words: Homosapiens, Human, unique, species, mental abilities, uniqueness, technological.

The natural fondness for using one hand more than the other in performing special tasks depending on which hemisphere is dominant for the task is known as Handedness (Rice, 1998). People are said to be right-handed if they use the right hand most of the time and left-handed if they prefer the left hand. Approximately 10-13% of the population in the world is left-handed. If an individual uses both hands equally well and approximately on equal amount of the time, he /she is referred to as ambidextrous. Generally, the likelihood of males to become left-handed is three times higher than the prediction for females (Habib, 2000). The reason for Handedness is sometimes explained by the dominance of the left or right hemisphere of the brain. This preference for using one side of the body more than the other in performing special tasks depending upon which hemisphere is dominant (Rice, 1993; Cardwell, 2003) is known as lateralization. If the left hemisphere of a person is more dominant than the other, the person tends to be right-handed. On the other hand, if a person's right hemisphere is more dominant, the person tends to use the left hand more than the other. Studies have revealed that the left hemisphere is important for language, logical decision making, in performing an analytical task, mathematical calculation, and performing fine motor skills (Ferrari 2007). Cognitive processes are generally defined as the abilities that enable us to "think" which include the ability to concentrate, remember, and learn. It is the method used by the central nervous system to process information and include knowing, understanding and awareness (Shimoda, 2008).

This paper is an attempt to decipher the existing literature on Handedness, and how does it impact further cognitive functioning. It also aims to suggest promising research areas where knowledge of Handedness may provide new insights.

Handedness and cognitive functions- Most often, it is widely assumed that those who are left handers possess lesser abilities but various researches have summarised that enhanced abilities are associated with left Handedness (McManus, 1997). Left Handedness is more common in Musicians, mathematicians, architects, artists and cricket players (Rice,1998). Studies also reveal that Handedness is somewhat related to intelligence level (McManus,2002). The literature available on Handedness provide a range of findings. Some reveal significant difference between left handers and right handers on cognitive variables while some research findings reveal that there is no significant difference between people due to hand preference. Moslem Abbasi et al (2011) conducted a study on Survey of Relationship between creativity and Lateral dominance in guidance school students with 60 male students (30- right-handers, 30 left-handers). The results showed that Left-handed Students showed higher creativity than right-

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handers. The relationship between creativity and lateral dominance was not significant.

Faurie et al. (2008) explored the relationship between socio-economic status and Handedness in two cohorts of French data. Only weak correlation was found between Handedness, education and income, with left handers females found to be more represented in higher education level.

James and Orlebeke (2002) in their study revealed that there must be at least one environmental determinant of Handedness, with low birth weight being strongly associated with left Handedness. Similarly, prenatal exposure to maternal depressive symptoms and critical life events are associated with increased risk of non-right-handedness (Rodriguez and Waldenström, 2008).

When right handers and left handers are compared on their performance, left handers tend to perform poorer on attention, language, learning, memory and executive functioning task (Andrea Assis et al. 2016). A study on Effect of Handedness on Intelligence Level of Students (N=150; left-handers=75, right-handers =75) by SabaGhayas and Adnan Adil (2007) using Laterality Assessment Inventory and Raven Standard Progressive Matrices Test indicated that left handed participants were significantly more intelligent than the right handed participants.

Another study on the same aspect by using Edinburgh Handedness Inventory and Raven's Progressive Matrices to assess Handedness and intelligence concluded that left-handers were more intelligent than right-handers (David, S.J. and Rajasankar, S., 2016). Johnston et al. (2013) conducted a study on Handedness, health and cognitive development in children. It was found that left-handed children had significantly lower cognitive development test scores than right-handed children with the exception of reading and no strong evidence was found for the left-handedness effect differs by gender or age. J. Al-Hashel et al. in 2016 conducted a study with 217 students (7 to 10 years) on association of Cognitive Abilities and Brain Lateralization among Primary School Children in Kuwait (Tool-Cambridge Neuropsychological Test Automated Battery). Result showed that Right-handed children had superior visuo-spatial abilities, visual memory and better scores in reaction time tests which incorporated elements of visual memory. Left handers also performed better in memory and attention task as compared to right handers where the sample size was 60 females (left-hander=30 and right hander=30; age-range= 18-25 years). The preference given to one hand as compared to the other is guided by various biological, physiological and environmental factors. The interplay of these factors determine performance of students (Chaudhary, S. et al., 2009).

Conclusion- Thus, the paper tries to argue that since there is less consistency in the findings of the studies on Handedness, it provides an impetus to the researchers to delve deeper into laterality and its associated aspects. As some researchers opine that right-handers perform better than left-handers on memory, attention, executive functioning, language and learning (Andrea et al.(2016); J.AlHashel et al. (2016); Johnston et al. (2013)) while as the same time some of them investigated that left-handers being more intelligent, creative and scoring higher on memory and attention task than right-handers (Chaudhary, S. et al., (2009); David, S.J. and Rajasankar, S. (2016); Moslem Abbasi et al. (2011); SabaGhayas and Adnan Adil (2007)). Through the review on Handedness, the present paper put forward the need to address the existing gap in the literature through extensive empirical research.

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