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Effects Of Stimuli on Hemispheric Potential in Intellectual Disability: An Experiment

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***Abstract*—The two hemispheres of the human brain (the right and left hemispheres) consist of several areas that are related to a particular physiological function of the body. The right hemisphere controls the left part of the body, while the left hemisphere controls the right side of the body. A case study was conducted on a 22-year-old male with moderate intellectual disability in which organs located on the right side of the body (e.g., the eye, ear, and right hand) were stimulated with external stimuli to increase the potentiality of the left hemisphere. The intensity of stimulation was accomplished with a time-specific learning plan. Assessment was done by identifying the hemispheric potential by pre- and post-testing the Hemispheric Dominance Inventory (1995) and BASIC-MR (Reeta Peshawaria, S. Venkatesan, Publisher, NIMH,1992). The results of the experiment showed that the potentiality of the left hemisphere was increased by stimuli. By identifying damage to the right and left hemispheres, it is easier to learn tasks related to the healthier hemisphere. The study found that specific training with an external stimulus enhanced left hemisphere qualities.**

***Indexed Terms*— Brain Hemispheres, Intellectual disability, Learning, Stimulation**

I. INTRODUCTION

Studies show that the two hemispheres of the brain (the right and left hemispheres) function interdependently. The left-brain and right brain theories were coined in the 1960s by a psychologist named Roger W. Spree. According to him, each of them has a role in the processing of information, although others are more effective at some tasks. The process is called brain lateralization. The degree of lateralization of the brain is not the same for everyone. A right hemisphere is responsible for the control of the left side of a body and has creativity, art, awareness, holistic thought, imagination, intuition, insight, music, and 3D forms. A left hemisphere is responsible for the control of the right side of a body and has working language, analytical thought, logic, science and mathematics, writing, and number skills. These physical functions and psychological abilities are affected by brain damage and some other developmental issues. One of these issues is intellectual disability. DSM-5 defines intellectual disability as neurodevelopment disorders that begin in childhood and intellectual difficulties in conceptual, social, and practical areas. A variety of tasks may follow patterns that suggest hemispheric dominance to some extent (Ghazniga, 2005).

The left hemisphere has been shown to be superior for the formation of associations in memory, selective attention, and positive emotions. The right hemisphere, on the other hand, has been shown to be superior in pitch perception, arousal, and negative emotions (Ehret, 2006).

In order to learn more in the context of various studies, this experiment was encouraged. This experiment has been taken as the basis for knowing the speed of learning and other behaviors induced by stimulation of the brain by external stimulation of a particular part of the body.

II. RESEARCH METHODOLOGY

A. Research design

The experiment was done by using single case study approach with ex-post facto design and repeated measures design.

B. Method

Before using the intellectually disabled subject in an experiment, the consent of their parents was obtained. The object of the experiment was explained to his parents. It was only a teaching process, so there was no need for an ethical committee.

An experiment was done on a moderately intellectually disabled male (inclusion criteria). There was no other disability in it (exclusion criteria). It was found out from medical history. A Bhatia battery test (C. M. Bhatia, 1955) tested the level of his intelligence quotient (*IQ*). The percentage of brain damage was determined by the Bender Visual Motor Gestalt Test (Bender, lauretta, 1938). It is a test used in all age groups to help identify possible learning disabilities, neurological disorders, intellectual disabilities, or developmental delays. Test results also provide information about specific abilities, including motor coordination, memory, and organization. Then the active hemisphere of the brain was detected using the Hemispheric Dominance Inventory Test (HDIT) (1995) to determine which side of the brain, left or right is dominant. HDIT has been filled by information given by parents, his teachers, and an inspection of the subject. When this was known, in order to give more strength to the work related to it, more emphasis was given to the work related to it.

For example, the right hemisphere of the usability brain was less active in an experiment, and the left hemisphere was more active. Left-hemisphere functions are analytic thought, logic, language, reasoning, science and math, writing, and number skills. Work related to these was done to increase their capabilities.

Basic used The BASIC MR Test (Reeta Peshawaria, S. Venkatesan, NIMH, 1992) was used in the experiment. There are seven domains in this test. The domains were motor, ADL, language, reading-writing, number-time, domestic-social and pre-vocational-money. Each domain has forty items. In order to examine the concept of numbers and money in the subject, only the domains related to numbers and money were selected. A basic-MR test was used before the experiment to see the subject's learning level. A subject was taught the task of identifying an Indian currency by identifying the digits. This was accomplished by a specific teaching method with indirect stimuli. Learning growth was assessed over time by the BASIC-MR test after the interval.

C. Experimental Procedure

The Skip counting method was used to teach numbers. The order of numbers was from small to large. Number recognition was introduced through books and paper. The ability to read and write numbers was developed. Then the distinction between metal and coins was taught. The coins were 1, 2 and 5. The coins were made to be identified from both sides and selected according to their value. Identification of the number printed on the paper rupees and identification of the paper rupees from both sides were also taught. Difference between rough papers and actual rupees was explained. The number of rupees was increased as the recognition ability increased by the subjects. More stimulation was given to the sensory organs on the right side of the body (eyes, ears and hands).

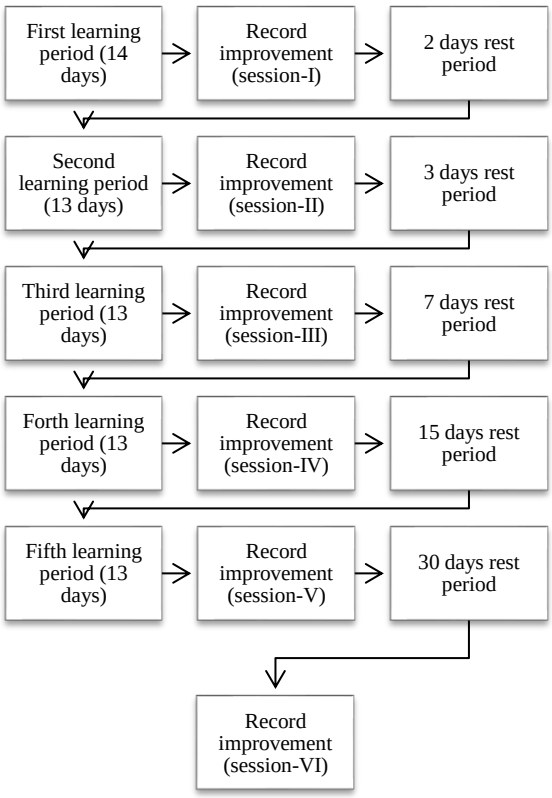

Figure 1: Method of learning session with specific time period

These stimuli included seeing objects with the right eye, listening to various sounds with the right ear and touching, holding most of the objects with the right hand. Daily attempts were tabulated.

The indexes use a special method in that they make a 4-month period and break pre-plan days (see figure 1). The subject output is filling in indexes by checking. From time to time, we found the percentage of assessments per month of BASIC-MR and the identity of improvement in learning. The trails of six sessions are filling in a separate index.

III. RESULT

In the present research work, data analysis has been done with the help of inferential statistics. Data from a BASIC-MR test were filled in, and the scores obtained were converted into percentages and tabulated. It shows up in Table 1.

Table 1: This table is give below only for a digits and money domain of four assessments.

Items	Domains (Digits And Money)							
40	Baseline Assessment		First Assessment		Second Assessment		Third Assessment	
	Score	%	Score	%	Score	%	Score	%
Total	65	32.5	131	65.5	165	82.5	187	93.5

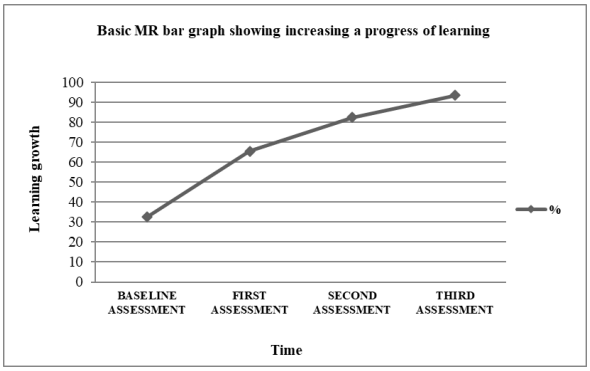

Figure 2: Basic MR bar graph showing increasing a progress of learning

The figure 2 was also tabulated after a similar time interval. The data from each assessment tabulated were placed in the graph between learning growth and time. The percentage increase in the line graph was observed between learning growth and time. A Bender gestalt test was redone, which also reduced the number of errors encountered.

IV. DISCUSSION

Some studies suggest that the relationship between language and emotion is related to the interplay of the two hemispheres; there is also a change in the ability of one of the two hemispheres to change the accuracy of the language. The change of language can be seen in the activation of the hemisphere in MRI (Scott K. Holland, 2007). These studies were paralleled on the basis of the hemisphere experiment. Data from the experiment show that a percentage increase in the line graph was observed between learning growth and time. It is seen that stimuli in the sensory organs on one side of the body increase the capacity of the hemisphere on the opposite side of the brain.

By identifying specific weak parts of a brain, if the tasks related to them are done with external stimuli from sensory body parts like the eye, ear, and limbs, then the ability of that hemisphere is increased, as well as those tasks being learned quickly. The use of special training with stimuli to increase the subject's hemisphere capacity was stimulated by a positive increase in his hemisphere-related work.

V. CONCLUSION AND IMPLICATION

A. Conclusion

The aim of this study was to find that stimulation in sensory organs on one side of the body increases the potential of the hemisphere on the opposite side of the brain, which statistically supports the data. By identifying damage to the right and left hemispheres, it is easier to learn tasks related to the healthier hemisphere. This experiment has helped in teaching easy to subject of special category as well as accuracy in the work related to their hemisphere. This experiment in neuropsychological rehabilitation gives a direction to rehabilitate special category subject.

B. Implication of the study

Different intellectual abilities and opposite hemisphere samples will be studied in the future. The findings of the experiment will be generalized to other categories of different intellectual abilities. Further study may provide new learning process of teaching in

neuropsychological rehabilitation for other categories of different intellectual abilities.

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