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Course: Psychology Cognition

Instructor:

Hemispheric contributions to nonverbal reasoning had been argued over time, yet in the study done, two kinds of nonverbal reasoning abilities such as spatial and proportional reasoning. Most of the participants in the experiment and study include patients with cerebro-vascular disease and those with stroke, since the measurement of the result is based on non-verbal reasoning. Under the experiment, the participants had undergone seven subtests which require them to use accurate memory and intelligence. According to Bates (2000) and Grodzinsky (200), most neurolinguistic studies find greater activation in the left hemisphere than in the right, (Matlin, 2005, p.309)

There are different hypothesis applied by researchers regarding hemispheric involvement in reasoning. In a study done by Langdon and Warrington, it found out that the left hemisphere plays a central role in problem solving and abstraction. Another study by Parsons and Osherson indicated that the right hemisphere is active for deductive reasoning while the left hemisphere is for inductive reasoning. Both deductive and inductive reasoning was further studied by Goel and Dolan (2004) wherein through MRI, the left frontal lobe activated for both type of reasoning without the necessary activation of the right hemisphere.

However, in some neuroimaging studies, it showed that the left hemisphere proved able to in both verbal and spatial reasoning yet the right hemisphere is uniquely purposed for spatial-problem solving tasks. According to Gensbacher & Kaschak, (2003), for many years, people thought that the right hemisphere did not play a role in language processing. However, we now know that this hemisphere does perform some tasks, (Matlin, 2005, p309.)

There are also studies which aim to determine the action of both hemispheres which involve decision-making tasks. In this study, it observed that patients with right hemisphere abrasions have a difficulty in reasoning with specific situations due to incomplete information. For instance, in a study done by Milner and Petrides (1984) it proposed that the left frontal lobe mediates self-produced plans and decisions while the right frontal lobe is responsible for monitoring the events. Goldberg, Podell and Lovell (1994), also found out that,

The left prefrontal system guides cognitive selection by working memory, intermediated internal contingencies, whereas the right system makes selections on the basis of environmental contingencies. (Goldberg, Podell and Lovell, 1994)

In relation to this study, researchers used several populations, especially those patients with brain deficiencies such as cerebro-vascular disease, major completed stroke, thrombosis, hemorrhage and aneurysm. Included in the population are samples of patients suffering from stroke and the specific samples used in the test includes the first patient used as a sample has a right internal artery endarterectomy with ruptured anastomosis which resulted to severe hemorrhage. Another patient used as a sample is a man suffering from stroke which resulted to left hemiplegia and left facial weakness.

The test done to these samples is assessed through HCT wherein abstraction and conceptual reasoning is measured by presenting a number of tasks to determine correctness of response. A specific number of these samples include, 27 patients with right hemisphere stroke (RH group), 19 patients with left hemisphere stroke (LH group), and 47 patients with multifocal or diffuse cerebrovascular disease (DIF group).

The items included in the test include Roman numerals, letters, solid and dashed lines, human stick figures,

and geometric figures. It could be observed that the samples used for the test are mostly composed of patients with brain deficiencies and patients aged 50 and above with an average of 10 years of education. With this kind of samples, it could be perceived that the previous lives of these sample patients were normal and their brains were fully functioning. However, due to the unexpected stroke and brain deficiency experienced in the final stages of their adult life, it was hard for them to recover and these patients make credible samples for the test.

The test undertaken by the patients are divided into seven subtests. According to the article, Subtest I requires one to match Roman Numerals with the appropriate numbered keys, while Subtest II involves a screen wherein participants should match the number of items to the correct key. Subtest III, on the other hand, involves the concept of uniqueness and oddity and Subtest IV is regarding quadrant–response key relationship. Subtest V and VI describes the principle of proportion and Subtest VII summarizes or reviews Subtests I to VI.

The experiment done to the participants could be described as a true experiment because it has specific number and characteristic of subjects chosen which had undergone several tests. A true experiment also has a specific time frame for which the treatment or tests would be applied and at the end of the test it was interpreted and summarized for conclusion.

A simple definition of a research variable is described as any characteristic that can take on more than one value. Some of the variables included in experiment would be speed and accuracy of recognition, originality and proportionality, level of intelligence and time. These variables are measured based on the subtests undergone by the participants, wherein end results would prove the patient's ability to recognize and to ensure correctness.

The only problem with the research is that physical status of the participants while the tests are conducted. Also, any accidental attacks of the deficiencies from the participants would cause the whole experiment to repeat from the start. The experimenter should, then, make sure that medical first–aid is prepared as the experiment is on–going.

The procedures though focused more on maximizing the use of memory and intelligence would seem quite uncomfortable for the participants since, they are patients mostly suffering from stroke. Though the test seemed easy, for people with brain deficiencies, these tests require them to involve string efforts in order to be good participants in the experiment. The experimenter should also try using normal mute participants in order to make the experiment more credible and reliable without harming anyone.

The result of this experiment was that the only difference is the percentage of errors on spatial positional reasoning compared to proportional reasoning factors. According to the research,

We (the experimenter) found no difference in factor score levels across groups and no group difference for any of the factor scores taken individually, but a difference was found in the difficulty level of the factor scores across the three groups. If not associated with specific lateralized dysfunction, these results may be associated with general ability levels across groups. In this context, grip strength was considered as an index of neurological physical disability, and IQ and the AIR, as general indicators of cognitive ability.

The participants did well in the Subtests II and II, mean of 0.17 (SD = 0.61) errors for I and 1.54 (SD = 2.22) for II. The differences among the group of participants for the subtests were insignificant, $F(2, 106) = 0.91$, $p = .40$, for Subtest I and $F(2, 106) = 1.44$, $p = .24$, for Subtest II. The two factor scores are related to the general cognitive yet with no physical neurological values. The findings of Goldberg, Podell and Lovell also suggested that internal representations involving working memory by the left hemisphere and information intake with the right hemisphere. According to Langdon and Warrington (1997),

Both hemispheres are required for solving problems requiring arithmetical reasoning and demonstrated this to be the case in patients with lateralized lesions, much like those examined in the current study. The lack of difference between the right and left hemisphere groups on the Proportional reasoning task in the current study is consistent with the involvement of both hemispheres in reasoning tasks that involve computing proportions and perhaps other arithmetical abilities.

References:

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