International Journal of Psychosocial Rehabilitation, Vol. 24, Issue 08, 2020
ISSN: 1475-7192

GENDER DIFFERENCES IN VISUOSPATIAL WORKING MEMORY

[1]Safal Srivastava, [2]Reetika Pal

Abstract

Visual-spatial working memory measures are widely used in clinical and experimental settings. Sex differences in visual-spatial working memory have important implication for research, theory, and practice, but they have yet to be quantified. The objective of this research is to study the gender differences on the visuo-spatial working memory. Since there aren't enough researches regarding the relationship of gender and visuo-spatial short term memory, so this research studies the direct relation among these variables and though working memory ideal models are broadly utilized in neuro-scientific and mental research, definitive information about potential variables, for example, sexual orientation is as yet absent. This study was conducted on 50 individuals (25 males and 25 females) among the age of 18 - 25 years. The tool utilised in this study is Corsi Block Test, which is a test that surveys visuo-spatial working memory. The result obtained shows that there is no significant difference in the visuo-spatial working memory of males and females.

Keywords:- *Visual-Spatial working Memory, Gender Differences*

I. INTRODUCTION

Memory is the capacity to learn, store it, and review it at a later time. In psychology, memory is broken into three phases: encoding, storage, and retrieval.**Encoding (or registration):** the way toward accepting, handling, and joining data. Encoding enables data from the outside world to achieve our faculties in the types of substance and physical upgrades. In this first stage we should change the data so we may put the memory into the encoding procedure.**Storage:** the formation of a perpetual record of the encoded data. Capacity is the second memory stage or process in which we keep up data over timeframes.**Retrieval(or recall, or recognition):** the getting back to back of put away data in light of some signal for use in a procedure or movement. The third procedure is the recovery of data that we have put away. We should find it and return it to our awareness. Some recovery endeavours might be easy because of the kind of data. **Short-Term memory** is otherwise called **working memory**. It holds only several things (investigate exhibits an extent of 7 +/ - 2 things) and continues for around 20 seconds. Regardless, things can be moved from without a moment's hesitation memory to long haul memory by methods for techniques like practice. An instance of training is the time when someone gives you a phone number verbally and you say it to yourself on and on until the point when the moment that you can record it. If someone barges in on your training by making a request, you can without quite a bit of a stretch

[1] Student of Bachelors of Arts, Amity Institute of Behavioural and Allied Sciences, Amity University, Lucknow Campus
[2] Assistant Professor, Amity Institute of Behavioural and Allied Sciences, Amity University, Lucknow Campus

Received: 18 Apr 2020 | Revised: 09 May 2020 | Accepted: 02 Jun 2020

ignore the number, since it is simply being held in your short term memory. **Alan Baddeley**(1986,1992) has presented the most total clarification of a multicomponent translation of working memory. As per Baddeley, working memory is a three-section framework that incidentally holds and controls data as we perform intellectual assignments. His emphasis on the control of data implies that working memory is more similar to a workbench where material is always being taken care of, joined, and changed. Baddeley proposed three segments for working memory: a phonological loop, a visuospatial sketch pad, and a central executive (Baddeley, 1986, 1988, 1992; Baddeley and Hitch, 1974).

Recent research by Martin (1993) states neuropsychological evidence for a different phonological loop. Martin tried a lady known as E.A. who exhibited ordinary sentence comprehension. Be that as it may, she demonstrated a quite certain shortage for recollecting phonological data. **Visuo-spatial Sketch Pad:** According to Baddeley's model, the another component is the visuospatial sketch pad. This component stores visual and spatial information. The limit of the visuo-spatial sketch pad is restricted (Frick, 1988, 1990). At the point when such a large number of things are provided to the sketch pad, you can't speak to them precisely enough to be effectively recovered. The limits of the phonological loop and the visuo-spatial sketch pad are independent.As Baddeley and Hitch (1974) examined, an individual can practice numbers in the phonological circle while settling on choices about the spatial game plan of letters on the visuo-spatial sketch pad.

In a study conducted by Dario, Vincenzo & Arturo Orsini (1980), spatial span (Corsi's block-tapping test) and verbal span (Wechsler Digits Forward test) were measured in 300 medical students (150 males and 150 females). Significant differences pointing to a better performance of males were found on both spatial span (p less than 0.001) and verbal span (p less than 0.05).

In a study conducted by Daneman& Carpenter (1980), individual differences in reading comprehension may reflect differentiates in working memory limit, especially in the trade off between its handling and capacity limits. A poor peruser's methodology may be inefficient, with the objective that they diminish the proportion of additional information that can be kept up in working memory. A test with overpowering planning and limit demands was considered to check this trade off. Subjects read so anybody may hear a movement of sentences and thereafter assessed the last articulation of each sentence. The examining length, the amount of definitive words surveyed, vacillated from two to five for 20 understudies. This range related with three scrutinizing understanding measures, including verbal SAT and tests including truth recuperation and pronominal reference. Practically identical connections were gotten with a listening territory task, showing that the association isn't specific to scrutinizing. These results were emerged from traditional digit range and word length gauges which don't interface with comprehension.

In a study conducted by Cornoldi&Vecchi (2004), the concept of working memory has acquired a crucial role within cognitive psychology. Its significance lives in the way that the human personality can't work without the help of a brief memory framework, holding and handling data to do subjective errands. Triumphs and disappointments in numerous exercises could then be expected to, separately, an effective or frail working of working memory. In this volume, examination is done on the particular qualities of the visuo-spatial segment

of working memory, thought to be basic in an assortment of human exercises like observation, activity, symbolism, or introduction. The exertion was coordinated towards two primary objectives.

The primary objective was to investigate the association and highlights of visuo-spatial working meory inside the more broad structure of the working memory framework. The second objective was to analyze the ramifications of visuo-spatial working memory restrictions in the investigation of particular populaces who, for various reasons, are differentially influenced by them. These two objectives are entirely interconnected, defending our way to deal with the investigation of working memory from an individual contrasts point of view.

In a study conducted by Lih-Juan ChanLin (1999), where learning assignment included representation of dymanic forms, distinctive working capacity of here and now and the utilization of review methodologies among students ought to be considered. The examination was to investigate sex contrasts in learning and procedure utilize when diverse visual controls (self-controlled versus framework controlled) were given. From a 2*2 ANOVA test, the primary impacts were both critical for visual control ($p<0.05$) and sex contrasts ($p<0.05$). Among young men who utilized secret methodologies for handling visual data, the contrast between medications is critical ($p<0.05$). Be that as it may, among young ladies who utilized unmistakable methodologies, the thing that matters is inconsequential ($p<0.05$).

In a study conducted by David, Mirjana, Henning & Oliver (2016), they used functional magnetic resonance imaging to investigate the effects of gender on verbal and visuo-spatial working memory maintenance tasks in a large and homogeneous sample of young healthy subjects. The discoveries demonstrated critical sex impacts on both the social and neurofunctional level. Females displayed burdens with a little impact estimate in both working memory areas joined by more grounded enactments in an arrangement of mind districts (counting reciprocal substantianigra/ventral tegmental region and right Broca's territory) autonomous of working memory methodology. As load and errand trouble impacts have been appeared for a portion of these districts, the more grounded enactments may mirror a somewhat lower limit of both WM areas in females. Guys demonstrated more grounded respective intra-parietal initiations by the precuneus which were particular for the visuo-spatial WM undertaking. Action in this particular locale might be related with visuospatial here and now memory limit. End: These discoveries give proof to a somewhat lower limit in both working memory modalities in females.

Study by Susan Loring-meier& Diane F. Halpern: The cognitive processes underlying these differences were investigated using laboratory tasks developed by Dror and Kosslyn (1994). Four psychological parts of visuospatial working memory were surveyed—picture age, support, filtering, and change—while attempting to recognize the fragments that would show differential effects for females and folks. The picture age assignment required recovery of shape data from long haul memory, age of a visual picture in working memory, and use of the data about the shape in a choice errand. The picture upkeep errand required just the last two procedures. The data preparing requests required by filtering and pivot errands originated from the need to change the visual picture with the goal that it could be utilized in basic leadership. Guys reacted all the more rapidly on each of the four errands (ds somewhere in the range of .63 and .77), with no between-sex contrasts in precision. We

reasoned that speed of preparing is key to understanding sex contrasts in visuospatial working memory. We examine ramifications of these discoveries for execution on certifiable visuospatial undertakings.

The present meta-analysis by Daniel, Susan & Jean quantified the magnitude of sex differences in visual-spatial working memory and examined variables that might moderate them. The examination utilized an arrangement of 180 impact sizes from solid guys and females drawn from 98 tests running in mean age from 3 to 86 years. Staggered meta-examination was utilized on the general informational index to represent non-autonomous impact sizes. The information likewise were dissected in isolated undertaking subgroups by methods for staggered and blended impacts models. Results demonstrated a little yet huge male favorable position (mean d = 0.155, 95 % certainty interim = 0.087-0.223). Every one of the errands delivered a male preferred standpoint, with the exception of memory for area, where a female favorable position developed. Age of the members was a noteworthy mediator, showing that sex contrasts in visual-spatial working memory seemed first in the 13-17 years age gathering. Expelling memory for area assignments from the example influenced the example of noteworthy arbitrators. The present outcomes showed male preferred standpoint in visual-spatial working memory, despite the fact that age and particular errand regulate the extent and bearing of the impacts. Suggestions for clinical applications, psychological model building, and test look into were talked about.

A study was conducted (Vuontela, Steenari, Carlson, Koivisto, Fjallberg&Aronen) which explored the impacts of age and sexual orientation on audiospatial and visuospatial working memory in a nonclinical test of school-matured youngsters utilizing n-back undertakings. The outcomes demonstrated that sound-related and visual working memory execution enhances with age, recommending useful development of fundamental intellectual procedures and cerebrum territories. The sex contrasts found in the execution of working memory assignments recommend a bigger level of youthfulness in young men than young ladies at the age time of 6– 10 yr. The distinctions saw between the acing of sound-related and visual working memory errands may show that visual working memory achieves utilitarian development sooner than the comparing sound-related framework.

Rationale of the study: Visual-spatial working memory measures are widely used in clinical and experimental settings. sex differences in visual-spatial working memory have important implication for research, theory, and practice, but they have yet to be quantified. The objective of this research is to study the gender differences on the visuo-spatial working memory. Since there are notmany studies regarding the relationship of gender and visuo-spatial short term memory, so this research studies the direct relation among these variables and Though working memoryideal models are broadly utilized in neuroscientific and mental research, definitive information about potential variables, for example, sexual orientation is as yet absent.Hence these variables are chosen. Studying about the gender differences would surely help in a lot of daily life applications such as division of jobs among the two genders and the study of the development of different skills and cognitive abilities of the two genders. It shows that there might be the presence ofsome neurological basis for these differences. It also opens up a wide range of options for further studies regarding the reasons for these differences.

II. METHODOLOGY

Objective: To study the gender differences on the visuo-spatial working memory using Corsi Block-Tapping Test.

Hypothesis: The visuo-spatial working memory of males will be better than that of females.

Independent variable: Gender

Dependent variable: Visuo-spatial working memory

Manipulation of Independent variable: Two groups of subjects were taken - males and females.

Measurement of Dependent variable: Corsi block-tapping test was used to measure the visuo-spatial working memory of the subjects.

Sample age and size: This study was conducted on 50 individuals (25 males and 25 females) among the age of 18 - 25 years.

Corsi Block-Tapping Test: It is a test that surveys visuo-spatial working memory. In this test, members are given a screen of 9 boxes. The boxes light up in a pre-settled arrangement and members are told to tap on the containers in a similar request they were lit. The arrangement length begins at a dimension of 3 boxes and can increment up to a length of 8 boxes being lit. The outcome turns out as BLOCKSPAN: the longest arrangement length that was effectively imitated at least twice.

III. RESULT & DISCUSSION

	Mean	Standard Deviation (SD)	SEd	tvalue	Degree of Freedom (df)	Significance
MALES	5.13					
		0.9952	0.3633	0.3578	28	t < 0.05 t < 0.01
FEMALES	5					

The above table shows that the obtained value of t is non-significant at both 0.05 & 0.01 levels of significance.

The mean score of males is 5.13 while the mean score of females is 5. The Standard Deviation (SD) obtained is 0.9952 while the Standard Error of the differences (SE_D) is 0.3633. The t-value is 0.3578 which is non-significant at both 0.05 & 0.01 levels of significance.

The value of t obtained is 0.3578 which is non-significant at both 0.05 & 0.01 levels of significance.

The objective of this research was to study the gender differences on the visuo-spatial working memory. For this, the Corsi Block-Tapping test was used. The hypothesis was-

The visuo-spatial working memory of males will be better than that of females.

The result obtained shows that there is no significant difference in the visuo-spatial working memory of males and females. The hypothesis formed is thus rejected and therefore, the null hypothesis is accepted i.e. there exists no significant difference in the visuo-spatial short term memory among both the groups.

The subjects of both the groups have been really active during the test. They found it quite interesting to perform and have been really really keen to know about their performance. So, factors such as the interest, the active participation and the attention they paid to the test could possibly be the basis of this result.

REFERENCES

1. Berch, D. B, Krikorian R. &Huha E. M. (1998) .“The Corsi Block-Tapping Task: Methodological and Theoretical Considerations.”*Brain and Cognition*. 38, 317–338.
2. Cornoldi, C.; Vecchi, T (2004). “Visuo-spatial working memory and individual differences” *Psychology Press*.
3. Corsi, P. M. (1972). “Human memory and the medial temporal region of the brain.”*Dissertation Abstracts International.*34 (02), 891B. (University Microfilms No. AAI05–77717).
4. Daneman, M.; Carpenter, A.P (1980). “Individual differences in working memory and reading.” *Journal of verbal learning and verbal behaviour*. 19(4), 450-466.
5. Kessels, Roy P. C. , van Zandvoort, Martine J. E. , Postma, Albert , Kappelle, L. Jaap and de Haan, Edward H. F.(2000) 'The Corsi Block-Tapping Task: Standardization and Normative Data'.*Applied Neuropsychology*, 7:4, 252 — 258
6. Lih-Juan ChanLin (1999). “International Journal of Instructional Media.” *Gender differences and the need for visual control.*(26-93), 329.
7. Loring-meier, S.; Halpern, D. F (1999). “Sex differences in visuospatial working memory: Components of cognitive processing.” *Psycho-nomic Bulletin & Review.*Volume 6, **Issue 3**, pp 464–471.
8. Orsini, A.; Grossi, D.; Matarese, V (1980). “Sex Differences in adults’ spatial and verbal memory span.” *Cortex* 16(2);339-40.
9. Smirni, P., Villardita, C., &Zappalà, G. (1983).“Influence of different paths on spatial memory performance in the Block-Tapping Test.”*Journal of Clinical Neuropsychology*.5, 355–359.

10. Trojano, L., Chiacchio, L., De Luca, G., Fragassi, N. A., &Grossi, D. (1994).“Effects of testing procedure on Corsi’s Block-Tapping Task in normal subjects and Alzheimer-type dementia.”*Perceptual and Motor Skills*, 78, 859–863.
11. Voyer, D.; Voyer, S. D.; Saint-Aubin, J.“Sex differences in visual-spatial working memory: A meta-analysis.”
12. Vuontela, V.; Steenari, M.;Carlson, S.;Koivisto, J.; “Audiospatial and Visuospatial Working Memory in 6–13 Year Old School Children.”
13. Zilles, D.; Lewandowski, M.; Vieker, H.; Gruber, O (2016). “Gender differences in verbal and visuospatial working memory performance and networks.” *Neuro-psychobiology.* 73(1):52-63.