

Gender differences in verbal working memory



**ASSIGN
BUSTER**

\n[[toc title="Table of Contents"](#)]\n

\n \t

1. [Method](#) \n \t
2. [Participants](#) \n \t
3. [Materials and Procedure](#) \n \t
4. [Results](#) \n \t
5. [Discussion](#) \n \t
6. [References](#) \n

\n[/toc]\n \n

In his book the physiology of behavior Carlson (2005) defines learning as the process by which experiences change our nervous system and hence our behavior, he referred to these changes as memories. Carlson identified two systems of memory, short term memory and long term memory Short term memory is the system in the brain that enables individuals to store limited amounts of information or events for a short period, in other for individuals to store larger amounts of information over an extended period, the second system of memory is required. Long-term memory is viewed as a permanent store of potentially unlimited capacity which stores information in terms of its meaning or significance to the individual. In essence the simplest model of memory process suggests that sensory information enters short term memory, rehearsal keeps it there, and eventually, the information makes its way into long term memory, where it is permanently stored.

For a number of years researchers have been interested in determining the differences in cognitive abilities between men and women especially in the

domains of spatial and verbal abilities (e. g. De Goede & Postma 2008, Vuontela, Steenari, Carlson, Koivisto, Fjällberg, & Aronen 2003). Evidence from neurophysiological and behavioral data proposes that the prefrontal cortex may be sexually differentiated in nonhuman primates. Duff and Hampson (2001) conducted a study that examined whether there are sex differences in working memory in humans that might reflect sexual differentiation of the human prefrontal cortex. Working memory is defined as the ability to temporarily store and hold information " on-line" for a brief period of time while other cognitive decisions or operations are taking place and the ability to manipulate that information or use it to guide action. Male and female participants were administered a novel multi trial spatial working memory task and a verbal working memory task. A total of three Studies were conducted, analysis of their findings indicated that females took significantly less time to reach each condition and made significantly fewer working memory errors than males on the Spatial working memory task. It is however important to note that the female advantage was not accounted for by differences in general intellectual ability, attention, perceptual speed, incidental memory, or speed of verbal access. In the 3rd study, a sex difference was also observed on a measure of verbal working memory. Their findings indicate that some prefrontal functions may be sexually distinguished in humans.

Voyer, Postma, Brake & Imperato-McGinley (2007) conducted a meta-analysis that investigated 123 effect sizes derived from 36 studies to quantify the magnitude of gender differences in object location memory tasks by using a hierarchical approach. They define Object location memory

as the cognitive ability that allows individuals to recall the locations of and relationships among specific objects, and functions in everyday life. Object location memory aides us remembering where we left certain items (e. g., cell phone, IPod, etc.) and in exploring our environment (e. g., identifying the location of mechanical equipment in the garage). Object location memory tasks usually instruct participants to make decisions about an array of objects each with a specific location (Lejbak, Vrbancic & Crossley 2009). The researchers conducted the study by investigating and analyzing object location memory tasks (86 effect sizes) and Object identity memory (37 effect sizes) separately. One independent variable in the study is the ex post facto variable of gender. It is defined as male vs. female. Object identity memory task showed significant gender differences that were consistent and in favor of women. As For the object location memory tasks, the effect sizes had to be separated by age (below the age of 13, between the ages of 13 and 18, 18 and above), object type (common, uncommon, gender neutral, geometric, masculine, feminine), scoring method (accuracy, time, distance), and type of measure (recall, recognition) to achieve homogeneity. The results of the study revealed a significant gender difference in favor of females in all the clusters above the age of 13, with the exception of feminine, uncommon, and gender-neutral objects. Male participants tested significantly in favor of objects and measures of distance.

Lejbak, Vrbancic & Crossley (2009) conducted a study to investigate if the female advantage in object location memory is robust to verbalizability and mode of presentation of test stimuli. Their study encompassed a total of 40 participants, 20 males and 20 female college students. The study required

the participants to perform in two different tasks (manual and computer generated) using stimuli that varied in degree of verbalizability. Analysis of the data was conducted using 2 × 2 × 3 ANOVA with Sex as a between-subjects factor, and Presentation and Stimuli as within-subjects repeated measures revealed a significant main effect for Sex. Females performed better and made fewer errors than males in both tasks. Their findings were construed within the context of the current literature that demonstrates a female advantage for object location memory.

Researchers have also geared some of their studies in an attempt to identify particular brain and neurological structures that facilitate the female advantage on different spatial tasks. For example; Alexander, Packard and Peterson, (2002) conducted a study that examined the Sex and spatial position effects on object location memory following intentional learning of object identities. A total of 51 participants were used in the study, 25 females and 26 males using the Silverman and Eals Location Memory Task, which measured memory for object location relative both to veridical center and to eccentricity. A subset of participants (17 males and 13 females) were administered a measure of implicit learning and the mirror-tracing task. The results indicated that there were no sex differences were observed in memory for object identities. In addition, it was discovered that the memory in both sexes for object locations was better for peripherally located objects than for centrally located objects. In contrast to these findings the authors were surprised to discover an observed advantage for females over males in the recovery of object locations in the right compared to the left visual hemisphere. Furthermore, memory for object locations in the right hemisphere

was associated with mirror-tracing performance in women but not in men. In conclusion, these data indicate that the analysis of object identification and object features in the left cerebral hemisphere may also involve the processing of spatial information that may contribute to superior object location memory in females relative to males.

In a study conducted by Berenbaum, Baxter, Seidenberg, & Hermann(1997). The researchers studied the role of the hippocampus in sex differences in verbal memory. The authors examined the neural and cognitive bases for sex differences in verbal memory in 57 patients who underwent left anterior temporal lobectomy, for the treatment of intractable seizures. The results of the study led the researchers to conclude that women recalled more words than men both before and after surgery, regardless of the extent of hippocampal damage. Their results also indicated that the extent of hippocampal sclerosis was related to memory loss in both men and women. Based on their findings it was also evident that women were more likely than men to use semantic clustering both before and after an anterior temporal lobectomy. Given the evidence, the results suggest that sex differences in verbal memory are not due to differences in the integrity of the left hippocampus.

Vuontela, Steenari, Carlson, Koivisto, Fjällberg & Aronen (2003) conducted a study to investigate the effects of age and gender on audiospatial and visuospatial working memory. The population was drawn from a sample of school age children between the ages of 6-13 years old and a mean age of 9.9 years. A total of 66 school aged children were used in the study, twenty four children between the ages of 6-8 (12 males, 12 females), Twenty
<https://assignbuster.com/gender-differences-in-verbal-working-memory/>

children between the ages of 9-10 years old (12 males, 8 females) and twenty two children between the ages of 11-13 (10 males, 12 females). The Participants were required to perform 3 tasks, the 0-back, 1-back, and 2-back visuospatial and audiospatial tasks. An analysis of variance for repeated measures (ANOVA) was used to analyze the data. Based on this analysis the researchers concluded that auditory and visual working memory performance improves with age, suggesting functional maturation of underlying cognitive processes and brain areas. The results also steered the authors to conclude that the observed differences between the mastering of the auditory and visual working memory tasks may be due to the visual working memory system reaching functional maturity earlier than the auditory system. On a final note the evidence suggested that gender differences found in the performance of working memory tasks was largely influenced by the level of immaturity in boys than girls between the ages of 6-10 years old.

The goal of this study is to examine the gender differences in verbal memory and determine if females would perform better than males on verbal memory tasks.

Method

Participants

All participants, males (17 males, $M_{age} = 22.4$ years, age range: 19-25 years) and females (52 females, $M_{age} = 23.1$ years, age range: 20-25 years) were recruited from the California State University Northridge psychology department. Participants were recruited through departmental efforts which encouraged psychology students to participate in a study.

<https://assignbuster.com/gender-differences-in-verbal-working-memory/>

Materials and Procedure

On the verbal tasks, the researchers selected 15 words, derived from Andre Rey Auditory Verbal learning Test (RAVLT) which was orally dictated to the participants, after which the participants were asked to recall as many words on the list they could remember in any order. This process was repeated on the first five trials, which are termed the learning trials (sometimes called List A). After the first five trials a new list (list B) was read out loud commonly referred to as the interference trial, followed by free recall by the participants. Trial seven followed immediately after the recall and required the participants to recall as many words as they could from list A, this recall was conducted without rereading list A to the participants. After a 20 minute delay, trial eight was administered in the same manner as trial seven (without reading the list). Finally a recognitions test was administered in which 30 words were read aloud and the participants were asked to indicate whether or not the word was on the list. Participants were not timed for their responses and the total number of correct words was recorded.

Results

This study was conducted to examine the gender differences in verbal working memory. Analyses, focuses on participants responses on the Rey Auditory Verbal learning Test. Means for the total numbers of words recalled are shown in table 1. The results showed that overall, females performed better on verbal memory tasks ($M = 7.92$; $SD = 1.939$) while the males responses recorded was ($M = 7.3$; $SD = 2.090$).

An independent samples t test on the difference between means was statistically significant ($t(66) = 2.075, p = .045$). This is evidence that females perform better on verbal tasks than males.

Discussion

The goal of the research was to investigate the gender differences in verbal working memory. Subsequent research on the topic indicated that females performed better than males on verbal learning tasks. The researchers hypothesized that females would perform better than males on verbal memory tasks. The research supported the data as indicated by an independent samples t test on the difference between means which was determined to be statistically significant ($t(66) = 2.075, p = .045$). Although the result of the research was significant there are still several areas that need improvement. A major shortcoming of the study was the sample size which was unevenly distributed with female participants accounting for 75 percent of the population size and this uneven distribution could have had adverse effects on the results of the study. Also the population was not indicative of the overall population as the participants were all college level students. Due to the small population size, randomization was not attainable. Possibly, a second threat to internal validity was instrumentation.

After examining the current study, future modifications could be made to help minimize possible threats and to increase internal validity. Also, in the context of the current study, it is possible that the sample size is too small and a larger amount of sample with randomization may have created an opportunity for more accurate significant results.

Table 1

Participants Characteristics

Gender

Mean

Std. Deviation

Std. Error

Mean

Male

7.35

2.090

.507

Female

7.92

1.939

.269

Figure 1. Mean difference values (ms) representing the total amount of items recalled for targets. Gender differences were found in total amount of items recalled.

References

Alexander, G. M., Packard, M. G., & Peterson, B. S. (2002). Sex and spatial Position effects on object location memory following intentional learning of object identities. *Neuropsychologia*, 40, 1516-1522. doi: 10.1016/S0028-3932(01)00215-9

Berenbaum, S. A. , Baxter, L., Seidenberg, M., & Hermann, B. (1997). Role of the hippocampus in sex differences in verbal memory: Memory outcome following left anterior temporal lobectomy. *Neuropsychology*, 11, 585-591. doi: 10.1037/0894-4105.11.4.585

Carlson N., R.,(2007). *Physiology of behavior: Learning and Memory*. (pp 431-479) Boston, MA: Allyn and Bacon

De Goede, M., & Postma, A. (2008). Gender differences in memory for objects and their locations: A study on automatic versus controlled encoding and retrieval contexts. *Brain and Cognition*, 66, 232-242. doi: 10.1016/j.bandc.2007.08.004

Duff, S. J., Hampson, E. (2001). A sex differences on a novel spatial working memory task in humans. *Brain and Cognition*, 47, 470-493. doi: 10.1006/brcg.2001.1326

Lejbak, L., Vrbancic, M., & Crossley, M. (2009). The female advantage in object location is robust to verbalizability and mode of presentation of test stimuli. *Brain and Cognition*, 69, 148-153. doi: 10.1016/j.bandc.2008.06.006

Voyer, D., Postma, A., Brake, B., & Imperato-McGinley, J. (2007). Gender differences in object location memory: A meta-analysis. *Psychonomic Bulletin & Review*, 14, 23-38.

Vuontela, V., Steenari, M. R., Carlson, S., Koivisto, J., Fjällberg, M., & Aronen, E. T. (2003). Audio spatial and visuospatial working memory in 6-13 year old school children.

Learning & Memory, 10, 74-81. doi: 10. 1101/lm. 53503