



Faculty of Cognitive Sciences and Human Development

**GENDER DIFFERENCES IN VERBAL AND VISUOSPATIAL
WORKING MEMORY CAPACITY PERFORMANCE**

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UNIVERSITI MALAYSIA SARAWAK

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Final Year Project Report

Masters

PhD

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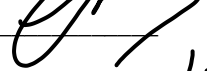
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**GENDER DIFFERENCES IN VERBAL AND VISUOSPATIAL WORKING
MEMORY CAPACITY PERFORMANCE**

NUR AIMI NADHIRAH BINTI MOHD AZMI

This project is submitted
in partial fulfilment of the requirements for a
Bachelor of Psychology with Honours

Faculty of Cognitive Sciences and Human Development
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ABSTRACT

This study aimed to investigate the gender differences in working memory capacity performance which focus on verbal and visuospatial working memory capacity performance based on total time taken and total number of correct recalled. This study used quantitative method by applying quasi experimental design. The participants were 30 undergraduate students from Universiti Malaysia Sarawak (UNIMAS). The study was using 2 online experiments which adopted Reading Span Task by Loboda to measure the verbal working memory and Mental Rotation Task by Online Psychology Laboratory to measure visuospatial working memory. To analyze the results, independent t-tests were used. The results showed that the males performed better for both verbal and visuospatial working memory capacity performance in terms of total number of correct recalled. Meanwhile for the total time taken, in verbal working memory, the females used lesser time in recalling, and in visuospatial working memory, it was the males that used lesser time. However, the findings indicated that there was no significant difference in gender for verbal and visuospatial working memory capacity performance based on total time taken and total number of correct recalled which is inconsistent with previous studies. This study also emphasized the limitations and implications for future researchers for reference.

Keywords: gender differences, working memory capacity performance, verbal working memory, visuospatial working memory

ABSTRAK

Kajian ini bertujuan untuk menyiasat perbezaan jantina dalam prestasi kapasiti ingatan kerja yang menumpukan kepada prestasi kapasiti ingatan kerja verbal dan visuospatial berdasarkan jumlah masa yang diambil dan jumlah bilangan ingatan yang betul. Kajian ini menggunakan kaedah kuantitatif dengan mengaplikasikan reka bentuk eksperimen kuasi. Para peserta adalah 30 pelajar sarjana muda Universiti Malaysia Sarawak (UNIMAS). Kajian ini menggunakan 2 eksperimen dalam talian yang mengguna pakai Reading Span Task oleh Loboda untuk mengukur ingatan kerja lisan dan Tugasan Putaran Mental oleh Makmal Psikologi Dalam Talian untuk mengukur ingatan kerja visuospatial. Untuk menganalisis keputusan, ujian-t tidak bersandar digunakan. Keputusan menunjukkan bahawa lelaki menunjukkan prestasi yang lebih baik untuk prestasi kapasiti memori kerja lisan dan visuospatial dari segi jumlah bilangan ingatan yang betul. Sementara itu untuk jumlah masa yang diambil, dalam ingatan kerja lisan, wanita menggunakan lebih sedikit masa dalam mengingat, dan dalam ingatan kerja visuospatial, lelaki yang menggunakan lebih sedikit masa. Walau bagaimanapun, dapatan menunjukkan bahawa tidak terdapat perbezaan yang signifikan dalam jantina untuk prestasi kapasiti memori kerja lisan dan visuospatial berdasarkan jumlah masa yang diambil dan jumlah bilangan ingatan yang betul yang tidak konsisten dengan kajian lepas. Kajian ini juga menekankan batasan dan implikasi kepada pengkaji akan datang untuk dibuat rujukan.

Kata kunci: perbezaan jantina, prestasi kapasiti ingatan kerja, ingatan kerja lisan, ingatan kerja visuospatial

CHAPTER ONE

INTRODUCTION

1.0 Introduction

This chapter presents the background of study, problem statement, research objectives, research questions and hypotheses of the study and conceptual framework. It will also explain about the significance of the study and clarify the terms used in definition of terms.

1.1 Background of Study

Over the last 30 years, many indicators have been developed to reflect individual differences in working memory capacity. Many studies of individual differences in working memory capacity measure through different types of complex-span task(e.g reading span task) (Daneman and Carpenter, 1980; Conway et al., 2005). According to Miyake and Shah (1999); Cowan (2010), working memory has been long acknowledged as the most essential in human cognitive processing as it is to store the new information. Baddeley (1986) stated that the newly obtained information will be held in working memory for a brief period of time before being recalled and stored in short-term and long-term memory. Working memory capacity refers to the individual differences' capabilities and storages in the dimension toward the restriction in a person's working memory (Wilhelm et al, 2013).

The investigation of working memory performance may facilitate the understandings of the differences between gender (Zilles et al, 2016; Hill et al, 2014; Haier et al., 2005; Halpern et al, 2007). The observed differences will play a big role to help explain the

variance in performance between women on various cognitive tasks, as well as call into question the concept of underlying neural network differences (Hill et al, 2014). The current study focuses on the data's subsequent implications in terms of working memory, in order to determine if such differences occur during working memory performance. Furthermore, due to the variety of paradigms used to investigate working memory, researchers chose a verbal and visuospatial task to assess gender differences within the working memory construct. From the result, it was identified that gender differences in working memory networks might have significant implications in other domains of cognitive performance (Hill et al, 2014).

1.2 Problem Statement

Past studies had indicated that there are gender differences in working memory. Even so, inconsistent findings were resulted from the studies regarding gender differences and working memory. Some of the studies stated that gender does influence the working memory (Torres et.al, 2006; Upadhayay & Guragain, 2014). According to Hill et al (2014), there quite few of studies proved that there were no gender differences in working memory. Due to that, the study of "Gender differences in working memory networks: a BrainMap meta-analysis" was to investigate more about it as to prove that gender differences did make changes in working memory performance (Hill et al, 2014).

In addition, some of the studies are based on simple span tasks when assessing the working memory. For example, an experiment study was conducted by Harness et al (2008) which it was employed with a list of 20 words and 20 images as stimuli when assessing the gender differences in working memory. The participants had simply able to memorize those presented stimulus and easy to recall back the information about those items. The study

resulted to no significant difference in word recall between men and women as they are able to recall in similar consequences.

Moreover, there are almost no research regarding this topic of study that focus on Malaysia context. Most of the studies about working memory are from the Western country. Those evidence provided by the studies may not be relevant to the Malaysia context as there are many differences aspect that can be measured as we live in different environment. Therefore, that's why this study need to be implemented as to become new resources for Malaysia population. Hence, this study was conducted in the context of Malaysia, among the undergraduates in UNIMAS.

Therefore, this study is designed to investigate the gender differences in verbal and visuospatial working memory capacity based on the total number of correct recalled and time taken.

1.3 Research Objectives

1.3.1 General Objective

To study gender differences in verbal and visuospatial working memory capacity performance based on total time taken and total number of correct recalled.

1.3.2 Specific Objectives

- To investigate the gender differences in verbal working memory capacity performance based on total time taken
- To investigate the gender differences in verbal working memory capacity performance based on total number of correct recalled

- To investigate the gender differences in visuospatial working memory capacity performance based on total time taken
- To investigate the gender differences in visuospatial working memory capacity performance based on total number of correct recalled

1.4 Research Questions

- Is there any gender difference in verbal working memory capacity performance based on total time taken?
- Is there any significance gender difference in verbal working memory capacity performance based on total number of correct recalled?
- Is there any significance gender difference in visuospatial working memory capacity performance based on the total time taken?
- Is there any significance gender difference in visuospatial working memory capacity performance based on total number of correct recalled?

1.5 Research Hypotheses

H1= There is significant differences between gender in verbal working memory capacity performance based on total time taken

H2=There is significant differences between gender in verbal working memory capacity performance based on total number of correct recalled

H3=There is significant difference between gender in visuospatial working memory capacity performance based on total time taken

H4=There is significant difference between gender in visuospatial working memory capacity performance based on total number of correct recalled

1.6 Conceptual Framework

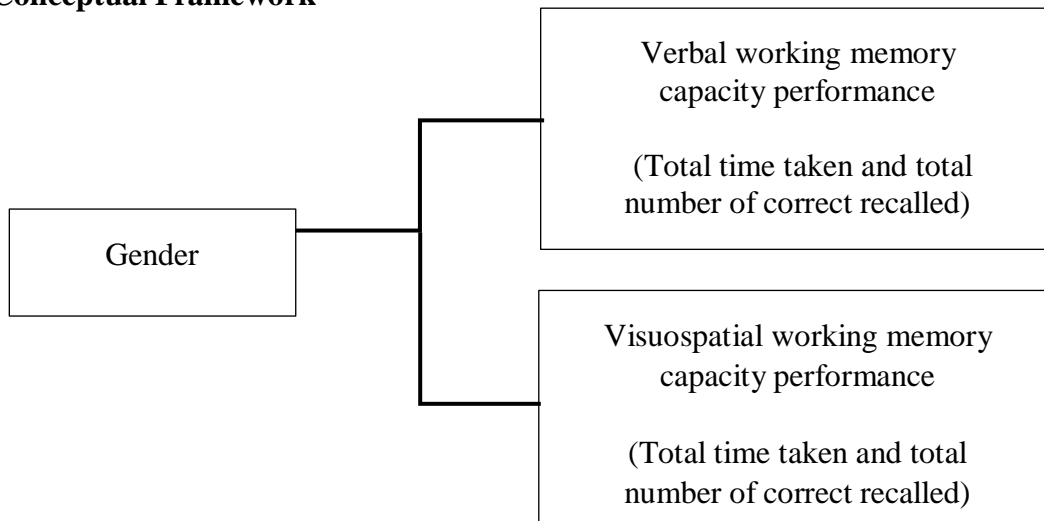


Figure 1.6 Conceptual framework of the study

1.7 Significance of Study

Working memory is crucial in many contexts, including learning. According to Cowan (2014), this cognitive function is required for individuals to prosper academically, it is important to focus on tasks to build and develop it. This study provides insight regarding working memory for people to know more about it. It also includes the development of verbal working memory and visuospatial working memory.

This study can help in improving the literatures more about working memory and other more possibility that can lead to better improvement of society. However, it is not considered as prevalent matter, such in Malaysia context for its few similar research which

led to the individual low in understanding of this topic. This study is to be recommended, in emphasis in Malaysia setting so it can enlighten readers and future researchers with better insights and ideas to have more understanding as well to bring improvements that can help future researchers to work on more regarding working memory.

1.8 Definition of Terms

1.8.1 Gender

Conceptual Definition:

American Psychology Association (2020) stated that gender is considered as the state of being male, female, or neuter. In a human setting, the contrast between gender and sex reflects how the term are used. Sex typically refers to the biological characteristics of being male or female, whereas gender refers to the psychological, behavioral, social, and cultural components of being masculinity and femininity.

Operational Definition:

In this study, gender is referred to male and female among the participants that are undergraduate students of UNIMAS.

1.8.2 Working Memory Capacity

Conceptual Definition:

According to Baddeley and Hitch (1974), working memory related to the short-term information maintenance and manipulation required for executing complex cognitive activities such as learning, thinking, and comprehension. It builds with limited capacity as the

information processing systems link to the storage information that required measurement of individual to access the information.

Operational Definition:

In this study, working memory capacity is considered as the participants' abilities to perform on how well they are in the working memory tasks, based on the total time taken and total number of correct recalled items over the tasks given.

1.8.3 Verbal Working Memory

Conceptual Definition:

As Kulman (2015) mentioned that verbal working memory refers to the ability to recall something and then conduct an action based on that memory. This ability enables us to remember knowledge to apply it for learning, thinking, or creating a result.

Operational Definition:

In this study, verbal working memory is identified with Reading Span Task, adopted from Loboda (2012), in which the participants' been measured through the amount of stimulus that required them to memorize and recall after the tasks were conducted.

1.8.4 Visuospatial Working Memory

Conceptual Definition:

Visuospatial working memory is the ability to retain a visual picture of information for a short amount of time (Rizzo and Vecera, 2002). It involves the ability to recall patterns and colors as well their positions and motions (Kulman, 2015).

Operational Definition:

In this study, visuospatial working memory is identified by Mental Rotation Task, adopted from Mental Rotation by Online Psychology Laboratory (n.d), on how much stimulus the participants' need to preserve and recall at the same time.

1.9 Summary

This chapter elaborate briefly about the background of study, problem statement, research objectives, research questions and hypotheses, conceptual framework, significance of the study and definition of terms are used.

CHAPTER TWO

LITERATURE REVIEW

2.0 Introduction

In this chapter, it explains the theories, models, past findings in gender differences on working memory capacity, and improvement in present study.

2.1 Gender

2.1.1 Theory Related to Gender Differences

2.1.1.1 Kohlberg's Cognitive-Developmental Theory

Kohlberg's Cognitive-Developmental Theory is a theory that looks at a child's cognition and how it impacts gender identity development. Based on the theory, gender identified as three stages. The first stage is gender identity which it starts to develop at age of 2. It is occurred when the child recognizes themselves as male or female, as well as how the other people are (Kohlberg's Cognitive Developmental Theory of Gender, 2018). Then it continues with the stage of gender stability. It happens at the age of 4. This signifies as the child learn to understand that their gender is definite, and they will be either male or female as they grow up. The last stage is gender constancy which develops between the age of 5 and 7. The child understands that physical appearance cannot change their sex. For example, girl who wear pant still considered as a female. In the study by Kuhn et al (1978), it investigated about gender stereotyping. The study involved in interviewing children at the very young age (2-3) about playing with dolls. It resulting to occur strong stereotyping over their own gender but not the opposite. They give positive characteristics regarding their own gender relations with playing dolls. This proved that understanding of gender occurs even at a young age.