

**BILINGUALS VS. MULTILINGUALS: THE DIFFERENCES IN
SHORT TERM MEMORY AND ATTENTION PERFORMANCES**

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ABSTRACT

BILINGUALS VS. MULTILINGUALS: THE DIFFERENCES IN SHORT TERM MEMORY AND ATTENTION PERFORMANCES.

Nurul Shuhadah binti Muhamed

Generally, the focus of this research is to determine whether there exist differences in short term memory and attention performances between the bilinguals and multilinguals. Matter arises with the question of whether mastering more languages will burden the brain cognitive processing or vice versa. The experiment design is quasi-experiment since no control group was involved and the instrument used to measure short term memory and attention was by using the Cognitive Psychology Laboratory on a CD (CogLab). The Brown-Peterson test was used to measure the short term memory performance and the Stroop effect test was used to measure the attention performance. Sixteen (16) form four students from Sekolah Menengah Jalan Batu Lintang and sixteen (16) students from University Malaysia Sarawak has been chosen as the participants in this study. No significant difference was found in short term memory performance between the bilinguals and multilinguals. However, there was a significant difference in attention performance between the bilinguals and multilinguals. The multilinguals scored better in the Stroop effect test compared to their bilinguals' peers. This proves that actually mastering or learning more languages does not bring you harm, in fact it enhances the cognitive processes.

ABSTRAK

BILINGUAL DAN MULTILINGUAL: PERBEZAAN PENCAPAIAN DALAM UJIAN MEMORI JANGKA MASA PENDEK DAN PERHATIAN.

Nurul Shuhadah binti Muhamed

Secara umumnya, objektif kajian ini adalah untuk mengenalpasti perbezaan pencapaian dalam ujian memori jangka masa pendek dan perhatian di kalangan individu bilingual dan multilingual. Persoalan tentang samada mempunyai kebolehan menguasai lebih daripada satu bahasa menimbulkan kesulitan dalam proses kognisi minda dikaji. Rekabentuk kajian yang digunakan ialah eksperimen kuasi kerana kumpulan kawalan eksperimen tidak wujud. Instrumen kajian yang digunakan untuk mengukur pencapaian memori jangka masa pendek dan perhatian telah dilakukan menggunakan 'Cognitive Psychology Laboratory on a CD (CogLab)'. Ujian Brown-Peterson digunakan untuk menguji memori jangka masa pendek individu dan ujian kesan Stroop telah digunakan untuk mengukur perhatian mereka. Enam belas (16) pelajar tingkatan empat Sekolah Menengah Jalan Batu Lintang dan enam belas (16) pelajar Universiti Malaysia Sarawak telah dipilih untuk menjadi responden projek ini. Tiada perbezaan yang signifikan didapati dalam pencapaian ujian memori jangka pendek di antara kedua-dua kumpulan. Walau bagaimanapun, ada perbezaan yang signifikan dalam pencapaian perhatian di mana kumpulan multilingual mendapat purata skor yang lebih tinggi berbanding kumpulan bilingual. Ini membuktikan bahawa menguasai atau mempelajari lebih daripada satu bahasa tidak mendatangkan sebarang kesulitan, malahan ia membantu proses kognisi minda manusia.

CHAPTER 1

INTRODUCTION

1.0 Introduction

This chapter will be discussing about the background of the study, statement of the problem, the objectives, the research question and hypothesis, the conceptual framework, justification of study and the definitions of every variables that involve in this study.

1.1 Background of the Study

The focus of this research is to determine whether there exist differences in short term memory and attention performances between the bilinguals and multilinguals.

Language plays a very important role to every individuals, besides symbolizing their own social community or races, it is also an entity that makes the world as advance as today. One of its reasons is because it is the precursor of education. Without language, knowledge would not be transferred successfully and communication would become absurd among human. The importance that attached to language learning in our society has created an interest in studying language acquisition processes.

Some may learn to master more than two languages and some may naturally inherited from family, both are called the multilinguals. According to Asmah Haji Omar in her book, *The Linguistic Scenery in Malaysia*, Malaysia multilingualism has been the result of many events and processes. The immigrants and the arrivals of foreigners in history have varied the types of languages in this country. It is proven that Malaysia also, as many part of the world is not isolated by multilingualism.

Usually, parents encourage their children to learn more than a single language, especially in Malaysia, mainly to expand the number of language that

the children can master. Little do they know that by going bilingual, the children can actually appear to have numbers of intellectual advantages than their bilingual peers. This study however will not emphasize on the advantages of being bilinguals, but more on the advantages or disadvantages that ones can have by being multilingual.

1.2 Statement of the Problem

The advantages in cognitive abilities have been proven to be in those who are bilinguals compare to the monolinguals. According to Judy Foreman through her writings on *Health Sense; The Evidence Speaks Well of Bilingualism's Effect on Kids*, she stated that Bialystok confirmed that bilinguals own the ability to focus attention and ignore distractions. Adele Diamond, director of the Center for Developmental Cognitive Neuroscience at the University of Massachusetts Medical School said that bilinguals also learn another useful skill, that is how to switch back and forth between tasks when the rules (such as the rules of a language) change. Learning to adapt to a new set of rules means learning how to inhibit, or not pay attention to a previously learned set, is a skill that also develop in them depends on development of a particular part of the brain that is the prefrontal cortex, which functions in concert with other areas. Diamond added that we constantly having to exercise inhibition because otherwise one language would intrude. We think this puts such a heavy demand on the system that it

pushes the brain to mature earlier. Many opinions and evidence can be found regarding the cognitive abilities of the bilingualism but there are few studies focusing on the multilingual. Is this because the fact that multilingual is just the expand form of bilingualism so the effect of it is not given focus on? There are some studies that have been done by neurosurgeons and lecturers that people who are bilinguals will have the ability to mislead information and inhibit. This heavy demand would 'push' the brain to mature earlier. That was all about having two languages, so how would having three, four or more languages effect this circulation? Will the brain mature earlier and operates better or vice versa? Does it have anything to do anything with the cognitive processes such as the short term memory and attention?

1.3 General objective

The general objective of this study is to analyze the differences in performance between the bilinguals and multilinguals toward attention and short term memory.

1.3.1 Specific Objectives

- To determine the differences of performance among bilingualism and multilingualism toward attention.
- To determine the differences of performance among bilingualism and multilingualism toward short term memory processing.

1.4 Research Questions

- Is there a significant difference between the bilinguals and multilinguals in short term memory performance?
- Is there a significant difference between the bilinguals and multilinguals in attention performance?

1.5 Conceptual Framework

Table 1

The conceptual framework of study.

Independent Variable	→	Dependant Variable
<i>Sample</i> Bilingual Multilingual		<i>Performance</i> Attention Short Term Memory

1.6 Justification of the Study

There are plenty of studies about language acquisition done by past researches, which mostly covered the matter of second language acquisition and its correlation with ethnicity, contact or communicative competence in a second language. In more simple words, the studies basically correlate bilingualism and social psychology.

However, utmost attention given when there were combination of studies that support the idea that bilingual, as opposed to monolingual, show advantages in the domain of cognitive flexibility. According to Maria Pilar Safont Jordáa through her writings in *Third Language Learners: Pragmatic Production and Awareness*, she stated that in the seventies, some researchers (Ianco-Worrall, 1972; Ben-Zeev, 1977; Bain & Yu, 1980) pointed to the positive impact of bilingualism on the individual's cognitive development. Subsequent research (Mägiste, 1984; Ringbom, 1987; Bialystok, 1988) has further confirmed the advantage of bilinguals over monolinguals in terms of linguistic and cognitive outcomes. These facts have given rise to a relatively young subfield in the study of language learning processes, namely that of third language acquisition.

The scarce presence of multilingualism studies becoming obvious when compared to the existing abundant research in the field of second language acquisition started to empower. The focus on monolingual compared to bilingual

has been focused more, and this study has turned the point of view towards acquiring the multilingual advantages opposed to the bilingualism.

In this study, the cognitive processes involve are attention and the short term memory processing.

1.7 Definition of Terms

1.7.1 Bilinguals

The ability to speak in two languages. - (Santrock,, 2004)

Operational Definition.

The ability to speak and write in two languages.

1.7.2 Multilingual

Someone with a high degree of proficiency in several languages (TEFL Glossary, 2002)

Operational definition.

A person who has the ability to speak and write more than two languages.

1.7.3 Attention

The concentration of mental effort on sensory or mental events. - (Solso et. al., 2005)

Operational Definition.

The ability to respond to one aspect of a stimulus in the Stroop Effect test, such as the color ink that a word is printed in, and ignores another aspect, such as what the word spells.

1.7.4 Short Term Memory

A system for temporarily storing and managing information required, carrying out complex cognitive tasks such as learning, reasoning, and comprehension (MedicineNet, 2005).

Operational Definition

A system that will store the three letters, called a trigram, and will retrieve the trigram again later after answering some mathematical questions in the Brown – Peterson test

1.8 Limitation of the Study

Analogous to every research done, most research will be facing with boundaries in implementing their studies. As in this study itself, the limitations that occur is that the result will only reflect the Malaysian culture. Curiosity arises if there might be different effect towards the cognitive abilities according to type of languages (e.g. Chinese to French, Spanish to Italian and etc).

There is also lack in attaining supporting materials from past research, especially in the area of multilingual; the effect towards attention and short term memory processing or cognitive abilities as a whole. Deep knowledge need to be interpreted independently, which will necessitate supplementary knowledge representation.

Respondents may also be experiencing stress or fatigue during the experiment. The duration of both tests is approximately twenty minutes. The challenge of the tests, which acquire full density of attention may interfere the

respondent's performance. A treatment in reducing the interferences must be sorted out in order to obtain precise results in advance.

The existential of different levels of language acquisition might influence the result of this test. For example, in bilingualism itself, there is a term for those who might master the first language than another which they are called the dominant bilinguals. In the other hand, those who have the ability to master both languages equally, they are called the balanced bilinguals. Since the test was done in English, this might affect the respondents who are dominants in other languages such as the Malay language, mandarin and etc.

CHAPTER 2

LITERATURE REVIEW

2.0 Introduction.

This chapter will be introducing several past researches that have been done in the domain of this study.

2.1 Bilingualism And Attention

Young bilinguals, 4–8 years old, are more skilled than their monolingual peers in solving problems that require attentional control to ignore or inhibit misleading cues. (Bialystok et. al, 2004). This processing advantage has been

found across several domains of thought, including language tasks, concepts of quantity, spatial concepts, and problem solving.

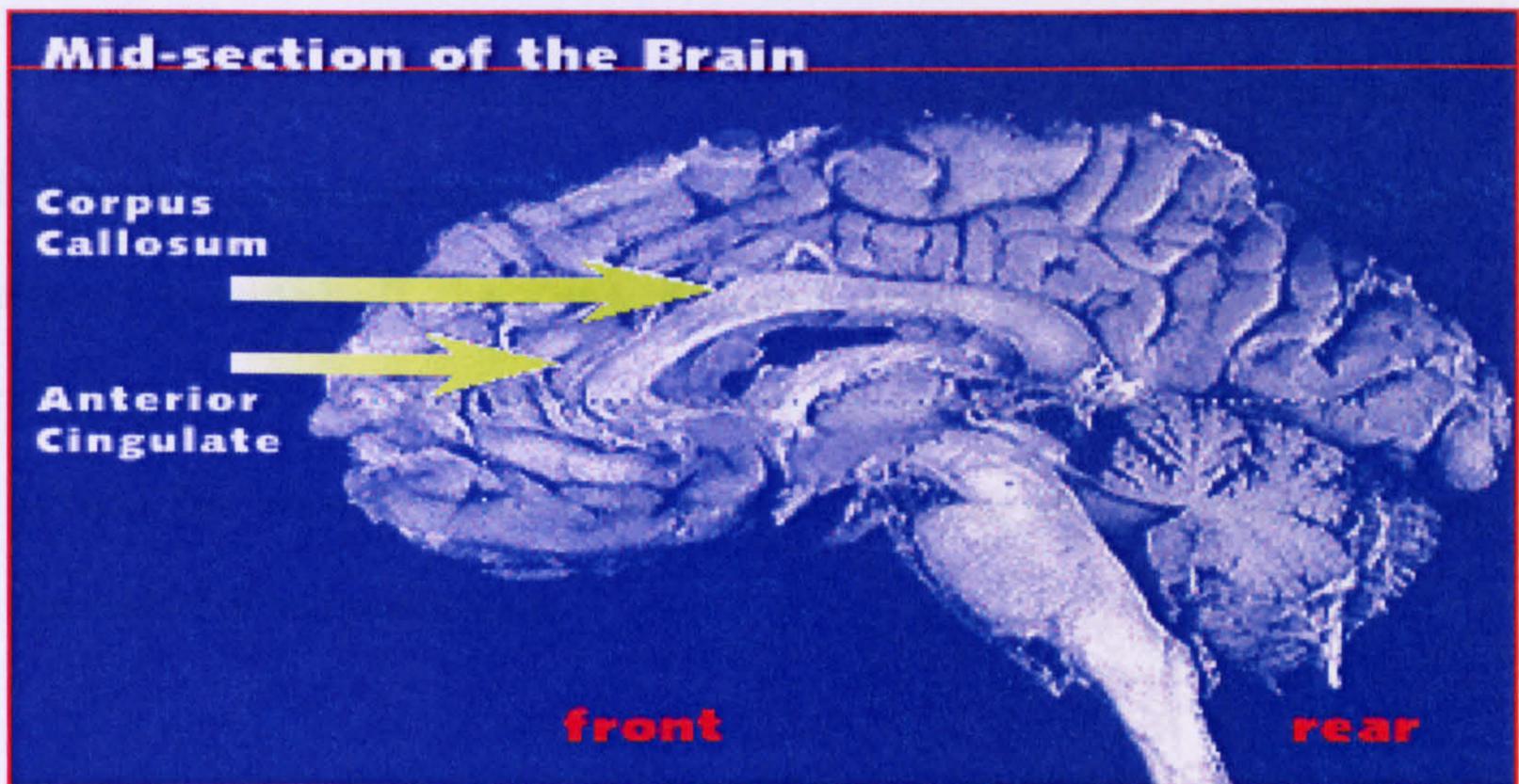
The statement is agreed by Diamond in 2002 when she said that learning to adapt to a new set of rules, or learning how to inhibit, or not pay attention to a previously learned set of rules is a skill that depends on the development of a particular part of the brain called the prefrontal cortex, which functions to concert with other areas of the brain.

Bialystok et. al, 2004 in their study of the Effect of Bilingualism on Cognitive Control in the Simon Task: Evidence from MEG stated that nonverbal task can be used to examine the extent to which bilinguals and monolinguals differ in inhibitory control in the Simon task, an experimental paradigm based on stimulus response compatibility. In the critical condition, a prepotent association to irrelevant spatial information interferes with a required response (for review, Lu and Proctor, 1995).

For example, in a visual display, participants may be told to press the right response key if a blue square appears and the left response key if a green square appears. These stimuli are presented on the left or right sides of the screen so that position information becomes part of the stimulus display although it is not relevant to response selection. In congruent items, the irrelevant spatial position

supports the rule-directed correct response (e.g., blue square on right side); in incongruent items, the irrelevant spatial position conflicts with the correct response (e.g., blue square on left side). The task, therefore, requires inhibitory control to ignore the irrelevant position information in the incongruent trials. This is the type of processing in which bilinguals should excel.

Yang & Lust, 2004 in their study of *The Effects of Bilingualism on the Attention Network Test: It's Significance and Implications* stated that there is significance in performance in the ANT between bilinguals and monolinguals. The bilingualism is said to be accurate compare to the monolinguals. In this study, the Stroop Effect test was used to measure the respondent's performance. John Ridley Stroop first reviewed this phenomenon in his Ph.D. thesis published in 1935, and over 700 articles have been written about it since. The task of selecting an appropriate response when given two conflicting conditions is processed in a part of the brain called the anterior cingulate (see Figure 1). This region lies between the right and left halves of the frontal portion of the brain, and is involved in a wide range of thought processes and emotional responses. Although the functions of the anterior cingulate are very complex, but it acts as a conduit between lower, more impulse-driven brain regions and higher, more rationally-driven behaviors.



THE ANTERIOR CINGULATE

Source: Arbor (2001)

Figure 1

2.1 Short Term Memory

Short term memory (STM) is defined as the memory used for keeping information for periods of time up to few seconds (Cook, 2003). She explained that the span of second language learners are restricted more than in their first language and the STM span increases as the second language learners develop and also related to how fast people can speak. There is also drawback in this acquisition, where second language users have a 'cognitive deficit' which makes many of their cognitive processes work slightly less well in the second language.

STM is similar to our computer RAM. Its capacity depends on the number of operations simultaneously feasible within a given time frame. When the computer is turned off, the RAM is cleared. In the case of language or text producing, we can say that while we are talking, we are thinking about the issue of present, but when the mind is distracted or 'switched off', we completely lost in the middle of communication.

Zhoong in 2003 in his research of *Memory Training in Interpreting* stated that an interpreter needs a good STM to retain what he or she has just heard. The idea of STM simply means that we are retaining information for a short period of time without creating the neural mechanisms for later recall. He also listed out the major characteristics of STM of a limited and small capacity, the encoding operations in STM occur by using visual coding, acoustic coding and semantic coding. People can also experience information loss because of the displacement of informations or interference.

2.4 Summary

The question that may arise from this study is that, it may create an intrusion in obtaining results because respondents might be familiar with the test, especially with the Stroop Effect test. However, the difference in speed between

naming colors and word reading does not depend upon practice because the association process in naming simple objects like colors is radically different from the association process in reading printed words (Brown, 1915). So, this might suggest that both experienced and non-experienced user may complete the equally task without bias.