

Faculty of Cognitive Sciences and Human Development

**EFFECT OF COLOUR OF HIGHLIGHTED TEXT ON MEMORY
RETENTION AMONG DIFFERENT GENDER**

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**EFFECT OF COLOUR OF HIGHLIGHTED TEXT ON MEMORY RETENTION
AMONG DIFFERENT GENDER**

LING MEE YIEN

This project is submitted
in partial fulfilment of the requirements for a
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The project entitled 'Effect of colour of highlighted text on memory retention among different gender' was prepared by Ling Mee Yien and submitted to the Faculty of Cognitive Sciences and Human Development in partial fulfillment of the requirements for a Bachelor of Science with Honours (Cognitive Science).

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ABSTRACT

The effect of colour on memory had been studied by many researchers recently. However, there is no known research focus on the colour of highlighted text. This study examined the effect of colour of highlighted text and gender differences towards memory retention. The samples of study involved 60 undergraduate students in University Malaysia Sarawak (UNIMAS). Qualitative result is obtained through experimental design research. This experiment used three different colours of highlighted reading materials which included red colour of highlighted text, blue colour of highlighted text and neutral that acts as a control group. 10 females and 10 males participants are assigned to each of the group for the memory test. Results are collected and analysed by using Two-Ways Independent Analysis of Variance (ANOVA). Results showed that there is no significant effect of highlighted colour text and gender difference on memory retention. Results and limitations are discussed for further improvement.

Keywords: colour, memory, highlighted text

ABSTRAK

Impak wana terhadap memori seseorang individu telah dikaji ramai oleh para pengkaji dalam bidang ini. Setakat ini, tiada kajian yang fokus kepada teks yang diwarnakan. Impak teks yang diwarnakan telah dikaji dalam pengekalan memori terhadap jantungina. 60 mahasiswa dan mahasiswi Universiti Malaysia Sarawak (UNIMAS) telah dijadikan sebagai sampel untuk mengkaji topik ini. Keputusan kualitatif diperoleh melalui penyelidikan reka bentuk eksperimen. Eksperimen ini menggunakan tiga jenis warna yang berbeza untuk setiap bahan bacaan yang diserlahkan iaitu warna merah, warna biru dan warna neutral yang bertindak sebagai kumpulan kawalan. 10 kaum perempuan dan 10 kaum lelaki peserta telah dibahagikan kepada setiap kumpulan untuk menjalankan ujian memori. Keputusan yang diperoleh telah dikumpulkan dan dianalisis dengan menggunakan dua cara analisis bebas varians (ANOVA). Keputusan menunjukkan tiada kesan yang ketara dalam teks warna yang diserlahkan dan perbezaan jantungina dalam pengekalan memori. Hasil dan kekangan kajian telah dibincangkan untuk penambahbaikan topik ini.

Kata kunci: warna, memori, teks yang diserlahkan

CHAPTER ONE

INTRODUCTION

1.0 Introduction

In this chapter, it begins with the background of study, following by problem statements. Research objectives, research questions, research hypothesis, definitions of terms, conceptual framework and significance of the study also will be discussed. Lastly, this chapter will discussed on scope of the study.

1.1 Background of study

Human cognition involves mental processes which are interconnected such as attention, memory, perception and thinking (Mariam Adawiah Dzul kifli & Muhammad Faiz Mustafar, 2013). The core cognitive process in human is memory. Memory refers to the mental process of encoding, retaining and retrieving information. Memory is the centre of human cognition research which cognitive psychologists still deal with (Olurinola & Tayo, 2015). In memory research, one of the most interesting and challenging issues is the way to enhance memory performance. Cognitive psychologists carried out various researches to discover a way in order to improve human memory abilities. Colour is believed to play an important role in enhancing and increasing human memory performance (Mariam Adawiah Dzul kifli & Muhammad Faiz Mustafar, 2013).

Human perceptual world is intensely enriched by the ability to perceive and experience colourful physical world through our colour vision (Webster, 1996). The ubiquity of colour fills up human's daily life includes environment, people, and objects around us and even in our dream (Elliot, Friedman and Moller, Maier, & Meinhardt, 2007). According to

Mohamed Faiz M. Mustafar and Mariam Adawiah Dzulkifli (2011), people use colour for various purposes. Some of them may use colour to emphasize the information or convey messages, some may use colours for decorative purpose. Colour becomes a powerful tool and strategy that can be utilised in different areas. For example, the use of colour in marketing setting, education setting and even sports (Mariam Adawiah Dzulkifli & Muhammad Faiz Mustafar, 2013).

In marketing setting, market researchers determined that colour can affect shopping habits (Daye, 2008). Colour has psychological impact on consumer's mind and result on his or her buying behaviour (Babolhavaeji, Vakilian, & Slambolchi, 2015). Consumer's purchasing decision can be affected by the colour of the product (Ogden, Ogden, Akcay, Sable, & Dalgin, 2010). Therefore, when designing marketing materials such as advertisement, business card, brochures and poster, the choices in selecting colours are crucial as it can enhance the appearance of the items and indirectly attract the attention as well as the desired to purchase among the target consumer.

In educational settings, student's learning process is inevitably linked to colour materials. Various colours are apply in school as it gives impact on student's learning outcome (Olurinola & Tayo, 2015). In traditional talk and chalk method, school teacher always use blue or black colour marker pen when writing on the whiteboard (Mohamed Faiz M. Mustafar & Mariam Adawiah Dzulkifli, 2011). However, red colour ink usually used to mark and correct student's work in order to draw the attention towards the mistake that student had done. Along with advancement of technology today, The Ministry of Education Malaysia introduced and facilitated the use of Information and Communication Technology (ICT) to improve pedagogy of teaching and learning (Azidah Abu Ziden, Issham Ismail, Spian, & Kumutha, 2011). The infusion of technology leads to the transformation of education system which shifted from traditional talk and chalk method to the power point

presentation. With the aid of power point presentation, students are exposed to the colourful slides which are more eye-catching and vast range of content such as videos, graphics, images and animations (Baltakmens, 2012). Moreover, colour brings tremendous impact on student learning and engagement especially when dealing with complex topics or chart (Center for Digital Education, 2012).

1.2 Problem Statements

Does colour really help in enhancing memory performance? Studying is unavoidable in student's life. One of the most common study strategies is the use of highlighting pen. Many researches had been carried out to investigate the highlighting and its effect on the memory performance. However, the results showed that there is no significance difference between highlighting and memory performance (Peterson, as cited in Goldstein, 2008). Peterson (1992) found that 82 % of students highlight the text while reading the materials at the very first time. This involves only little deep thinking while performing the act of highlight (Goldstein, 2008). Intervention of other techniques such as elaboration and rehearsal after highlighting are important in order to encode the information into memory. Yue, Storm, Kornell and Bjork (2014) stated that highlighting may be useful when student reread the text twice. Another possible reason is student put more effort in performing the act of highlighting rather than remembering or memorizing the text. Thus, these events had raised the interest of the researcher in investigate whether the colour will bring effect towards the memory performances through the use of highlighted text. Yet, there is still no known research that looks into the effect of colour of the highlighted text.

1.3 Aim and Objectives

1.3.1 General Objective

1. To examine the effect of different colours of highlighted text and gender differences towards memory retention.

1.3.2 Specific objectives

1. To examine the effect of colour differences of highlighted text on memory performance.
2. To examine the effect of gender differences on memory performance.
3. To examine the colour differences of highlighted text and gender differences on memory performance.
4. To examine the differences between warm colour and cool colour of highlighted text on memory performance.
5. To examine the differences between colour and non-colour of highlighted text on memory performance.

1.4 Research Questions

- 1.4.1 Is there a significance difference between colour differences of highlighted text and memory performance?
- 1.4.2 Is there a significance difference between gender differences and memory performance?

1.4.3 Is there a significance interaction of colour differences of highlighted text and gender differences on memory performance?

1.4.4 Is there a significance difference between red colour and blue colour on memory performance?

1.4.5 Is there a significance difference between colour and non-colour on memory performance?

1.5 Research Hypothesis

H_{01} = There is no significance difference between colours of highlighted text on memory performance.

H_{02} = There is no significant difference between gender and memory performance.

H_{03} = There is no significant interaction between colour of highlighted text and gender differences on memory performance.

H_{04} = There is no significant difference between warm colour and cool colour of highlighted text on memory performance.

H_{05} = There is no significant difference between colour and non-colour highlighted text on memory performance.

1.6 Definition of terms

1.6.1 Colour

Conceptual definition of colour is the formation of colour derived from the reflection or projection of light by object with different range of wavelength that interacting with the eyes (Zammitto, 2005).

Operational definition of colour in this study is referred to the different colour of highlighted text in reading materials. Two colours which are red and blue that represented warm and cool colour respectively are used in this study.

1.6.2 Memory retention

Conceptual definition of memory retention is the ability to hold the information in mind and retrieve the information in response to external stimuli (Hafeezullah Amin, & Aamir S. Malik, 2013).

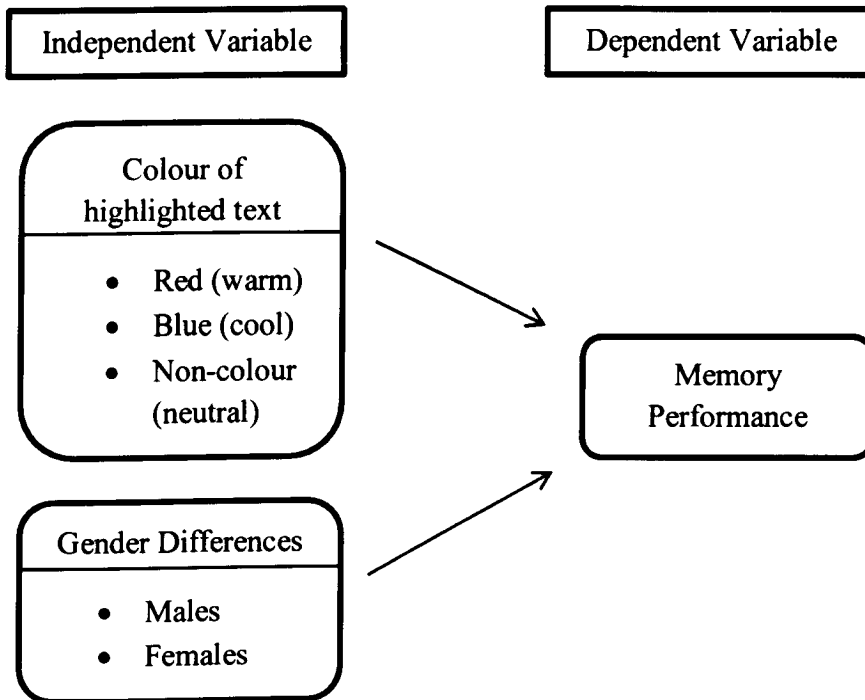
Operational definition of memory retention in this study is referred to the ability of participants to remember the content of reading materials with highlighted text after 2 minutes break. Simple task is given within the short break. Good memory retention leads to better memory performance.

1.6.3 Gender differences

Gender is defined conceptually as the characteristic of one's maleness or femaleness. Gender differences show psychological or behavioural differences between males and females (Papalia & Feldman, 2012).

Operational definition of gender differences in this study is referred to the differences of male and female in colour performance.

1.7 Conceptual Framework



1.8 Significance of the Study

The findings of this study will increase the awareness of human that colour plays an important role in learning. Educational book designer may apply the recommend approach from the results of the study to enhance and facilitate student's learning process. In addition, it benefits the students as they are able to know how colour can take part in learning process and help them to improve their performance. In addition, this study also helps other researchers to know that colour is a critical area in educational process.

1.9 Scope of the Study

In this study, researcher had determined the effect of colour on memory retention between male and female. This study focused on the highlighted text instead of the act of

highlighting. Participants who involved in this study were the undergraduates of University Malaysia Sarawak, Kuching.

1.10 Summary

This chapter discussed on the overview of this study. Background of study, problem statement, objectives, definition of terms, conceptual framework, significance of the study and scope of the study are defined and explained in this chapter. Literature review and theories will be further discussed in next chapter.

CHAPTER TWO

LITERATURE REVIEW

2.0 Introduction

This chapter presents an overview of the literature related to this research. It begins with the description and explanation that include theories of related research. Research findings from past studies that are related to this study also been discussed in this chapter.

2.1 Colour perception and theory

Colour originates from sunlight. Without light, there is no colour (McCartney, 2005). Light plays a role as a messenger while colour is a message. Different wavelength of light corresponds to different colours. When the light hits on an object, it will be absorbed, transmitted or reflected (Wood & Jackson, 2004). Human retina consists of two different types of receptor which are rods and cones. The sensation of colour generated by physical stimulation of light detectors is cones (“The Nature of Color”, n.d.). Whilst, cones cell is responsible for the colour vision.

Colour comprises of three attributes which are hue, chroma and value (X-rite, 2007). Generally, when human perceived an object, hue is the colour that human would first say. Besides, chroma is the purity of colour which also known as saturation (Gaines & Curry, 2011; “The Nature of Color”, n.d). In other words, chroma is defined as the vividness or dullness of colour. When the purity of colour decreases, dullness will increase. Meanwhile, value is associated with the lightness or darkness of colour. It can be described as the degree of lightness (X-rite, 2007).

Colour still use as arts terminology by artist until today (Ekperigin, 2015). Colour possesses temperature. Colour can be described in terms of warm or cool colour (Smith, n.d.). Red, orange, yellow and brown are considered as warm colour while blue, green and purple are categorised as cool colour. Reddish colour is believed to induce warm feelings whereas bluish colour induces cold feelings (Hardin, 2000; Ho, Van Doorn, Kawabe, Watanabe, & Spence, 2014). Warm colour provides the sensation of warmth and comfort. Aside from this, warm colour usually associated with energy, strength and joy (Color Theory Basics, n.d.). Contrasting with the warm colour, cool colour gives or delivers the feeling of sadness and melancholy (Ekperigin, 2015). For instance, the green and blue colours represent the feelings of calm and restfulness (Ekperigin, 2015).

Study conducted by Levy (1980) showed that different emotional response was revealed when participants were exposed to different coloured panels. Profile of Mood States was used to examine their feeling. The results depicted that bluish-violet gave them the feeling of sadness and fatigue, bluish-green aroused feeling of confusion, reddish-orange stimulated feeling of anger and vigour while dark mustard yellow provoked the feeling of sad and very little vigour.

2.2 Modal of Human Memory

Memory is “a process involved in retaining, retrieving, and using information about stimuli , images, events, ideas, and skills after the original information is no longer present” (Goldstein, 2008, p.116). Atkinson and Shiffrin (1968) proposed a modal which known as model of memory, this model plays a large and significant role in memory research. There are three main structural features of the model which are sensory memory, short-term

memory and long-term memory. The modal model of memory was illustrated in Figure 1 below.

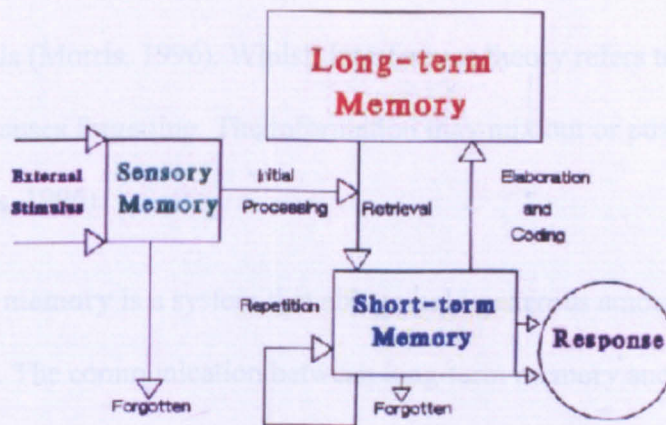


Figure 1. Stage model of memory. Reprinted from "Information processing and memory: Theory and application," by S. T. Lutz & W. G. Huitt, 2003, Retrieved from <http://www.edpsycinteractive.org/papers/infoproc.pdf>.

Sensory memory is an initial stage of stimuli perception. Sensory memory can hold a huge number of information, however its memory capacity is limited. The information that entered sensory memory can only be retained for seconds. Therefore, information that fail to transfer into next stage will start to decay and cannot be further processed in memory system (Lutz & Huitt, 2003). There are many strategies to ensure the information to be transferred to the next stage. The most influencing strategy of processing information is attention (Fougnie, 2008; Goldstein, 2008; Lutz & Huitt, 2003; Mariam Adawiah Dzulkifli & Muhammad Faiz Mustafar, 2013).

Short-term memory, which also known as working memory, is the second stage in model of memory. Short-term memory has limited capacity that holds 5 to 7 items about 15 to 30 seconds. The use of control processes such as rehearsal, elaboration, and other memorization techniques can help in transferring the information from short-term memory

into long-term memory. There exist two theories of retention and retrieval in short-term memory which are decay theory and interference theory. Decay theory is the strength of memory decrease with the passing of time. Therefore, it caused people hardly to remember the reading materials (Morris, 1996). Whilst, Interference theory refers to the interference of other information causes forgetting. The information may mix out or push aside with other information (Morris, 1996).

Long-term memory is a system that able to hold generous amount of information for long period of time. The communication between long-term memory and short-term memory is dynamic in order to encode or retrieve information (Lutz & Huitt, 2003).

2.3 Attention

The study of attention is the major part in contemporary cognitive neuroscience and cognitive psychology. Attention is defined as the selection or processing of certain information at the expense of other information (Pashler, 1998). Attention influences all aspects of perceptions, cognitions and actions including making choices (Johnson & Proctor, 2004). For instance, when performing a task that involves memorizing or remembering, attention plays critical roles to the retrieval cue such as a person's face before shifting to evaluate the possible names of that person for retrieval. Attention is essential for perception as the perceptual system has limited processing capacity (Johnson & Proctor, 2004; Mangun & Hillyard, 1991). Attention limits the input in perceptual system in order to prevent overload problem. In addition, attention able guides one's behaviour by affecting their decision making (Johnson & Proctor, 2004). When dealing with a complex task, attention will direct to the most important goals.