

THE IMPACT OF COLORS ON SMA NEGERI 1 TOMOHON STUDENT'S IMMEDIATE AND DELAYED RETENTION OF VOCABULARY

Louna Anastasia Rogahang, Nihta V.F Liando, Mister Gidion Maru

Abstract

This study intends to describe a cause effect relationship between independent variables, *words printed in cool color* and *words printed in warm color* on the dependent variable, *word retention*. This study was conducted at second graders of MIPA at SMA Negeri 1 Tomohon in the academic year 2015/2016 and the sample were 60 students randomly chosen from 179 students in all of 5 parallel classes to represent the population that using random sampling technique. The second grade of MIPA department consisted of 5 parallel classes with 179 students in all and 36 per class on the average. It is a quantitative research, the data are in form of test scores, and analyzed using the statistical technique (*t-test*), the results of statistical testing or analysis confirm that both the hypotheses dealing immediate is rejected which means that the alternative hypothesis is accepted, because at p (or α) = .05 and $df = 62$, the $t_{(observed)}$ is larger than the $t_{(critical)}$ or $3.023 \geq 2.000$. Similarly, the null hypothesis dealing with delayed retention was also rejected, because at p (or α) = .05 and $df = 62$, the $t_{(observed)}$ is larger than the $t_{(critical)}$ or $4.062 \geq 2.000$. In both immediate and delayed retentions, the subjects in cool color group outperformed those in warm color group. Based on this result, it can be concluded that words printed in cool color with white background more significantly affect students' immediate retention than words printed in warm color with the same color background also similarly with immediate retention, it can be concluded that words printed in cool color with white background more significantly affect students' delayed retention than words printed in warm color with the same color background. Based on the conclusion, it is suggested for English teachers to make maximal use of colors to help their students memorize new words in English. In addition, the information provided by this study is also important for textbook writers and teaching aid providers. Therefore, it is necessary that they make their textbooks and teaching aids colorful in order the students are interested in reading their textbooks and looking at the teaching aids used.

Keywords: impact, color, student, immediate, delayed, retention, vocabulary

INTRODUCTION

Vocabulary acquisition in foreign language learning is crucial. The crucial role that vocabulary plays is admitted by experts in second/foreign language teaching. All these experts implicitly admit that vocabulary should be the focus of foreign language teaching if learning a foreign language is to be successful. Theoretically, foreign language vocabulary can be taught explicitly or implicitly. Vocabulary can be taught or introduced to students through explicit teaching or direct instruction. This can be done by explicitly introducing a group of new words to students, explaining their meanings and contexts of use and having them practice using them in similar contexts. In the 2013 curriculum, for example, the teaching of vocabulary is integrated in the teaching of the four language skills. In such an indirect instruction, students are required to pay attention to the new words introduced during the teaching learning process and learn them by themselves.

In both direct and indirect instruction, in addition to textbooks, teaching aids such as pictures and flashcards are often used to enrich students' vocabulary. With the advances in communication technology, various kinds of textbooks and teaching aids can be easily produced. As can be observed, the textbooks and teaching aid used at schools are colorful and make them more interesting for the students.

In the textbooks for SMP, new vocabularies, if carefully observed, are introduced to the students in various presentation formats. Some vocabulary tasks, for example, a number of new words are presented in single pictures; some others are presented separately with one picture or image each. Almost all of the pictures particularly static ones are colorful. The use of various kinds of colors is primarily intended to make not only the teaching of English more interesting, but also help students easily remember the materials being learned. Due to the diverse findings concerning color effect and nature of experimental research in which not all extraneous variables can be strictly controlled, the researcher finds it necessary to address the following research problems:

1. Which group of words more significantly affects immediate retention, those printed in cool color or in warm color?
2. Which group of words more significantly affects delayed retention, those printed in cool color or in warm color?

The purposes of this study are:

As with all experimental research, the present study was conducted to describe a cause effect relationship between independent variables, *words printed in cool color* and *words printed in warm color* on the dependent variable, *word retention*. Put it another way, the

study tried to find out which type of color, cool or warm, more significantly affected word retention of second graders of MIPA at SMA Negeri 1 Tomohon.

It is hypothesized that words printed in cool color with white background more significantly affect students' immediate retention than words printed in warm with the same color background and words printed in cool color with white background more significantly affects delayed retention than those printed in warm color with the same color background.

In conducting this research, due to her limitations in time and financial support, the writer found it necessary to delimit her study. The delimitation was closely related to the words and colors selected to be experimented, length of the experimentation, subjects to be involved, and test to be used to assess the subjects' word retention.

Concerning words and colors selected, this study dealt only with words denoting parts of a jet plane. These words were selected, because the students are familiar with jet plane, but not with various parts of it. Concerning colors, research finding indicated that warm colors generated more arousal and attention than cool colors (see 1.1). That was why warm and cool colors, specifically red and blue were selected.

Concerning length of the experimentation, the experiment was conducted in two phases: in the first phase, the subjects were to read and memorize a twenty-wordlist in twenty minutes; and in the second phase they were to write down all the words they could remember in ten minutes. The same procedure was repeated when assessing the subjects' delayed retention.

Concerning the subjects of the experimentation, the subjects involved were second graders of MIPA at SMA Negeri 1 Tomohon. The subjects and school were selected because they were accessible.

Concerning test, the test used to assess the subjects' word retention was memory test in which the subjects were required to immediately write down as many words they had memorized as possible. There was no guessing in such a test.

THEORETICAL BASIS

Description of Colors

Color has been found to increase a person's arousal. It is proposed by Faber Birren (1950) that warm colors, such as red and yellow, increase arousal more than cool colors, such as green and blue. Warm colors are vivid in nature. Artistically speaking, they are said to advance in space, opposed to cool colors that are soothing and tend to recede in space. Birren's finding was supported by further research done by Greene, et.al (1983). They found that warm colors increase arousal compare to the cool colors.

Color is very important to make a concept in developing learning vocabulary in a teaching and learning process. It can help both teacher and students to share each ideas or opinion. In addition, they also concluded that while the children use the colors as a way to remember, it helps the retention of information. If color can increase arousal, and arousal can increase memory, then it is possible that we could find that color can increase the memory (Spence, Wong, Rusan and Rastegar, 2006).

Memorization

Memorization using working memory can last as little as a few seconds, and its capacity is very limited, playing a central role in individual differences in cognitive abilities (Myers, 2004). On average, a person's mind can hold up between five to nine items at one moment; any effort to try to hold more than that more than likely will result in forgetting the "middle" items (Cowan, 2008). Memorization skills vary in techniques and what aspects the individual chooses to use it for. A student may use a certain method to aid in memorizing vocabularies, whereas an employee may have a completely different method to try to memorize procedural steps in completing a task. Rehearsal and practice can increase the strength of responses, regardless of age, if it is done enough (Baddeley, 2003).

Word length has been shown to effect one's working memory pertaining to the memorization of words in recall tests. As the number of long words to memorize in a list increase, the proportion of correct responses decreases, if there is no suppression of the phonologic loop. If other components of working memory are suppressed, correct responses for long and short words also decrease (Cowan, Baddeley, Elliot, & Norris, 2003).

Within word length, the number of sounds when a word is spoken in a language (phonemes) and the number of syllables have also been shown to effect the memorization of words during recall tasks. Based on Finnish phonotactics, three-syllable items were recalled less than short pseudo words structured as consonant-vowel-consonant-vowel and two-syllable items. Researchers contrasted the difference between the numbers of syllables with the number of phonemes. Two-syllable items with six different phonemes were as difficult to recall as three- syllable items (Service, 1998).

Experiments on environmental context effects have shown a relationship to recall of items. The environmental context of background color for to-be-remembered items, in free recall, has shown mixed results. Background color always exists behind any item although it may not always be noticed. When background color is the same or repeatedly changed for each to-be-remembered item, no significant context effects are found and recall is not significantly affected. However, to-be-remembered items were recalled more frequently when against the same background color during study and test times (Isarida, Takeo and Isarida, Toshiko, 2007).

Researchers have studied the use of a highlighting marker as a tool to emphasizing text material to determine if retention scores increase. Participants were divided into four groups, actively highlighting, passive highlighting, experimenter highlighting, and no highlighting. Although there were no significances in total scores for all four groups, the experimenter highlighting group scores were significantly better than the no highlighting group scores on 18 test questions pre-highlighted for the experimenter group. Overall, this test qualified highlighting as a means to increase retention for long-term memory. Whether it was the use of a highlighting pen or that the participant chooses to emphasize a specific part of the article to remember, has yet to be studied (Fowler & Barker 1974).

An experiment involving colored letters and color names in a modified memory recall test have also been conducted. Color names and Xs printing in colored ink were recalled equally, whereas color names printed in incongruent colored ink were recalled significantly less. Participants choose the actual printed word rather than the color printed on the word in this experiment (Sagi, 1980).

The literature review search yielded no published research on the interaction of both word length and color on working memory for memorizing words or word recall. As suggested in prior research, continuous different color backgrounds or the same color background for memorizing long words with multiple syllables will be more difficult to recall than two separate colored backgrounds for the same list of words. The interaction of both factors of word length and color, and how they affect word memorization, would be affected by the different variations of long words selected and in which way color was used in conjunction with those words.

Effects of Color on Attention and Memory

Colors are often used as an effective tool to display information, deliver a certain message, and decorate for art purposes (Dzulkifli & Mustafar 2013). Many researchers have conducted studies to understand this wide use of colors and particularly explore the relationship between color and memory (Pan 2010). Based on the argument that attention is an important process of memory that is necessary to transfer information from sensory to short-term memory (Atkinson & Shiffrin 1986), these studies have investigated whether colors can contribute to increasing people's attention level and thereby lead to better performance on memory tasks. This question was explored by measuring participants' ability to match colors to objects and comparing obtained reminiscence of colored and non-colored materials. It was expected that if colors capture more attention from people and high level of attention promotes memory retention, colored materials should lead to better recall and retention.

Overall, this hypothesis was born out in empirical studies. Farley and Grant (1976) randomly assigned 52 undergraduate nursing students to either color or black-and-white

presentation condition and compared their performances on immediate and seven-day memory retention tasks. Their results demonstrate that color presentation has greater effect than non-color presentation on attention and memory. Spence *et al.* (2006) also investigated the recognition of colored natural scene images and gray-scale natural scene images by 120 participants.

The two types of presentation resulted in significant differences, with the participants' recognition of colored images approximately 5% higher than that of gray-scaled images. Smilek *et al.* (2001) further found that congruent colors are more effective than incongruent colors in memorizing numbers. When digit numbers were presented in three different conditions, that is, black and white, congruent color, and incongruent color, the participants performed better in recalling numbers presented in congruent colors.

Another interesting study was conducted by Pan (2009), who compared the effect of color with that of shape on recognition by asking participants to identify whether the color or shape of two previously presented objects was the same or not. The result showed that color captured more attention than shape of objects, as evidenced in shorter response time to determine color differences than shape differences. The study by Miyakoda *et al.* (2013) was different from the previous studies in that it investigated the effect of color in relation to vocabulary retention. Yet, it again confirmed the color effect by showing that learners obtained higher memory retention rates for vocabulary presented in colored letters. Overall, previous studies have demonstrated that colors cause a higher level of attention and arousal and thereby lead to better memory performance. The present study attempted to replicate this finding in the context of L2 vocabulary learning and also compared color effect with serial-position effect.

Related Studies

A number of studies have been previously done on the effect of color on memory. The studies are experimental, action research, and surveys in nature.

Martinez, *et al.*, (2010) investigated whether retrieval would be best when study materials and tests are printed on the same colored paper, consistent with the encoding specificity principle. Undergraduates read a passage printed on red or green paper (Experiment 1) or white paper (Experiment 2), and took a test printed on red or green paper (Experiment 1) or white, blue, green, yellow, or pink paper (Experiment 2). ANOVAs revealed no significant interaction and no significant effect of the test's paper color ($p > .05$), but a small effect of the passage's paper color did very closely approach statistical significance ($p = .052$). Participants who studied material on green paper outperformed those who studied material on red paper. These findings suggest that educators using different colors to distinguish test versions will

not negatively impact students' performance, but that the color of study materials will affect the amount retained.

Huchendorf (2007) examined whether color has an effect on memory. Participants were 115 college undergraduates enrolled in an introductory psychology course. They were each given a packet consisting of a list of 20 words, a mathematical task, a blank recall sheet, and a demographic questionnaire. All sheets within each packet were the same color, but different participants received warm colored (red and yellow), cool colored (green and blue), or white packets. The participants were given one minute to memorize the list of words. They then completed the mathematical task. Lastly, they tried to recall as many words as possible on the blank recall sheet. The percentage of words recalled correctly was the dependent variable. A one-way ANOVA was conducted and the results indicated that there was not a statistically significant difference in percentage of words recalled based on packet color.

Dae (2010) explores the role that color can influence people's visual attention and working memory through a computer-based experiment. With the assumption that there are trade-offs between attention/ memory, and loading tasks which create distractions (e.g., tasking/working people cannot afford to pay attention to other objects, and no tasking people would more pay attention to the objects), the study examines the effects of colors on people's visual attention and the relevance of attention to retention of working memory by performing a dual-task experiment called the box shooting test. The results show that the color effect shows significant differences on working memory indicating that color would more significantly play a role for forming people's memory rather than holding attention.

Cabal (2005) studied color-association in memory prompted the question about color and its effects on memory. The primary purpose of this experiment is to find differences in memory retention between a list enumerated in black ink and another enumerated in various colored ink. His hypothesis states that there will be no profound difference between retention of words in black ink and retention of words in different-colored inks. The data collected will be analyzed to find out if either gender is more efficient in remembering words from either black or colored lists. By listing and comparing the data collected, it should be evident which gender remembers more words, assuming one gender remembers more than the other. Words from the list in black ink are more likely to be remembered than words from the colored list. Men retained more words from either list than women had.

Stitt and Pula (2013) conducted a 14-day short-term, classroom action-research study examined the differences between using traditional black-and-white flash cards and those with colored text in relation to vocabulary acquisition and low-level information recall with middle school students. Specifically, two comparable language arts classes of on-level seventh graders with mixed abilities participated in the study. Students in one section made flash cards with black letters; students in the other section made flash cards of the same

words using self-selected colors. Students took a pretest and a posttest designed to show understanding gained of a subset of the definitions of the words studied. Statistical analysis using two-tailed *t*-tests assuming equal variances showed students remembered definitions better when they studied incolor. A major conclusion of the study is that students may be more likely to retain information with the aid of sensory recall through color.

Kimura *et al.*, (2013), in Experiment 1, measured the memory color effects of logos which varied in terms of their familiarity (high, middle, or low). Results demonstrate that the memory color effect occurs only in the high-familiarity condition, but not in the middle- and low-familiarity conditions. Furthermore, there is a positive correlation between the memory color effect and the actual number of domestic stores of the brand. In Experiment 2, they assessed the semantic association between logos and food/beverage names by using a semantic priming task to elucidate whether the memory color effect of logos relates to consumer brand cognition, and found that the semantic associations between logos and food/beverage names in the high-familiarity brands were stronger than those in the low-familiarity brands only when the logos were colored correctly, but not when they were appropriately or inappropriately colored, or achromatic.

Parker, Nitse, and Tay (2009) conducted a survey on consumer satisfaction in relation to consumer retention of color inaccuracy in consumer products. Results indicate that consumers are aware of color inaccuracies and that their reactions will negatively impact the marketer. Over 55% of the consumers surveyed indicate that they will not make future purchases from an online merchant that delivered an item in a color that did not match their expectations. Color inaccuracy has many negative consequences, the most important of which is customer defections. This indicates that colors play important role in our daily life.

METHODOLOGY

This study aims at describing cause-effect relationships between independent, *words printed in warm color with white background* and *words printed in cool color with the same color background*, and dependent variable, *word retention*. The independent variable is the variable intentionally selected in order to see its effect; the dependent is the one that is observed in order to know the effect of the dependent.

There are two kinds of variables in this research. They are independent and dependent variables. Independent variable or the major variable is the variable which is selected manipulated and measured by the researcher (Walliman, 2011:10). In this study, *words printed in warm color with white background, and those printed in cool color with the same background are the independent variables. Word Retention (Immediate and Delayed) is the*

dependent variable. The dependent variable is a variable which one observes and measures to determine the effect of the independent variable (Walliman, 2011:10).

Since this study is experimental, the experimental design should be used. The design used is the one called *posttest-only controlled group design*. The design is selected because the design which is good in controlling most of other variables which may possibly affect results of the experimental treatment. Experimental treatment itself refers to any condition intentionally selected for observation of its effect on the dependent variable. The design can be visualized as this:

In terms of the nature of data and how they were analyzed, the present research fell into the category of quantitative research. It was quantitative in that the data were in the form of test scores, and analyzed statistically.

The population of this study was second graders of MIPA at SMA Negeri 1 Tomohon in the academic year 2015/2016. The second grade of MIPA department consisted of 5 parallel classes with 179 students in all and 36 per class on the average.

The data representing the second graders of MIPA at SMA Negeri 1 Tomohon students' immediate and delayed retention of vocabulary were collected using a memory recall test in which the subjects in the two treatment groups were to memorize the words printed in warm and cool colors with the same background color in twenty minutes and soon after that they immediately wrote down as many words they could remember as possible (*immediate retention*) and a week later (*delayed retention*) in ten minutes each.

The words selected to be memorized were words denoting parts of the body of a jet plane. These words were selected for this experimentation because although all the subjects had once seen at least a jet plane directly or indirectly, the technical terms related to parts of the plane were unfamiliar to them.

The data in this in the form of test scores representing the second graders of MIPA at SMA Negeri 1 Tomohon students' immediate and delayed retention of vocabulary were statistically analyzed. Since this study was a true experimental research, the data were analyzed statistically using *t-test*.

This statistical technique is usually used if the assumptions of normality, homogeneity of variance, etc are met. However, these assumptions can be ignored if the number of sample in the two groups are equal and that the minimal sample size is thirty per group. According to Hays (1973 cited in Moore, 1983:281), assumption of normality do not greatly affect the results with sample sizes of 30 or more. Violations of the assumption of homogeneity of variances also have little effect on the *t-test* value when sample sizes are equal.

This research was conducted in SMA Negeri 1 Tomohon. This school is located on Jln. Siswa No. 129, Kelurahan Walian Kecamatan Tomohon Selatan, Kota Tomohon. The details of the school are as follows:

1. The Teaching Staff

There are 58 teachers who handle 1195 students. They were assigned to teach certain subjects according to their field of studies. The distribution of teachers, part timers and administrative staff is as follows:

Table I. Teaching, part timer and Administrative Staff

No.	Status	Number	Qualification
1	Principal	1	S-2
2	Vice Principal	5	S-1/S-2
3	Full time teacher	44	S-1/S-2
4	Part time Teacher	8	S-1
5	Administrative	7	S-1/D-3

2. The Students

SMA Negeri 1 Tomohon consisted of three grades. Each grade consisted of several parallel classes. There were 1195 students studying there with the specification:

Table II. Number of classes and students

Grade	Department	Number of Classes	Average Number students/class	Total Number of students/grade
X	BB	2	36	71
	MIPA	5	43	213
	IPS	5	36	180
XI	BB	2	35	69
	MIPA	5	36	179
	IPS	4	34	135
XII	BB	2	26	53
	MIPA	6	30	179
	IPS	4	29	116
Total	3	35	305	1195

3. Facilities

There were several kinds of facilities at SMA Negeri 1 Tomohon. The facilities were as follows:

Table III. School Facilities

No	Status	Total
1	Principal room	1
2	Administrative	1
3	Teaching staffs room	1
4	Library	1
5	IPA Laboratory	3
6	Language Laboratory	1
7	Computer Laboratory	1
8	Multimedia room	1
9	Room for counseling and career development	1
10	Room for OSIS	1
11	Room for UKS	1
12	Classrooms	35
13	Koperasi	1
14	Toilet	20
15	Hall	1
16	Art Room	1
17	Storage	1
18	House of Security for School	1

FINDING AND DISCUSSION

As the hypothesis, H_0 means there is no significant correlation between the variables; H_1 means there is a significant correlation between the variables. If the probability (sig) > 0.05 means that H_0 is accepted; if the probability (sig) < 0.05 means that H_0 is rejected.

Experimental Treatment	α level	$t_{(observed)}$	$t_{(critical)}$
Immediate Retention	0.05	3.023	2.000
Delayed Retention	0.05	4.062	2.000

Result of the data analysis indicates that at p (or α) = 0.05 and $df = 62$, the $t_{(observed)}$ is larger than the $t_{(critical)}$ or $3.023 \geq 2.000$. This, in other words means that the null hypothesis, *Words printed in cool color with white background do not more significantly affect students' immediate retention than words printed in warm color with the same color background*, is rejected. This, in turn, means that the alternative hypothesis, *words printed in cool color*

with white background more significantly affect students' immediate retention than words printed in warm color with the same color background, is accepted.

Result of the data analysis indicates that at p (or α) = .05 and $df = 62$, again the $t_{(observed)}$ is larger than the $t_{(critical)}$ or $4.062 \geq 2.000$. This, in other words means that the null hypothesis, *words printed in cool color with white background do not more significantly affect delayed retention than those printed in warm color with the same color background, is rejected.* This, in turn, means that the alternative hypothesis, *words printed in cool color with white background more significantly affect delayed retention than those printed in warm color with the same color background* is accepted. In both immediate and delayed retentions, the subjects in cool color group outperformed those in warm color group.

Conclusion

Based on the result and discussion, this study can be concluded as follows:

The data analysis using *t-test* concerning with the first research question, result of the analysis indicates that at p (or α) = .05 and $df = 62$, the $t_{(observed)}$ is larger than the $t_{(critical)}$ or $3.023 \geq 2.000$. Based on this result, it can be concluded that words printed in cool color with white background more significantly affect students' immediate retention than words printed in warm color with the same color background.


Concerning with the second research question, the result of the statistical analysis indicates that at p (or α) = .05 and $df = 62$, again the $t_{(observed)}$ is larger than the $t_{(critical)}$ or $4.062 \geq 2.000$. Based on this result, it can be concluded that words printed in cool color with white background more significantly affect students' delayed retention than words printed in warm color with the same color background.

REFERENCES

- Atkinson, Richard C. and Shiffrin, Richard M. 1986. *Human memory: A Proposed System and its Control Processes*. In Kenneth Spence and Janet Spence, eds., *The Psychology of Learning and Motivation 2*. New York: Academic Press.
- Baddely, Alan. *Memory, Science and Technology*, Vol. 10, pg. 674-675
- Baddely, Alan. 1993. *Your Memory: a User's Guide*. United Kingdom: Prion
- Baddeley, A., Cowan, N., Elliott, E., & Norris, J. 2003. *List Composition and the Word Length Effect in the Immediate Recall: A comparison of Localist and Globalist Assumptions*. *Psychonomic Bulletin & Review*, 10, 74-79.
- Benbasat, I. Dexter, A. S. 1986. *An Investigation of the effectiveness of color and Graphical Information Presentation under Varying Time Constraints*. *MIS Quarterly* March 59-83.

- Birren, F. 1950. *Color psychology and color therapy*. New York: McGraw-Hill.
- Birren, F. 1978. *Color & Human Response*. New York: Van Nostrand Reinhold
- Cabal, Abigail L. 2005. *The Effects of Color on Short-Term Memory between Males and Females*. Kennesaw State University. October 13.
- Coady, James. 1997. L2 vocabulary acquisition: A synthesis of research. In James Coady and Thomas Huckin, eds., *Second Language Vocabulary Acquisition*, 225-237. New York: Cambridge University Press.
- Cowan, N., Horton, N., Towse, J., & Whytock, S., 2008. *Task Experience and Children's Working Memory Performance: A Perspective From Recall Timing*. *Developmental Psychology*. 44(3), 695-706.
- Dae, Young Kim. 2010. *The Interactive Effects of Colors on Visual Attention and Working Memory: In Case of Images of Tourist Attractions*. International CHRIE Conference-Refereed Track.
http://scholarworks.umass.edu/refereed/CHRIE_2010/Saturday/
- Debiase, Marc. 2009. *Effects of Color and Animation on Visual Short-Term Memory in Computer-Environment Learning Tasks*. A Dissertation. <http://udini.proquest.com/view/effects-of-color-and-animation-on-pqid:1898612411/>
- Dzulkifli, M. A., Mustafar, M. F. 2013. *The Influence of Color on Memory Performance: A Review*. *Malays J Med Sci*. 20(2): 3–9.
- Farley, F H., & Grant AP. 1976. *Arousal and cognition: Memory for color versus black and white multimedia presentation*. *J Psychol*. 1976; 94(1):147–150.
- Fernandez, Karen V. and Dennis L Rosen. 2000. *The Effectiveness of Information and Colour in Yellow Pages Advertising*. *Journal of Advertising*, Vol 29 (2), 61-73.
- Fowler, R. & Barker, A., 1974. *Effectiveness of Highlighting for Retention of Text Material*. *Journal of Applied Psychology*, 59, 358-364.
- Greene, T.C., Bell, P. A., & Boyer, W. N. 1983. *Coloring the Environment: Hue, Arousal, and Boredom*. *Bull Psych Society*, 21(4):253–254.
- Hayes, D. P., and M. G. Ahrens. 1988. *Vocabulary Simplification for Children: A Special Case of "Motherese"?* *Journal of Child Language*, 15:395–410.
- Hays, William Lee. 1973. *Statistics for the Social Sciences*. New York: Holt, Rinehart and Winston.
- Huchendorf, Lynnay. 2007. *The Effects of Color on Memory*. *UW-L Journal of Undergraduate Research X*.
- Hunt, A., & Beglar, D. 2005. *A Framework for Developing EFL Reading Vocabulary*. *Reading in a Foreign Language*, 17(1), 23-59.
- Isarida, Takeo & Isarida, Toshiko. 2007. *Environmental Context Effects of Background Color in Free Recall*. *Memory and Cognition*, 35, 1620-1629

- Jacobs, K. W. & Suess, J. F. 1975. *Effects of Four Psychological Primary Colors on Anxiety State. Perceptual and Motor Skills*, 41,207-210. University of Southern Mississippi.
- Jennifer L. & Pula, Judith J. 2013. *The Impact of Color on Vocabulary Attainment with Multi-Ability Seventh Graders*. Delta Kappa Gamma Bulletin, Vol. 79, No. 4.
- Klauer, Karl Christoph & Zhao, Zengmei. 2004. *Double Dissociations in Visual and Spatial Short-Term Memory*. Journal of Experimental Psychology: General, Vol 133(3), pp. 355-381. <http://dx.doi.org/10.1037/0096-3445.133.3.355>
- Kimura, Atsushi., Mail, Yuji Wada., Masuda, Tomohiro., Goto, Sho-ichi., Suzuki, Daisuke., Hibino, Haruo., Cai, Dongsheng., & Dan, Ippeita. 2013. *Memory Color Effect Induced by Familiarity of Brand Logos*. DOI: 10.1371/journal.pone.0068474
- Lewis, M. (Ed.). 2000. *Teaching Collocation: Further Developments in the Lexical Approach*. Hove: Language Teaching Publications.
- Martinez, Jennifer V., Oberle, Crystal D., & Thompson, Jon G. Jr. 2010. *Effects of Color on Memory Encoding and Retrieval in the Classroom*. American Journal of Psychology Research, Volume 6, Number 1.
- McConnohie, B. V. 1999. *A study of the Effect of Color in Memory Retention When Used in Presentation Software*. Unpublished doctoral dissertation, Johnson Bible College.
- Miyakoda, Haruko, Kaneko, Kei-ichi, and Sasaki, Aya. 2013. *Effective Way of Learning Abstract Lexical Items: Focusing on Color in Vocabulary Learning*. International Journal of Information Technology & Computer Science 7, 39-45.
- Moore, Gary W. 1983. *Developing and Evaluating Educational Research*. Boston: Little, Brown and Company.
- Myers, J. 2004. *The Color of Learning*. Fundamentals, Training and Development, 19-20.
- Pan, Yi. 2009. *Research on the Content-based Working Memory-Driven Capture of Visual Attention and its Automaticity*. Doctoral dissertation. Zhejiang University.
- Pan, Yi. 2010. *Attentional Capture by Working Memory Contents*. Canadian Journal of Experimental Psychology 64.2, 124-128
- Parker, Kevin R., Nitse, Philip S. & Tay, Albert S.M. 2009. *The Impact of Inaccurate Color on Customer Retention and CRM*. The International Journal of an Emerging Transdiscipline, Volume 12.
- Richards, J. C., & Schmidt, R. 2002. *Longman Dictionary of Language Teaching and Applied Linguistics* (3 rd Ed.). London: Pearson Education.
- Sagi, A. 1980. *Color-word Interference in Recall Test*. The Journal of General Psychology, 103, 149-154.
- Service, E. 1998. *The Effect of Word Length on Immediate Serial Recall Depends on Phonological Complexity, not Articulatory Duration*. The Quarterly Journal of Experimental Psychology, 51A, 283-304.

- 
- Schaie, K.W. & Heiss, R. 1064. *Color and Personality*. New York: Huber and Grune & Stratton.
- Singleton, D. 1999. *Exploring the Second Language Mental Lexicon*. Cambridge: Cambridge University.
- Smilek, Daniel, Dixon, Mike J., and Merikle, Philip M. 2001. *Synesthetic Color Experiences Influence Memory*. *Psychological Science Bulletin* 13.6, 548-552
- Spence, Ian., Wong, Patrick., Rusan, Maria., & Rastegar, Naghmeh. 2006. *How Color Enhances Visual Memory for Natural Scenes*. A Research Report. *Association Psychological Science*, Volume 17—Number 1
- Tuckman, Bruce W. 1999. *Conducting Educational Research*. New York: Harcourt Brace College Publishers.
- Walliman, Nicholas. 2011. *Research Methods: the Basics*. London and New York: Routledge Taylor and Francis Group.
- Wilson, G. D. 1966. *Arousal Properties of Red versus Green*. *Perceptual and Motor Skill*, 23, 947-949.