

2005

## Color's Influence on Short-Term Memory In Each Gender

Ryan W. Schroeder  
*South Dakota State University*

Follow this and additional works at: <http://openprairie.sdstate.edu/jur>

 Part of the [Psychology Commons](#)

---

### Recommended Citation

Schroeder, Ryan W. (2005) "Color's Influence on Short-Term Memory In Each Gender," *The Journal of Undergraduate Research*: Vol. 3, Article 3.  
Available at: <http://openprairie.sdstate.edu/jur/vol3/iss1/3>

This Article is brought to you for free and open access by Open PRAIRIE: Open Public Research Access Institutional Repository and Information Exchange. It has been accepted for inclusion in The Journal of Undergraduate Research by an authorized administrator of Open PRAIRIE: Open Public Research Access Institutional Repository and Information Exchange. For more information, please contact [michael.biondo@sdstate.edu](mailto:michael.biondo@sdstate.edu).

# Color's Influence on Short-Term Memory in Each Gender

Author: Ryan W. Schroeder  
Faculty Sponsor: Dr. Debra Spear  
Department: Psychology

## ABSTRACT

This study evaluated links between gender and short-term memory using coloration of three groups of 12 stimuli: numbers, non-emotion based words, and nonsense syllables. The participants were undergraduate students enrolled at South Dakota State University. The participants viewed these colored stimuli and recalled as many as possible. Using a between subjects design, each group of participants was assigned a specific color. When interpreted with an ANOVA and post-hoc t-tests, neither gender nor color significantly altered recall of stimuli.

## COLOR'S INFLUENCE ON SHORT-TERM MEMORY IN EACH GENDER

Color is one of the most influential aspects of human perception. Color can be seen in virtually every aspect of nature and life. Colors are so significant in lives that many people have favorite colors and even favorite pieces of art based on interplay of color. Thus, color seems to be very important to people. Color is not only a perceptual detail that enhances life, but color also serves as an important function that signals and facilitates perceptual and cognitive organization.

Denby (2002) indicated that individuals who looked at a black-and-white newspaper ad had a 6% unaided recall rate whereas those who looked at the same ad in color had a 21% unaided recall rate. Kishiyama, Yonelinas, & Lazzara (2004) found that novel items, such as colored words appearing in a list of black-and-white words, increased memory recollection. In addition, Longo (2001) found that women were more likely to recall colored stimuli accurately than were men.

Unfortunately, the majority of memory studies using colored stimuli have focused on how colored pictorial stimuli influence memory and not how individual colored words or numbers influence memory. The current study will evaluate whether color has any effect on the short-term memory (when viewing numbers, non-emotion based words, and nonsense syllables) of men and women. Based on existing data, color should have little influence on short-term memory in either gender, but color should have a slightly more pronounced influence on the women's short-term memory than on the men's memory.

## METHOD

### *Participants*

Participants were 84 volunteers consisting of both men and women (32 men and 52 women). These participants were students from undergraduate South Dakota State University (SDSU) psychology classes. Most of the participants received extra credit for participating, although 11 students knowingly did not receive this credit. All participants were also entered into a drawing for free food donated by the on-campus dining service.

Students that met any of the following criterion were not allowed to participate in the study: colorblind or color deficient, memory impairments, ADHD, vision problems, reading disorders or other form of learning disability, or epilepsy. SDSU's Human Subjects Committee approved the protocol for the study and the investigator completed the National Institute of Health's online training for ethical conduct before beginning the study. In addition, the investigator informed the participants of their rights and followed the American Psychological Association's "Ethical Principles of Psychologists and Code of Conduct."

### *Materials*

A custom-made PowerPoint presentation revealed stimuli on an overhead projector in campus classrooms. Using opportunistic sampling, the investigator assigned all the participants to groups and each group saw three PowerPoint presentations. The first presentation consisted of 12 numbers ranging from 04 to 59 arranged in no particular order. The second presentation consisted of 12 non-emotion based words, each word ranging from four to eight letters long, while the third presentation consisted of 12 sets of nonsense syllables. Three consonants arranged in an order not obviously related to words or common abbreviations constituted a nonsense syllable, such as PQG. Each of the three PowerPoint presentations (numbers, non-emotion based words, and nonsense syllables) was created in all of the selected colors: orange, red, blue, yellow, green, and black (control group), creating 18 individual PowerPoint presentations. Furthermore, each stimulus was presented on a white background, thus allowing the investigator to compare differences due to the coloration of the stimuli.

### *Design and Procedure*

Each group, consisting of both men and women, saw all three of the PowerPoint presentations in a single color. The investigator showed all the participants a PowerPoint presentation of the twelve stimuli in 3-second intervals. After the twelfth stimulus occurred, the screen turned black and each participant received 1 minute and 15 seconds to write down all the stimuli they could remember viewing. Immediately following the 1 minute and 15 seconds, the investigator told the subjects to prepare for the next presentation.

### *Results*

Each participant received one point for every correct number and non-emotion based word accurately written down. Because the nonsense syllables were more difficult to

accurately write down, each participant was given a half point if he or she wrote down two of the three consecutive consonants from the nonsense syllable. A participant was given one point for accurately writing down the whole nonsense syllable. The average number of non-emotion based words recalled was 7.31 ( $SD = 1.55$ ) and the average number of the numbered stimuli recalled was 6.46 ( $SD = 1.57$ ). However, the average number of nonsense syllables recalled, after the participants received the additional half-point increments, was 3.87 ( $SD = 1.31$ ) thus indicating nonsense syllables were more difficult to recall than either the non-emotion based words or the numbers.

However, to determine the effects of color on recall of the numeric and verbal stimuli, all three stimuli groupings (numbers, non-emotion based words, and nonsense syllables) were collapsed for each participant and all the points were summed to form a single score. As shown in Figure 1, 25 men had an average recall of 17.17 ( $SD = 3.04$ ) for the colored stimuli and 5 men had an average recall of 17.40 ( $SD = 4.25$ ) for the control stimuli. As shown in Figure 2, 45 women had an average recall of 18.10 ( $SD = 2.99$ ) for the colored stimuli and 7 women had an average recall of 17.14 ( $SD = 3.73$ ) for the control stimuli.

As seen in Table 1, a 2 x 6 ANOVA (Gender x Color) was computed and revealed no main effects and no interactions to be significant. Additionally, post-hoc t-tests were performed to check for significance between the color which was, on average, recalled the most often and the color recalled the least often, see Figures 3 and 4. For men, the average number of green stimuli recalled ( $M = 18.93$ ,  $SD = 2.25$ ) was compared to the average number of yellow stimuli recalled ( $M = 15.40$ ,  $SD = 3.92$ ), this result was not significant,  $t(10) = 0.19$ ,  $p > 0.05$  (two-tailed). For women, the average number of red stimuli recalled ( $M = 20.14$ ,  $SD = 2.64$ ) was compared to the average number of black stimuli recalled ( $M = 17.14$ ,  $SD = 3.73$ ), this result was not significant either,  $t(13) = 0.11$ ,  $p > 0.05$  (two-tailed).

### *Discussion*

The results did not significantly validate the hypothesis. Regardless of gender, color had little to no effect on the participant's short-term memory for this particular task. However, since each participant saw the stimuli in only one color, this study did not account for differences in attention due to coloration of the stimuli. Brandt (1943) found evidence that a person's attentional value may fluctuate due to coloration of stimuli. In addition, Camgöz, Yener, and Güvenç (2004) found that colors which were bright and highly saturated attracted more attention than those which were less bright and not as highly saturated. Thus, if the participants would have seen the stimuli in multiple colors, their attention may have fluctuated between each of the colors, which may in turn influence the results.

There was also a difference between the average number of non-emotion based words, nonsense syllables, and numbered stimuli recalled in this study. Participants recalled numbers and non-emotion based words much more easily than they recalled nonsense syllables. A possible reason for this effect may be due to the common use of words and numbers in daily life, whereas nonsense syllables are not as frequently used. Another possible reason for this effect could be due to the limited capacity of short-term

memory. Miller (1956) stated that the capacity of short-term memory is anywhere from five to nine items. Since nonsense syllables are more difficult to chunk together than words and numbers, they would occupy more of the limited storage of the short-term memory.

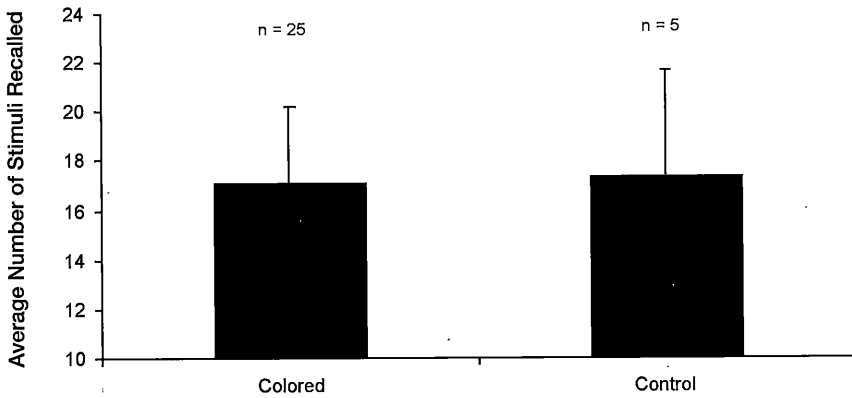
In addition, D'Argembeau and Van der Linden (2004) found emotionally-based-colored words were recalled significantly more often than were non-emotion-based-colored words. Furthermore, using procedures similar to those in this current study, Sleeth (2004) used pictorial stimuli instead of verbal stimuli to find significance between color and memory. On the other hand, this current study found little to no evidence that coloration has an effect on verbal stimuli in short-term memory, but according to Morales (2003), color is more likely to manipulate long-term memory than short-term memory. Thus, different designs have produced varying results; this study did not find colored verbal stimuli to have a significant influence on short-term memory, but this study does not prove that color does not have any effect on memory.

## REFERENCES

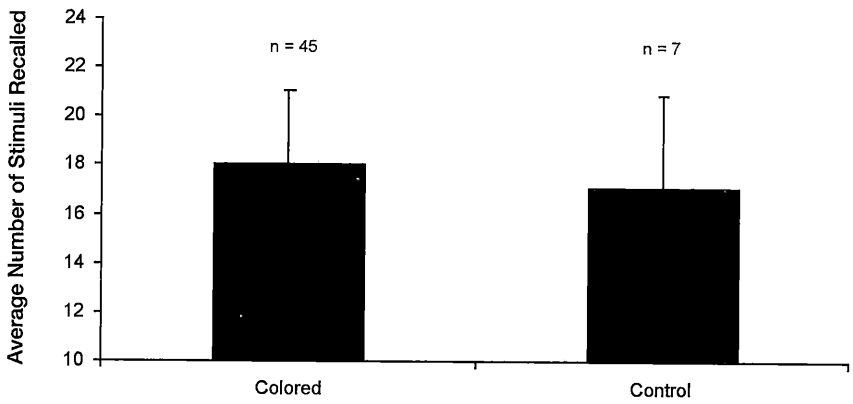
- Brandt, H. F. (1943). The attention value of color evaluated by means of ocular photography. *Proceedings of the Iowa Academy of Science*, 50, 298-298.
- Camgöz, N., Yener, C., & Güvenç, D. (2004). *Effects of hue, saturation, and brightness: part 2: Attention. Color Research and Application*, 29, 20-28.
- D'Argembeau, A., & Van der Linden, M. (2004). Influence of affective meaning on memory for contextual information. *Emotion*, 4, 173-188.
- Denby, C. (2002). Importance of memory color. Retrieved Jan 13, 2005 from [http://hubel.sfasu.edu/courseinfo/SL02/memory\\_color.htm](http://hubel.sfasu.edu/courseinfo/SL02/memory_color.htm)
- Kishiyama, M. M., Yonelinas, A. P., & Lazzara, M. M. (2004). The von Restorff Effect in amnesia: The contribution of the Hippocampal System to novelty-related memory enhancements. *Journal of Cognitive Neuroscience*, 16, 15.
- Longo, P. J. (2001, March 5-28). What happens to students learning when color is added to a new knowledge representation strategy? Implications from visual thinking networking. Paper presented at the 2001 combined Annual Meetings of the National Science Teachers Association and the National Association for Research in Science Teaching. Retrieved Jan 13, 2005 from ERIC database.
- Miller, G. A. (1956). The magical number seven plus or minus two: Some limits on our capacity for processing information. *Psychological Review*, 63, 81-97. Retrieved March 3, 2005 from PsychINFO database.
- Morales, D. A. (2003). Memory for color over brief intervals: One capacity or two? Dissertation Abstracts International: Section B: The Sciences & Engineering, 64, 2414. Abstract retrieved Jan 13, 2005 from PsychINFO database.
- Sleeth, W. M. (2004). The use of color to increase memorization. Retrieved Jan 13, 2005 from <http://clearinghouse.mwsc.edu/manuscripts/480.asp>

Source	SS	df	Mean Square	F
Gender	12.55	1	12.55	1.25
Color	20.80	5	4.16	0.42
Gender*Color	51.18	5	10.24	1.02
Error	721.79	72	10.03	
Total	27058.50	84		

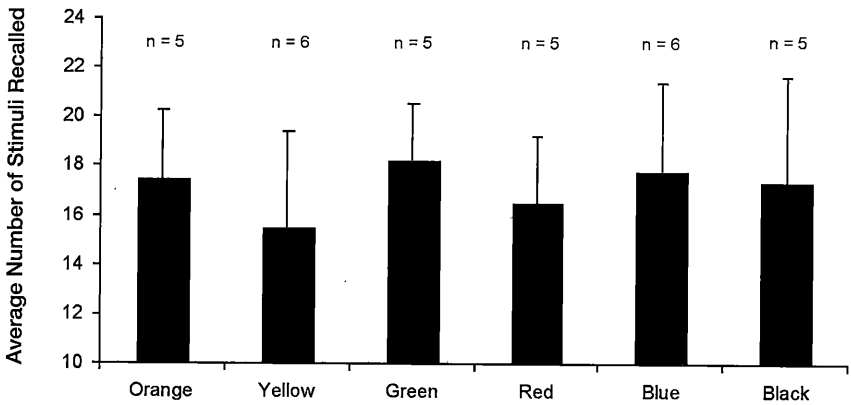
**Table 1.** Analysis of Variance for Gender and Recall of Colored Stimuli



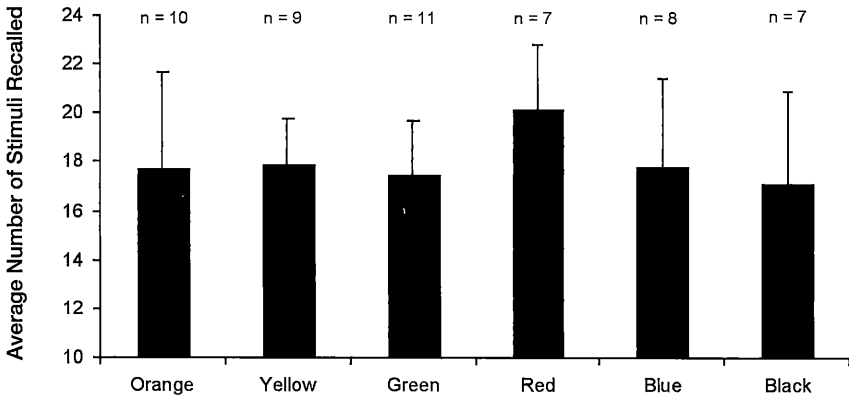
**Figure 1.** Average number of correctly recalled stimuli with standard deviations by men for colored and control stimuli.



**Figure 2.** Average number of correctly recalled stimuli with standard deviations by women for colored and control stimuli.



**Figure 3.** Average number of correctly recalled stimuli with standard deviations by men for each colored and control stimulus.



**Figure 4.** Average number of correctly recalled stimuli with standard deviations by women for each colored and control stimulus.