Student Works

2011-02-18

The Effects of Color on Visual Short-Term Memory

TaeLynn Johnson

Zachary Burk

Kassandra Larson

Annalisa Ellsworth

Follow this and additional works at: <https://scholarsarchive.byu.edu/studentpub>

Part of the [Psychology Commons](#)

BYU ScholarsArchive Citation

Johnson, TaeLynn; Burk, Zachary; Larson, Kassandra; and Ellsworth, Annalisa, "The Effects of Color on Visual Short-Term Memory" (2011). *Student Works*. 127.

<https://scholarsarchive.byu.edu/studentpub/127>

This Presentation is brought to you for free and open access by BYU ScholarsArchive. It has been accepted for inclusion in Student Works by an authorized administrator of BYU ScholarsArchive. For more information, please contact scholarsarchive@byu.edu, ellen_amatangelo@byu.edu.

The Effects of Color on Visual Short-Term Memory

INTRODUCTION

This experiment examined the affects of the color of images on the short-term memory of participants. We hypothesized that naturally colored images and unnaturally colored images had differing effects on short-term memory not affected by gender and favorite colors.

Background

Chromatic cues as well as observations of shape, form, position, and movement of objects are important to recognize and make sense of the world (Wichmann, Sharpe & Gegenfurtner, 2002). Vernon & Lloyd-Jones who found colored objects were identified in less time than black and white objects (2003). It has been shown that elderly Alzheimer's patients find it is easier to negotiate their environments and identify objects when color is used to improve their short-term memory which also improves their functional abilities (Cernin, Keller, Stoner, 2003). Furthermore, color assists recognition of the content of environments even if the image is somewhat blurry (Castelhana & Henderson, 2007). Natural color coding improves our ability to recognize objects more quickly (Vernon & Lloyd-Jones, 2007). What is not well known is how natural and unnatural colors affect visual short-term memory recall.

Hypothesis

- Research Question: How does object coloration affect a person's visual short-term memory of observed items?
- Primary Hypothesis: The control group would be able to recall and record more images present in the collage the experimental group.
- Secondary Hypotheses: Gender and reported favorite color would have no significant effect on memory. Operational Definitions:
 - Memory: Number of items remembered and reported
 - Natural coloration: Commonly-recognized coloration, or coloration usually found in nature
 - Unnatural coloration: Altered and uncommon coloration, or coloration not found in nature

METHOD

Between-Subjects Design

- Group A (control) viewed Collage A
- Group B (experimental) viewed Collage B
- Independent variable: Which collage was viewed
- Dependent variable: Number of Images remembered after viewing assigned collage for 30 seconds

Participants

- Convenience (Internet) Sample
- Total: 150
 - Males = 31
 - Females = 89
- Group A (Control): 60 participants
 - Males = 18
 - Females = 42
- Group B (Experimental): 60 participants
 - Males = 13
 - Females= 47

Administration

- Qualtrics (www.qualtrics.com)
- SONA (www.byu.sona-systems.com)

Measures

- Primary Measure: The number of items remembered by each participant group in a collage.
- Secondary Measure: The number of times and item of each color was remembered, compared to the number of images displayed in participants' favorite colors.
- Control: We limited exposure to the assigned collage for 30 seconds, and allowed open-response reporting for 90 seconds.

Procedure

- Participants selected one of links on SONA Systems, classifying them into either Group A or Group B. Each link routed to Qualtrics where the online survey was hosted. Participants read and agreed to an online consent form.
- Participants were asked to view a collage for 30 seconds with the intent to remember the items viewed in a collage.
- Participants were asked to record for 90 seconds the items they remembered from the collage they viewed in open box provided for them.
- Participants were then asked to answer demographic questions, including age range, gender, major in college, colorblindness, and favorite color.
- Participants were then asked to record in a 7-point Likert scale how the y thought the color of the images affected their memory.

Analysis

- All data were analyzed using SPSS 18.

Zachary Burk, TaeLynn Johnson, Kassandra Larson & Annalisa Ellsworth

Brigham Young University

Collage A

Collage B

Table 1 – Tests of Between Subjects Effects Group & Gender

Test of Between-Subjects Effects					
Dependent Variable: <u>totalremembered</u>					
Source	Type III Sum of Squares	Df	Mean Square	F	Sig.
Corrected Model	135.443 ^a	3	45.148	4.656	.004
Intercept	7944.964	1	7944.964	819.300	.000
Group	115.841	1	115.841	11.946	.001
Gender	25.407	1	25.407	2.620	.108
Group*gender	10.449	1	10.449	1.077	.301
Error	1124.882	116	9.697		
Total	12493.000	120			
Corrected total	1260.325	119			

a. R Squared = .107 (Adjusted R Squared = .084)

Figure 1 - Number of Images Remembered Between Groups

RESULTS

Overall Results

- We hypothesized that color would influence participants' ability to recall colored images. There was a significant difference in the number of items each team remembered.
- Participants who viewed the commonly colored collage recalled a greater number of items than participants who viewed the strangely colored collage.

Analysis of Primary Hypothesis

- We hypothesized the control group (Group A) would be able to recall more images from memory than the experimental group (Group B).
- ANOVA revealed a significant difference between groups, $F=11.946$, $p < .001$. This indicated that Group A was in fact able to recall more items than Group B, as we predicted.
- Using this information we were able to reject the null hypothesis and infer that object color influenced participant memory.

Analysis of Secondary Hypotheses

- Gender was not an overall determinant in the number of items remembered, nor was it a determinant within groups as shown by univariate analysis that an overall gender effect was ($p = .108$). gender effects within each group yielded.301. This effect was insignificant at the $p \leq .05$ level.

DISCUSSION

General Discussion

- The fact that naturally colored images were remembered more frequently than unnaturally colored images suggests that object color significantly affects visual short-term memory and item recall.
- In order for our mind to efficiently and accurately store data, visual information needs to be presented in a way that can be readily recognized. We suspected that unnatural coloration would require more cognitive power and negatively affect a person's ability to identify and memorize the items in the collage. These results compliment previous findings, which suggest that color plays an important role in object identification and recall.

Limitations

- Possible limitations to our study that should be addressed. Our collage included several safety items designed to be noticeable in everyday life (e.g. the stop sign and the traffic cone). It is possible that the functional nature of these items affected participants' ability to remember them.
- Also of note is the fact that several of the included items are recognizable in other colors. For example, an apple can be identified as having red, yellow, or green skin. Whether this decreased the contrast between each collage is unknown.

Future Directions

- Using color properly to enhance memory will benefit businesses related to advertising, the educational field relating to textbook and learning graphics, the health industry relating to cognitive and improvement or healthy environments.
- This knowledge will enable the above industries to provide more effective advertisements, learning graphics, and healthy environments and improve quality of life for people of all ages.