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## The Influence of Color on Mood

Mariah Palmer<sup>16</sup>

*Sensory stimuli, including color, may play a role in corresponding mood (Wells, 1910). Kaya and Epps (2004) showed participants attribute and associate colors with positive and negative emotions. Compared to previous research, in the present study, participants' moods were measured while they were exposed to a color. The primary focus of the current research was to see if a color stimulus would influence mood. Secondly I also studied mood change among two groups: right-hemispheric and left-hemispheric dominant participants. I wanted to find out whether right-brained participants would experience more change in their mood than the left-brained participants. According to Matikas, Petras, Skusevich, and Darius (2010), the right-hemisphere specializes in perception. There is not a great deal of research about the ways the different hemispheres process color; therefore, it is important to take a closer look into this process with the current research. An online survey was utilized, and participants were randomly assigned a text color. The questions on the survey helped to determine the hemisphere of the brain that the participant uses most readily. Additionally, participants were surveyed on mood in the beginning and at the end of the survey. The results of this study were that there was no significant impact of colors on mood. Knowing this, more research should be pursued so look for a connection.*

According to Wells (1910), sensory stimuli may play a role in corresponding mood. One type of sensory stimuli that we encounter is color. Color is most often defined by three characteristics of saturation, hue, and light (Dresp-Langley & Langley, 2010). There are a multitude of explanations as to why color has the ability to influence mood. One of those reasons is that each person has his or her own color preferences (Kaya & Epps, 2004; Taylor, Clifford, & Franklin, 2013). An extension of that idea is that there are color preferences, but they are more focused on a universal level. Color also has the ability to influence corresponding mood by the associations we have with the specific color stimuli and one way that this is argued is through the theory of ecological variance. There are also theories

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that show color can evoke physiologically arousing responses in a person, which may also be an explanation for corresponding emotion or mood (Pressly & Heesacker, 2001). Furthermore, there are cerebral hemispheric differences in humans that may also be a significant piece of information in understanding how sensory stimuli influences mood. Understanding the complex process that is color perception is necessary, as color is a large portion of the daily lives of humans. The present study looked at these cerebral differences and hypothesized that they do impact the mood associated with various color stimuli.

### **Theories on Perception of Color**

It is essential to recognize that color has associations with emotion or mood. For example, light colors consistently receive more positive feedback whereas dark colors consistently receive more negative feedback. In a study conducted by Kaya and Epps (2004) a total of 98 participants were questioned about their emotional responses to specific colors. That is, the researchers specifically asked the participants to explain what kind of emotion a color evokes. Participants were presented a randomized color on a white background and asked three questions in relation to their feelings and perception of the specific color. The researchers were mainly focused on hues and light categories. Kaya and Epps (2004) tested green, purple, and black among other colors and found that green and purple both received positive responses; green received a positive rating of 95.9% and purple received a positive rating of 64.3%. Black received a low positive response of only 7.1%. While it is important to note these feelings toward these specific colors, it is also important to note that these are most likely explicit feelings toward colors and not implicit mood (Kaya & Epps, 2004). Similarly, Wells (1910) also researched attributions that participants gave to various colors. While this study is dated, it helps to show the temporal consistency of feelings that people ascribe to colors in comparison with other research. Participants were given a list of descriptor words and a list of colors and asked to

match the two. As the Kaya and Epps (2004) study suggested, green and purple were given more positive attributes among 63 participants. Statistical analyses for this research study were not completed with only raw scores provided. Consistent with Kaya and Epps' (2004) study the data show that there were overall more positive words associated with green than with purple (Wells, 1910).

As previously mentioned, there may be cross cultural differences or similarities among color preferences. This is one topic that is necessary to discuss as color preferences could be one way that mood can change. Taylor, Clifford, and Franklin (2013) examined differences in color preference between British and Himba participants. The comparison is essential as British participants lived in an industrialized culture whereas the Himba participants lived in a non-industrialized culture. The stimuli were implemented by having the participants view a color on a screen with a grey background. Participants were then asked to rate their preference of the color on a 10-point scale. The data achieved through this study did not support the idea that there are universal preferences in colors. The results of this study were that the British participants preferred the colors that were said to be part of the universal preference (blue hues) and the Himba participants preferred saturated and yellow hues, which are colors that previous research has shown participants to have an aversion to (Taylor et al., 2013). However, one concept that this study did find support for was that color preferences are often a result of associations that participants have with various objects. The researchers concluded that more research between cultures is needed in order to determine whether there is a universal color preference. According to these researchers, most previous research has been done solely in industrialized cultures which may account for similarities in color preferences in current research (Taylor et al., 2013).

## **Hemispheric Differences Pertaining to Color**

The two hemispheres of our brain have their own specializations. While each side of the brain does not typically work independently, there is research that shows these differences in specialization and disorders within the hemispheres (Harris, 1999). The qualities of the right cerebral hemisphere are those that are more holistic in nature. For example, the right hemisphere would excel in “visuo-spatial abilities,” “aesthetic discrimination,” “affect in general,” and “affect related to aesthetics,” (Torrance, Reynolds, Ball, & Reigel, 1976, p. 2). Its counterpart, the left cerebral hemisphere, is described as being more analytic. One would find that this hemisphere specializes in “verbal memory,” “scientific reading,” and “mathematics” (Torrance et al., 1976, p. 2). While it is important to note that both of the hemispheres of the brain integrate to process color, one would imagine that it is the right hemisphere that would dominate in this type of process as it specializes in color processing (Barnett, 2008). In this study, participants were tested in two parts. The first part was exposure to a Mondrian stimulus (rectangles of color blocks all blocked together) and the second was exposure to object stimuli. In the Mondrian trial, there were a total of 200 exposed stimuli and with the object trial there was a total object count of 204. The most important result drawn from this study is that color stimuli exposed to the right hemisphere were more accurately processed than those exposed to the right visual field. Knowing this, one could conclude that the right hemisphere is involved more in the identification of color as a result of its specialization for more holistic tasks (Barnett, 2008). Similarly, Davidoff (1976) found significant evidence to show that when color was exposed to the right hemisphere of the brain, participants were able to better discriminate differences in color stimuli. In this study, participants were exposed to rectangular cards that were similar in color and asked to decipher if the colors were the same or

if they were different. These results support other literature that has clarified that the right cerebral hemisphere is more attuned to color (Davidoff, 1976).

### **Emotional Processing**

There is a great deal of evidence that support that right hemispheric superiority over emotional control over the left hemisphere. Borod, Koff, Lorch, Nicholas, and Welkowitz. (1988) researched the differences in emotional expression of participants with right cerebral hemisphere damage and found results that are in accordance with previous research. This study compared results of those with right hemisphere damage, those with left hemispheric damage, and those with no damage in the ways that they expressed emotions. In order to test participants, they either asked them to show an emotion or showed them a stimulus to evoke emotion. One thing that they found was that participants with damage to the right cerebral hemisphere scored lower in both responsivity and accuracy compared to the other two groups of participants (Borod et al., 1988). Knowing these data, it is safe to assume that some type of emotional processing happens through the right cerebral hemisphere.

### **The Present Study**

Three pieces of critical information can be gathered from previous research: that color can evoke emotion, that color is processed more efficiently in the right hemisphere, and that there is an emotional functioning of the right hemisphere. Upon gathering this information, the next research question at hand is, if participants are exposed to even a small portion of a color stimulus (i.e., text on a screen), will they have a mood that is impacted? A second research question is that if participants are identified as being right-brained, will they have a mood that is impacted greater than those who are identified as being left-brained? These ideas were tested by manipulating font in an online research survey and assessing the mood of participants.

## Method

### Participants

Participants were recruited through a total of four online sources as a sample of convenience. Participants were recruited through the Lindenwood Participant Pool (LPP) and online sites by using Facebook, LinkedIn, and the Psi Chi website. To recruit certain participants, the researcher followed all necessary and ethical standards set by the Participant Pool at Lindenwood University. Included in this sample were a total of 139 responses. Of the participants, 93 students were recruited from the participant pool while 46 participants were recruited through either Facebook, LinkedIn, or the Psi Chi website. Since this was a survey on color, 12 participants were removed from analyses as a result of any type of color-blindness or blindness. A total of 43 respondents were removed for incomplete responses and 1 participant was removed for listing that he or she was under the age of 18. Upon removing those respondents, the data analysis was left with a total of 83 participants. There were 69 participants that identified themselves as female, 14 participants that identified as male, and no participants identified as anything other. The ages of participants ranged from 18 to 56 with the average age being 21. Participants recruited through the LPP were compensated in the form of extra credit and participants recruited from online sources were offered the opportunity to enter their name into a drawing of a \$15.00 Amazon e-gift card.

### Materials and Procedure

The materials of this research study were online resources. The survey was created on Qualtrics, which is a platform that allows researchers to create surveys online and distribute them through a link (see Appendix A for questionnaire). The questions were either designed by the primary investigator or derived from a Learning and Thinking Inventory by Torrance, Reynolds, Ball, and Riegel (1976). Since not all the participants spoke English as a first language, I

adapted the questions in a way so that the questions were easier for participants to understand. Additionally, I took out the third multiple choice option to make categorizing the participants easier. Only a total of nine questions were asked assessing hemispheric dominance in order to also more easily categorize participants as right-brained or left-brained.

Prior to beginning the survey, participants were asked to read and agree to an electronic statement of consent. Following, they were asked to verify that they were at least 18 years of age or that they were being recruited through the Lindenwood Participant Pool. Participants who were recruited from the LPP were allowed to be under 18 years of age if they had a consent form filed with the LPP. All other potential subjects under the age of 18 were unable to participate. Participants were also asked if they suffered from any blindness or colorblindness so that their data could be removed from the analysis; however, these participants were not excluded from participation.

The survey consisted of three categories of questions regarding mood, personality, and demographics. Upon consenting, participants were asked on a 10-point scale how they were currently feeling. The scale asked them to rate cheerfulness, calmness, neutrality, and feelings of melancholy. Participants were then asked to give information about their blindness or colorblindness. Following this, participants were asked a total of nine questions about personality and preferences. The information was used to determine whether the participant is more right-brain or left-brain dominant. After participants answered these questions, they were asked to again rate their mood. The end of the survey asked two demographic questions of age and gender, concluding with an option to rate the survey. There were four versions of the same survey differing only in font color: green, brown, purple, and black. Each participant only saw one version of the survey, thereby exposed to only one font color. Participants were randomly assigned to the different versions of the survey. There were four versions of the same survey



differing only in font color: green, brown, purple, and black. Each participant only saw one version of the survey, thereby exposed to only one font color. Participants were randomly assigned to the different versions of the survey. Participants who were not being recruited through the participant pool were given a link to a second survey where they were able to provide their email addresses if they wished to do so. The second survey was utilized in order to ensure anonymity of participants while still being able to enter a drawing for an e-gift card.

### Results

Upon removing all necessary data sets, statistical analyses were completed. In order to test the first question, if color had an impact on mood, a one-way repeated measures ANOVA was conducted through SPSS. For this measurement, color was the independent variable and change in moods (cheerful, melancholy, neutral, and calm) was used as the measure of the dependent variables. The results of this statistical analysis were insignificant. The one-way repeated measures ANOVA did not provide significant evidence for an impact of color on mood. There were no within-subjects effects of color on mood. The difference in score for cheerfulness with color ( $M = .13$ ,  $SD = .903$ ) and without color ( $M = .13$ ,  $SD = .619$ ), calmness with color ( $M = .06$ ,  $SD = 1.043$ ) and without color ( $M = .31$ ,  $SD = .602$ ), neutral with color ( $M = .09$ ,  $SD = 1.203$ ) and without color ( $M = .00$ ,  $SD = .894$ ) and lastly, the mood with the most notable differences was melancholy with color which was ( $M = .01$ ,  $SD = 1.108$ ) and without color ( $M = -.31$ ,  $SD = .704$ ). However, none of these were significantly different (see Table 1 for SPSS analysis)

To conduct analyses for the second question, if right-brained participants were more impacted by color than left-brained participants, a series of independent samples *t*-tests were completed through Microsoft Excel. These tests compared the two groups of participants on the difference in scores of the four moods assessed. For left-brained participants, cheerfulness

before ( $M = 6.75$ ,  $SD = 2.01$ ) and cheerfulness after ( $M = 7$ ,  $SD = 2.09$ ) were not significant at  $t(11) = -0.89715$ ,  $p = 0.389$ . Calmness before ( $M = 6.25$ ,  $SD = 1.86$ ) and calmness after ( $M = 6.58$ ,  $SD = 2.07$ ) were not significant at  $t(11) = -0.0842423$ ,  $p = 0.417$ . Neutral feelings before ( $M = 5.25$ ,  $SD = 1.76$ ) and after ( $M = 4.83$ ,  $SD = 2.12$ ) were not significant at  $t(11) = 0.890$ ,  $p = 0.392$ . Feelings of melancholy before ( $M = 3.67$ ,  $SD = 2.39$ ) and feelings after ( $M = 3.33$ ,  $SD = 2.39$ ) were also not significantly different at  $t(11) = 1.7728$ ,  $p = 0.104$ . For right-brained participants, cheerfulness before ( $M = 5.84$ ,  $SD = 2.26$ ) and cheerfulness after ( $M = 95$ ,  $SD = 2.26$ ) were not significant at  $t(54) = -0.903015$ ,  $p = 0.37053$ . Calmness before ( $M = 5.71$ ,  $SD = 2.16$ ) and calmness after ( $M = 5.71$ ,  $SD = 2.14$ ) were not significant at  $t(54) = -0.573819$ ,  $p = 1$ . Neutral feelings before ( $M = 5.29$ ,  $SD = 2.09$ ) and after ( $M = 5.49$ ,  $SD = 1.99$ ) were not significant at  $t(54) = -1.375398$ ,  $p = 0.175$ . Feelings of melancholy before ( $M = 4.12$ ,  $SD = 2.29$ ) and feelings after ( $M = 4.51$ ,  $SD = 2.32$ ) were also not significantly different at  $t(54) = -0.573819$ ,  $p = 0.568$ .

### Discussion

The hopeful outcome of this study was to show whether color influences mood. Results of this analysis did not show support for this hypothesis. A secondary goal of this study was to determine whether the impact of color on mood might depend on the participants' hemispheric dominance. Results of this analysis also did not support this idea.

Some limitations of this study included the mood ratings as they were self-rated and only assessed participants on a total of four moods among the countless number of moods that exist. This is a limitation as participants may have had a mood shift that was not included on the questionnaire. A suggested improvement of this for future research would be to ask about more moods and over a longer survey period. Another limitation could be that participants were identified as being left-brained and right-brained based on their self-reported answers on a

questionnaire rather than on the basis of physical brain activity in the hemispheres, which would result in more accurate identifications. A suggestion to resolve this issue would be to ask more questions in order to determine which hemisphere the participant uses more often. For convenience, only nine questions were asked in this survey. It may also be a possibility to physically measure hemispheric activity while completing tasks in order to determine the hemispheric dominance of a participant; however, questionnaires are also an acceptable format.

More suggestions for future research may be to use an in-person format as the setting could be more easily manipulated. Additionally, using an in-person format may also allow you to assess mood in different ways other than those used in this study. As other researchers have suggested, further research is needed in order to study the influence of color on mood. This is an essential topic to study as color plays a large role in how we live our daily lives.

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Table 1

**Descriptive Statistics**

	Colors	Mean	Std. Deviation	N
CheerfulDiff	Color	.13	.903	67
	NoColor	.13	.619	16
	Total	.13	.852	83
CalmDiff	Color	.06	1.043	67
	NoColor	.31	.602	16
	Total	.11	.975	83
NeutralDiff	Color	.09	1.203	67
	NoColor	.00	.894	16
	Total	.07	1.145	83
MelancholyDiff	Color	.01	1.108	67
	NoColor	-.31	.704	16
	Total	-.05	1.047	83

**Tests of Within-Subjects Effects**

Measure: ColorYN

Source		Type III Sum of Squares	df	Mean Square	F	Sig.
DiffMood	Sphericity Assumed	3.326	3	1.109	1.012	.388
	Greenhouse-Geisser	3.326	2.979	1.116	1.012	.388
	Huynh-Feldt	3.326	3.000	1.109	1.012	.388
	Lower-bound	3.326	1.000	3.326	1.012	.317
DiffMood * Colors	Sphericity Assumed	2.218	3	.739	.675	.568
	Greenhouse-Geisser	2.218	2.979	.744	.675	.567
	Huynh-Feldt	2.218	3.000	.739	.675	.568
	Lower-bound	2.218	1.000	2.218	.675	.414
Error(DiffMood)	Sphericity Assumed	266.180	243	1.095		
	Greenhouse-Geisser	266.180	241.307	1.103		
	Huynh-Feldt	266.180	243.000	1.095		
	Lower-bound	266.180	81.000	3.286		

## Appendix A

**Survey/ Questionnaire**

How much are you feeling each of these moods?

1 = Little to not at all

10 = A great deal

- Cheerful (noticeably happy and optimistic)
- Calm (relaxed, tranquil, not showing or feeling nervousness, anger)
- Neutral (not one thing or the other; indifferent)
- Melancholy (a feeling of sadness, typically with no obvious cause.)

Which of these best describes your handedness?

- Right - Handed
- Left - Handed
- <I use each hand equally.
- Other. Please explain.
- Don't know.

Which of these best describes your footedness?

- Left- Footed
- Right- Footed
- I use each foot equally
- Other. Please explain.
- Don't know.

Do you have any sort of blindness or color-blindness? If yes, please specify.

- Yes.
- No.

Which choice best describes your abilities?

- Better at remembering names
- Better at remembering faces

Which choice best describes you?

- Responds best to verbal instructions
- Responds best to instruction by example

Which choice do you prefer?

- Preference for essay tests
- Preference for multiple-choice tests

Which choice best describes you?

- Poor at thinking up funny things to say and/or do
- Good at thinking up funny things to say and/or do

Which choice do you prefer?

- Prefer language and analysis of a problem in order to find solutions
- Prefer use of visualization and imagery in problem solving

Which choice do you prefer?

- Prefer classes in which I listen to others
- Prefer classes in which I am moving and doing things

Which choice do you prefer?

- Classes or work to be planned and know exactly what I am supposed to do
- Classes or work to be open with opportunities or flexibility and change as I go along

Which choice best describes you?

- Responsive to logical, verbal appeals
- Responsive to emotional appeals

Which choice do you prefer?

- Preference for critical and analytical reading as for a book review, criticism of a movie, etc.
- Preference for creative, synthesizing reading as for making applications and using information to solve problems

How much are you feeling each of these moods?

1 = Little to not at all

10 = A great deal

- Cheerful (noticeably happy and optimistic)
- Calm (relaxed, tranquil, not showing or feeling nervousness, anger)
- Neutral (not one thing or the other; indifferent)
- Melancholy (a feeling of sadness, typically with no obvious cause.)

What is your age? \_\_\_\_\_

What is your gender?

- Male
- Female
- Other
- Prefer not to say

What would you rate this survey?

0 = Not at all enjoyable

10 = Very enjoyable