

Color and Perception in Cognitive Psychology (SPSY 375-01)

Perceiving Color: An Interdisciplinary Module to Advance Color Awareness in Daily Living

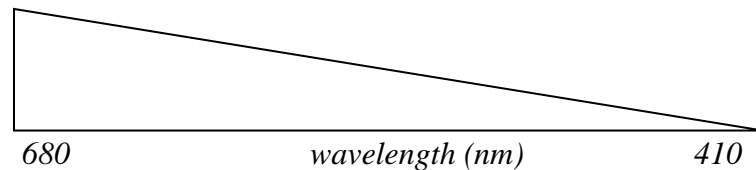
Module 1: Color Perception

What is perception?

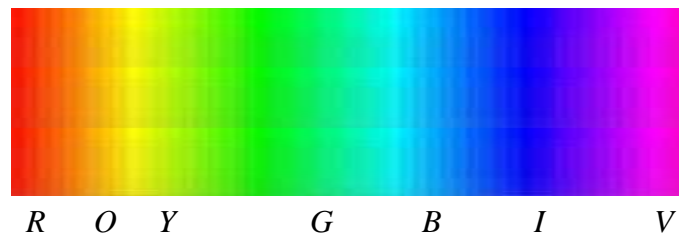
If a tree falls in the woods, but no one is there to hear it, does it make a sound? From a cognitive psychologists perspective if no one is there to hear it, the answer would be no, it does not make a sound. Perception is a psychological experience of a physical experience; it is what you bring to the world. Perception is the process of recognizing, organizing, and interpreting information from senses. Our brain structure determines how we perceive things.

When we see light, all that is coming in are the wavelengths. There is no perception there. It is not until the wavelengths come in contact with a person or animal that perception happens. So in cognitive psychology, when we talk about perception, we are talking about it as a psychological process. Not just the objects out in the world, but how do we perceive them? The perceiver defines perception; it's not something out in the environment.

What's "out there"



What we see



We experience distinct colors even though wavelengths are continuous. Concepts aren't "given" in the world...so why do we think in concepts if they don't accurately correspond to reality?

Learning Objectives

Upon completion of Module 1 the student should be able to:

- 1.) Explain what is meant by the statement "color is a psychological phenomenon, entirely subjective in nature".
- 2.) Distinguish between the three qualities associated with color; hue, brightness, and saturation.
- 3.) Identify the brain regions thought to be involved in color vision and discuss the ramifications of sustaining damage to these regions.
- 4.) Describe the various forms of color vision and the underlying cause of each.

Pre-Assessment

1. What do you know about the way we perceive color?
2. What questions do you already have about how we perceive color that you want to find out more about?

Lesson Plan

Preparatory Materials:

- Complete Pre-Assessment Questions in class prior to beginning Module 1 on Color Perception
- Watch Brain Games episode on Perception
 - http://www.dailymotion.com/video/xq1rfl_national-geographic-test-your-brain-episode-2-perception_shortfilms
 - Complete Quiz #1 questions about episode on class Moodle website

Quiz #1 Questions

- Describe an example of how shadows can influence color perception. Why does this happen?
 - How does depth influence object perception?
 - Explain, in your own words, how the brain perceives motion.
 - Explain the concept of mirror neurons and provide an example from your own life.
 - How do visual cues influence our perception of sound (the McGurk Effect)
- Read “*Sadness Impairs Color Perception*” (Thorstenson, Pazda, & Elliot, 2015)

Abstract

Past research has shown that emotion can influence low-level visual processes, including color perception, which may play a role in higher-order vision. Moreover, the prevalence of linguistic pairings between emotions and color words suggests that emotional experience and color perception may be linked. The purpose of the present research was to test whether emotion influences color perception. We did this by experimentally manipulating emotion with video clips in two experiments (specifically, sadness and amusement in Experiment 1, and sadness and neutral emotion in Experiment 2) and measuring color perception (specifically, accuracy in identifying desaturated colors). The results of both experiments showed that sadness impaired color perception along the blue-yellow color axis but not along the red-green color axis.

In class (Day 1):

- Class discussion topics:
 - Individual differences in color perception
 - Color in the Visual Cortex

Does everyone see colors the same way?

About 8% of the male population (and 0.5% of the female population) have a form of color vision deficiency. There are varying degrees and kinds of color discrimination deficiency ranging from slight anomalies to full dichromacy ("color blindness"). All of them can be characterized as a tendency to confuse groups of colors that are clearly distinguishable by the color-normal observer. Most people with color vision deficits can distinguish between most light wavelengths, although some wavelengths are indistinguishable.

Color-normal observers make color discriminations in a three dimensional color space consisting of two "chromatic" dimensions ("red/green" and "yellow/blue"), and brightness. Color deficient have reduced ability to discriminate colors along one of the two chromatic dimensions. Dichromats can discriminate colors in just two dimensions (the other chromatic dimension and brightness) (see Figure 1).

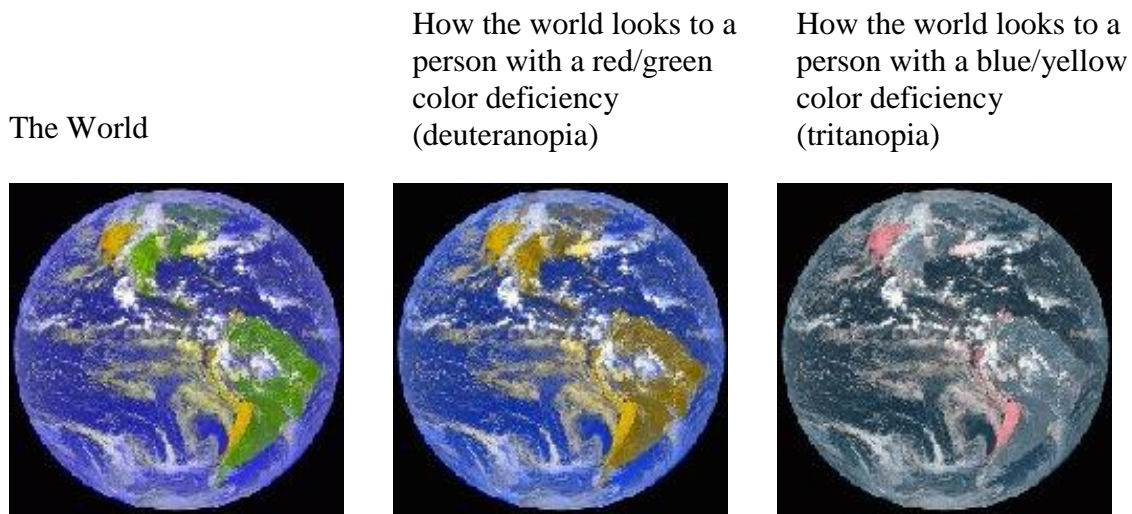


Figure 1: Color vision simulator examples

- *In class group activity*
 - Create a concept map using the following terms:
 - Achromatopsia, Deuteranope, Protanope, Tritanope, Color-Anomalous, Cone Monochromat, Rod Monochromat, Agnosia, Anomia, Saturation, Hue, Brightness
- *Quiz #2 (Post Module)*

Quiz #2 Questions

1. *Describe the three types of cones in the human visual system and explain the differences between them.*
2. *What does a color with zero saturation look like?*
3. *What is a unique hue? Provide an example.*
4. *Explain brightness in your own words.*
5. *What is achromatopsia?*

6. *In what way are color-anomalous individuals and cone monochromats color blind?*

Module 2: The Psychology of Color

Color Psychology

Color psychology is the study of hues as a determinant of human behavior. Did you know that your surroundings may be influencing your emotions and state of mind? Color psychology is widely used in marketing and branding. Many marketers see color as an important part of marketing because color can be used to influence consumers' emotions and perceptions of goods and services. Companies also use color when deciding on brand logos.

Learning Objectives*

Upon completion of Module 2 the student should be able to:

- 1.) Attend to and monitor their color awareness (i.e. awareness of how color influences daily behavior)
- 2.) Develop plausible behavioral explanations that rely on scientific reasoning and evidence rather than anecdotes and pseudoscience.
- 3.) Demonstrate broader understanding of how color affects us physically, mentally, and emotionally.
- 4.) Apply the knowledge and skills in color psychology concepts (as it relates to cognitive psychology) to everyday situations they encounter in interacting with other persons and with their environment.

**Learning Objectives will be assessed in a reflection paper at the end of the module.*

Pre-Assessment

1. How does color impact your daily life?
2. What advice would you give a friend who wanted to become more color aware?

Lesson Plan

Preparatory Materials:

- Complete Pre-Assessment Questions in class prior to beginning Module 2 on Color Psychology
 - Complete the “My Color Psychology Questionnaire”

In class (Day 1):

- Think-pair-share discussion topics:
Color and...
 - Mood/Symbolism
 - Marketing
 - Sports
 - Evolution

Modern Research on Color Psychology

Research has found that color can impact people in a variety of surprising ways:

- One study found that warm-colored placebo pills were reported as more effective than cool-colored placebo pills.
- The temperature of the environment might play a role in color preference. People who are warm tend to list cool colors as their favorites, while people who are cold prefer warmer colors.
- More recently, researchers discovered that the color red causes people to react with greater speed and force, something that might prove useful during athletic activities.
- One study that looked at historical data found that sports teams dressed in mostly black uniforms are more likely to receive penalties and that students were more likely to associate negative qualities with a player wearing a black uniform.
- Studies have also shown that certain colors can have an impact on performance. No one likes to see a graded test covered in red ink, but one study found that seeing the color red before taking an exam actually hurt test performance.
 - In the first of the six experiments described in the study, 71 U.S. colleges students were presented with a participant number colored either red, green or black prior to taking a five-minute test. The results revealed that students who were presented with the red number before taking the test scored more than 20 percent lower than those presented with the green and black numbers.

Post-Assessment (reflection paper)

1. *What did you learn about color perception that is in conflict with your prior understanding?*
2. *How do the ideas discussed in this module relate to previous class sessions?*
3. *Do you feel that your perception and understanding of color has improved as a result of this module? Explain your answer.*
4. *How did the lessons you learned in the module(s) relate to lessons learned in previous classes?*
5. *Explain how your new color perception knowledge is different from your previous understanding of color perception.*
6. *How will the lessons learned in the module(s) impact you personally (beyond the classroom)?*

References

Individual Differences in Color Vision

http://colorusage.arc.nasa.gov/indiv_diffs.php

Color Vision Simulator

<http://www.vischeck.com/examples/>

Color Psychology

https://en.wikipedia.org/wiki/Color_psychology

How Colors Impact Moods, Feelings, and Behaviors

<http://psychology.about.com/od/sensationandperception/a/colorpsych.htm>

AAC&U Value Rubrics (modified to form Color Awareness Rubric)

<https://www.aacu.org/value/rubrics>

Feeling Blue and Seeing Blue: Sadness May Impair Color Perception

<http://www.psychologicalscience.org/index.php/news/releases/feeling-blue-and-seeing-blue-sadness-may-impair-color-perception.html>