

**Crown 85 Winter 2016**

**Visual Perception: A Window to Brain and Behavior**

**Lecture 8 Perception of Color and Art & Illusion**

**OVERVIEW:** In the final two lectures we will discuss how the visual system enriches perception by adding the dimensions of depth, motion, and color to the canvas of visual information. These lecture will bring more *psycho* in our treatment. Although we will not be able to be as definitive in assigning specific neural networks, we will connect perceptions to the kinds of information processing which neurons can accomplish. Artists are perhaps the most astute “viewers” of the visual world. In the second part of lecture 8 we will look a visual illusion and how artists recognize and take account of visual information processing in their works.

**READING:** [Joy of Vision](#) and [Joy of Vision Eye, Brain, and Vision](#)

**LOOKING:** [Additive Colors](#) (needs JAVA)  
[Subtractive Colors](#) (needs JAVA)

Illusions ([Illusion Art Museum](#), [U. Mass Lowell](#), [Illusion of the Year Galleries](#))

Interactive Illusions ([see CROWN85 WWW Project Page](#))

Vision and Art ([see CROWN85 WWW Project Page](#))

1. What property of light is responsible for color information? Under white light why does an opaque or translucent blue object appear blue? What would be the appearance of the blue object when illuminated with red light?
2. Know the following terms related to the color of objects:
  - a. hue
  - b. brightness
  - c. saturation
  - d. value
  - e. trichromacy
3. Describe the differences between additive and subtractive color mixing. Which types of color mixing applies to (1) paint pigments, (2) stage lighting (multi spotlight), and (3) Pointillist art?
4. Which receptors cells of the retina allow us to see color? To what general regions of the color spectrum do each of them respond? What is the origin of the different spectral sensitivities of the three cone pigments?

5. The UC Center for Adaptive Optics (CfAO) is located on the hillside adjacent to Natural Sciences II and Thimann Lecture Halls. What is adaptive optics, how was it used to obtain maps of the color sensitive receptors in the 'alive' human eye? What did it reveal about the relative numerosity of L-, M-, and S-cones among individuals?
6. Know the following terms related color vision:
  - a. metameric match
  - b. simultaneous contrast
7. What are color opponent cells?
8. How do the Young-Helmholz and Herring theories of vision differ? Are they incompatible?
9. Which of the major "parallel pathways" transmits color information?
10. Know the following terms related to congenital color blindness:
  - a. protanopia
  - b. deuteranopia
  - c. tritanopia
  - d. protanomaly, deuteranomaly, tritanomaly
11. How is congenital color blindness inherited? Are men or women more likely to have inherited color blindness?
12. What is a possible explanation for Benham's color wheel?
13. Distinguish between bottom-up and top-down processing.
14. How are the following factors involved in various visual illusions?
  - a. illusions with explicitly known physiological origins
  - b. illusions consistent with perceptual overestimation of acute angles
  - c. context or association including size constancy
15. Give examples of the visual system "making bets" or "filling in" and understand how these can lead to illusions.