PSYC 1340 / VLST 2110 Perception

Recitation 7 - Color Constancy; Weird Cones; Cone Heredity

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Object Color

Percieved color can change based on the illumination and the surface reflectance of an object.

$$C(\lambda) = E(\lambda) \cdot S(\lambda)$$

Object Color Practice

Consider an illumination spectrum E_1 (λ) with an intensity of 1000 quanta at 480 nm, 400 quanta at 520 nm, and 10 quanta at 680 nm, and intensity zero at other wavelengths.

Consider a surface S_1 (λ) that reflects 50% of the illumination that reaches it at 480 nm, 10% at 560 nm, and 90% at 680 nm.

Calculate the spectrum of the light that will be reflected from the surface to the eye when the illumination E_1 (λ) reflects from the surface S_1 (λ). Give the numerical intensity at each of the wavelengths where the intensity is not zero.

Imagine that instead that the surface reflects 30% of the illumination at 480 nm. How many quanta of light at this wavelength is needed to have the same proximal stimulus as before?

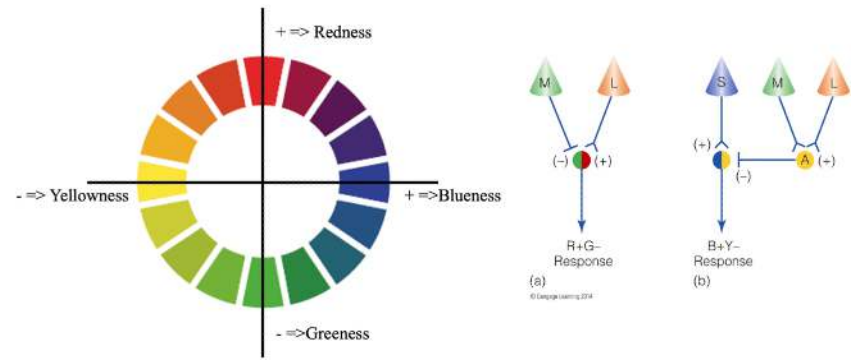
Weird Cones!

Imagine Martians have arrived on Earth. They have the same cone types as us, except their M cone weight is half as strong for the R+/G- neurons.

What will the light that that they percieve as a pure Yellow look like to us?

What will the light that they percieve as a pure Blue look like to us?

What will the light that they percieve as a pure Red look like to us?



Chromosomes and Cones

- Cone genes are found on the X-chromosomes, not the Y-chromosomes
  - The person expresses the union of the genes supplied by the chromosomes

1. Let X_N denote a typical human X chromosome that has genes for both the L and M cone photopigments. Let X_M denote a protanopic X chromosome that has only the M cone gene (we called this X_P in lecture). Let X_L denote a deuteranopic X chromosome that has only the L cone gene. An individual will have any cone photopigment whose gene is in at least one of their X chromosomes.
2. What happens when one parent of a child has X_M and X_L, the other parent has X_N and a Y chromosome. Describe the vision of each parent, then their daughtor, then their son.

See you next week!