Sensation – Auditory and Visual

Overview:

- Auditory Sensation – Hearing
- Visual Sensation – Sight

Auditory Sensation

- Sound is a repetitive fluctuation in air pressure.
- Vibrating objects create the fluctuations in air pressure that create sound.
- A repetitive fluctuation or change in pressure is a wave.

Auditory Sensation

Waves have three important physical characteristics related to three psychological qualities:

Amplitude influences the *loudness* of a sound

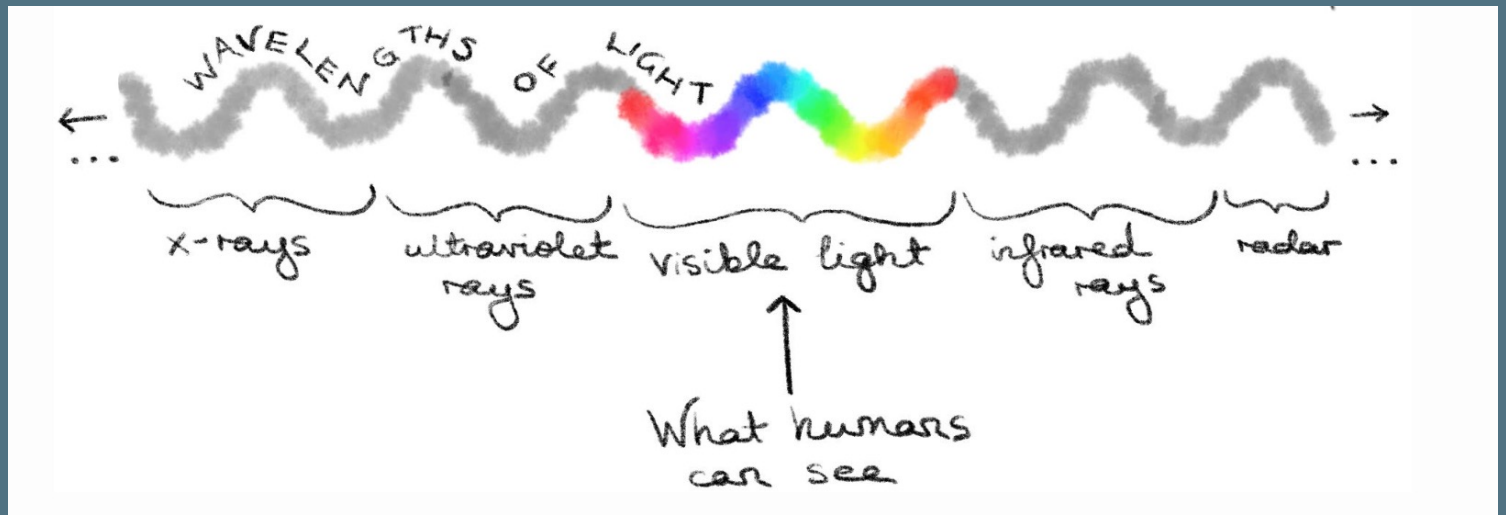
Frequency influences the *pitch*

The complexity of the **wavelength** influences the *timbre*

Explore these characteristics in this demo.

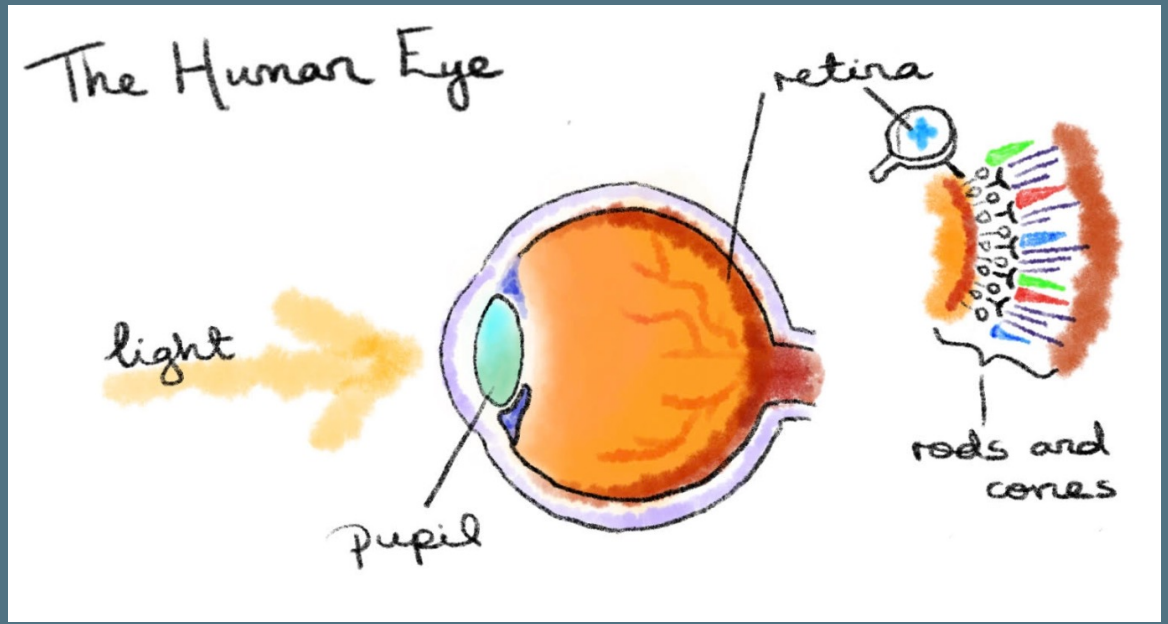
Visual Sensation

- Visible light is electromagnetic radiation that has a wavelength from about 400 to 750 nanometers.
- We cannot see electromagnetic radiation or light wavelengths that are outside of this range.
- Our sensation depends on light intensity and light wavelength.



Visual Sensation

- Light waves pass through the cornea, the pupil, and the lens before being focused on the retina.
- The iris adjusts the size of the pupil opening.
- The cornea and the muscles that hold the lens in place focus the light on the retina through a process called ***accommodation***.



Visual Sensation

- Visual transduction, the conversion of light energy into neural activity, takes place in the photoreceptors of the retina.
- The ***photoreceptors*** contain ***photopigments*** that break down in reaction to light and cause changes in photoreceptor membrane potentials.
- ***Dark adaptation***, the gradually increasing ability to see in the dark, occurs as new photopigments are synthesized.
- ***Rods***, one type of photoreceptor, contain the photopigment rhodopsin and are more sensitive to light but cannot discriminate between colors.
- ***Cones***, the other type of photoreceptor, contain three varieties of iodopsin, which can detect color and are more active in bright light. Cones are highly concentrated in the fovea, where acuity is greatest.

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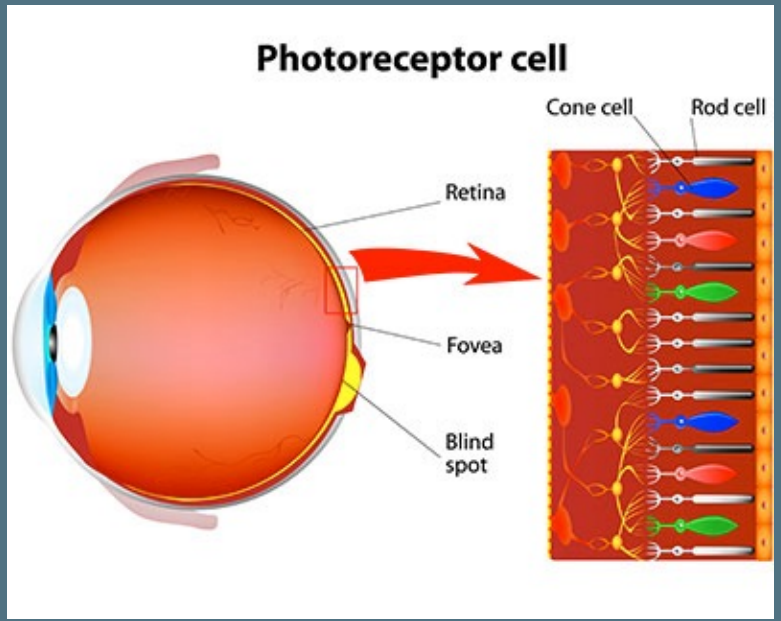

Visual Sensation

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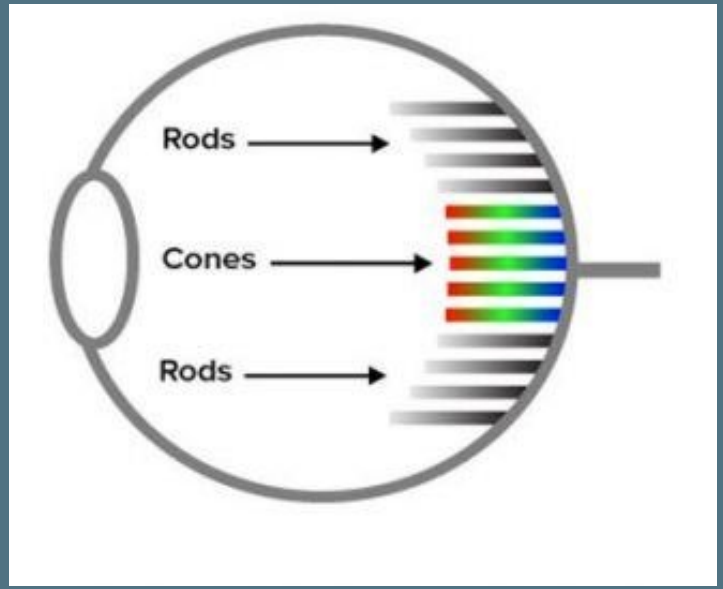
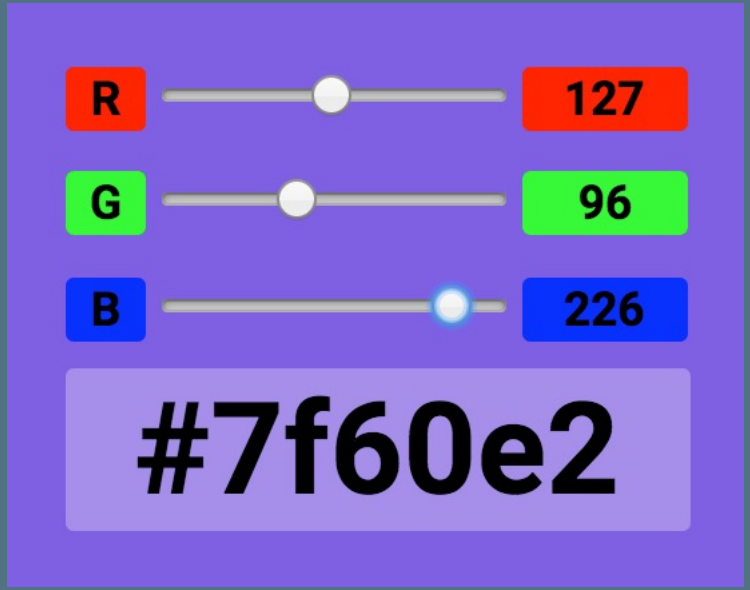


Explore dark adaptation through a demo here.

Visual Sensation

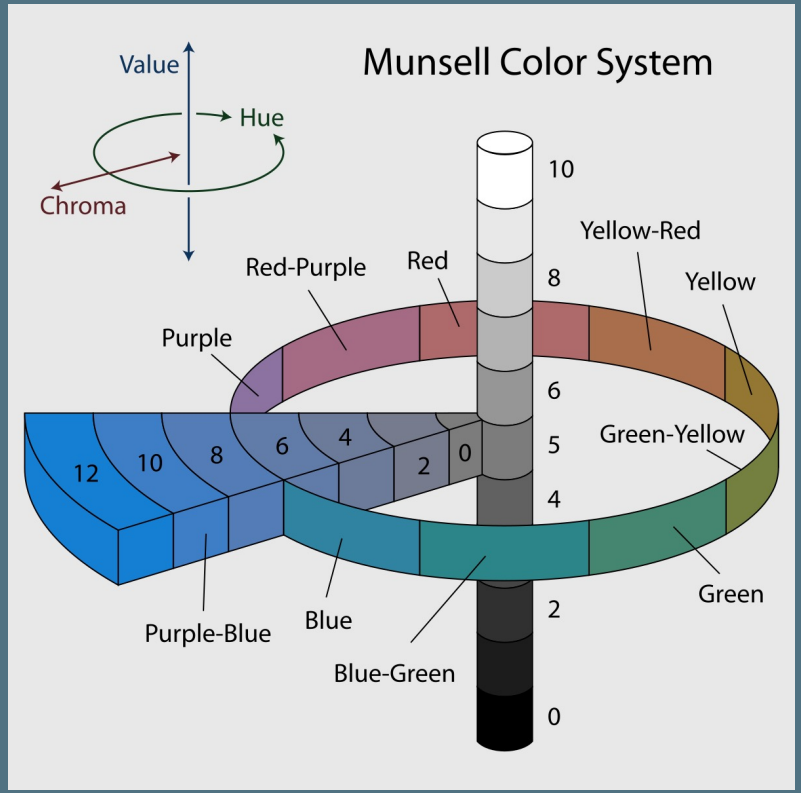
- Each cone is one of three types: a red receptor, a green receptor or a blue receptor.
- A combination of how much these red, green or blue receptors are stimulated is responsible for the color that your brain perceives.
- The way that our eyes understand color using red, blue and green receptors is mirrored in our understanding of color on a computer, where we often use ratios of RGB.



Visual Sensation

Hue, ***saturation*** (or chroma), and ***brightness*** (value) are three psychological aspects of color sensation.

They are represented together on the Munsell color wheel.

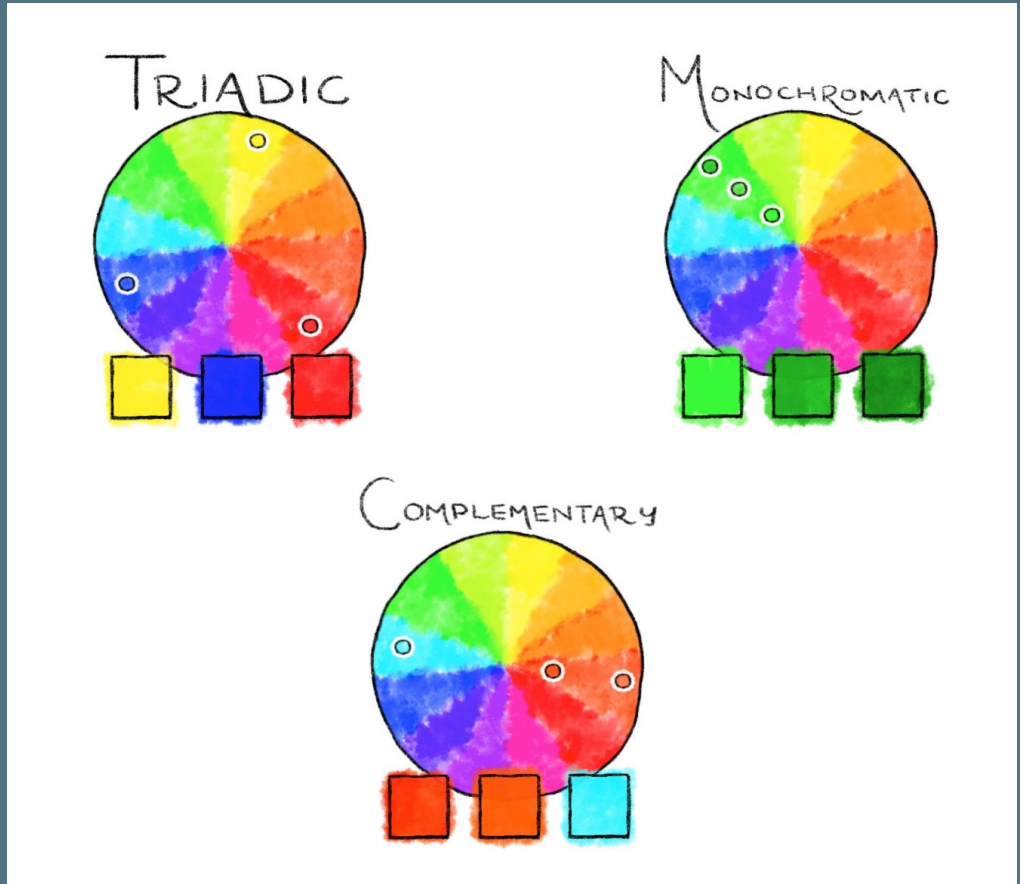


Visual Sensation

So what actually looks nice?

First, we need to understand color relationships.

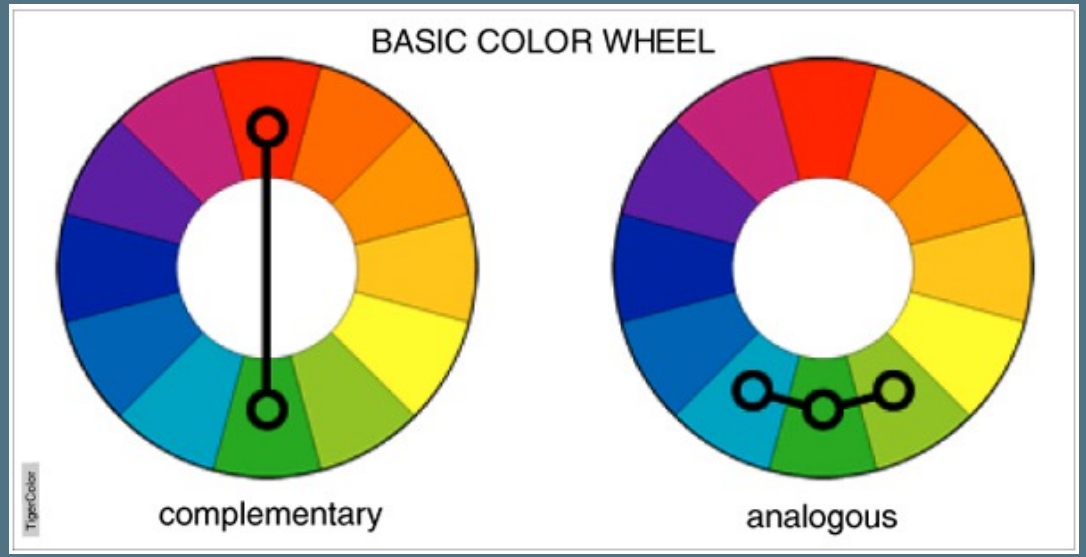
The Adobe Color tool is a great resource for visualizing these relationships.



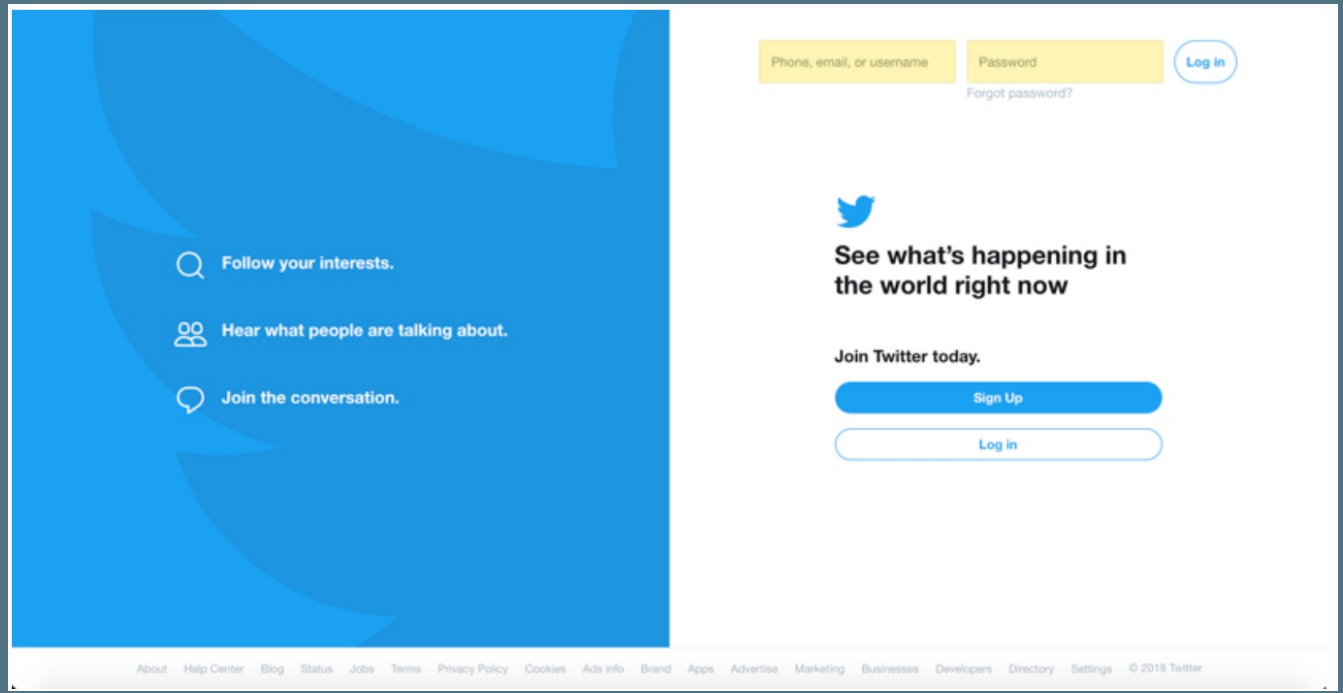
Visual Sensation

Complementary colors are interesting – they're challenging for our eyes to see together.

You have red, green, and blue cones. But they can't process red and green wavelengths at the same time. They take turns. Sometimes this makes complementary (or contrasting) colors seem to vibrate.



Visual Sensation



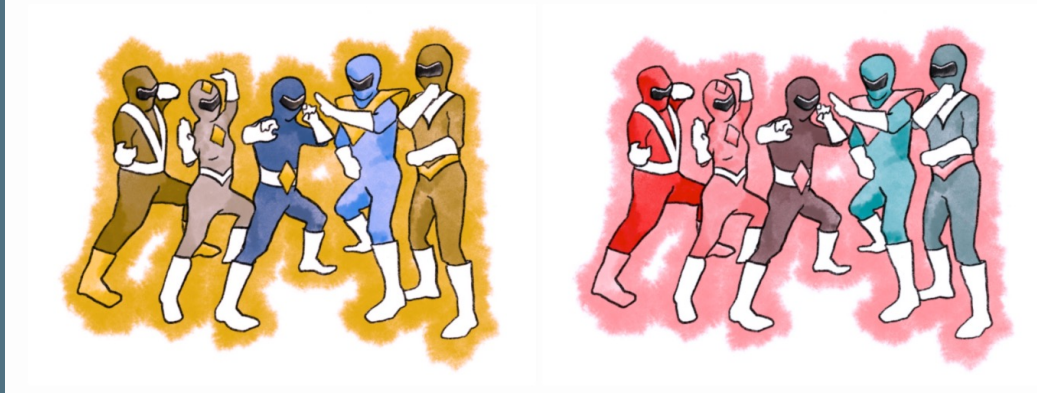
That doesn't mean we shouldn't use complementary colors! This past Twitter login uses a monochromatic blue scheme, but draws attention to key fields using a complementary yellow.

Visual Sensation

Accessibility is important here. 8% of men and 1% of women globally are affected by some type of color vision deficiency.

Each type results in difficulty distinguishing between certain hues.

Above, left: normal colour perception. Above, right: red blindness.



Above, left: green blindness. Above, right: blue blindness.