

# Consciousness and Blindsight

- **Blindsight**: The ability to respond appropriately to visual inputs while lacking the feeling of having seen them
- These patients are unable to see, but are able to reach for objects placed in their blind visual field.
  - Implies that we need not be conscious of a stimulus in order to act on that stimulus

# Blindsight



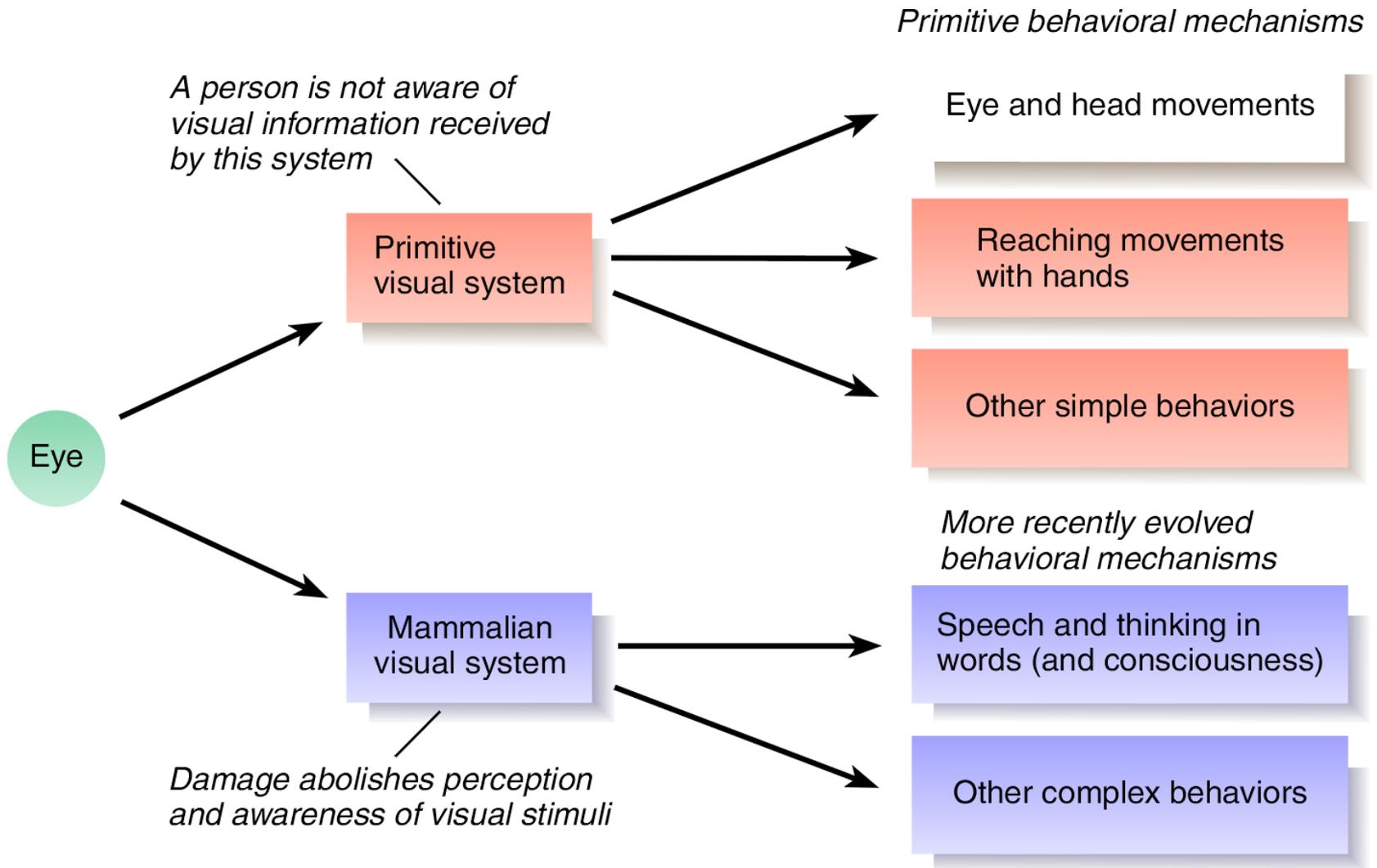
VIDEO TOOL KIT  
FOR INTRODUCTORY PSYCHOLOGY

## **“Blindsight”: Seeing Without Awareness**

Length: 4:00

Source: “The Final Mystery”, Brain Story  
(BBC Motion Gallery)

# Blindsight



*How do we see in color?*



**What color is this dragon?**



# Color



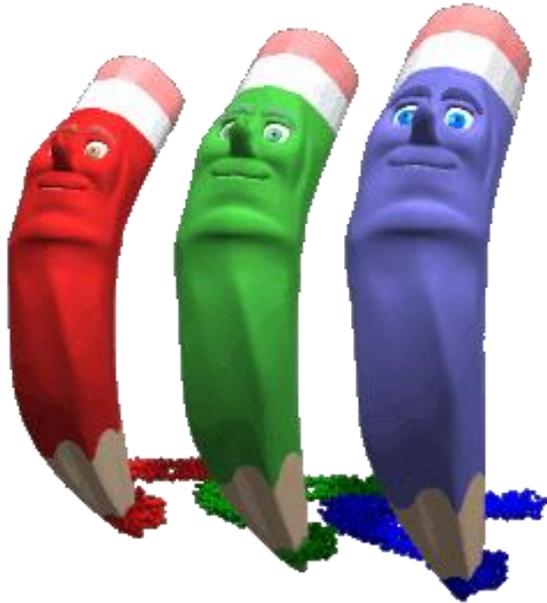
- The dragon is anything but red.
- The dragon rejects the long wavelengths of light that to us are red- so red is reflected off and we see it.
- Also, light has no real color.
- It is our mind that perceives the color.

# Color Vision

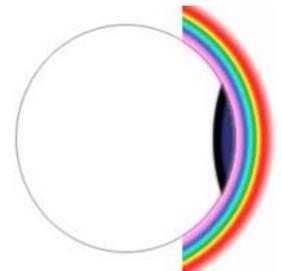


**TWO MAJOR  
THEORIES**

# *Young-Helmholtz Trichromatic (three color) Theory*

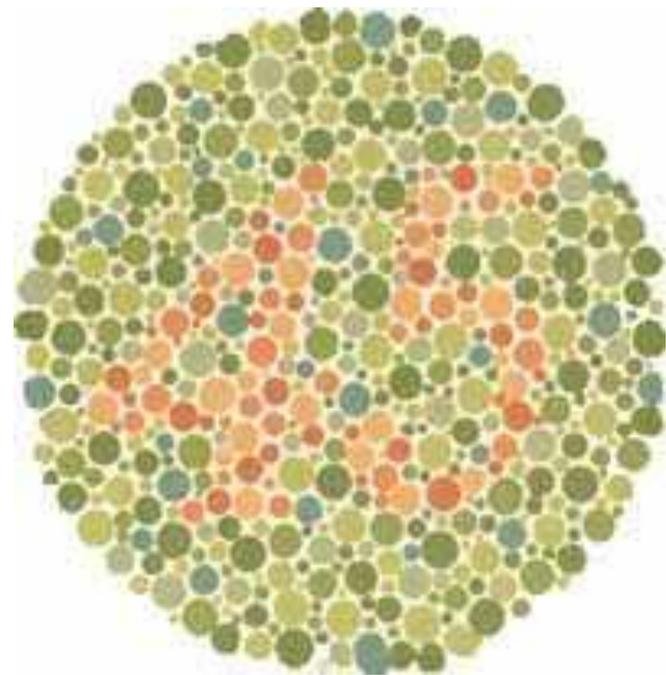
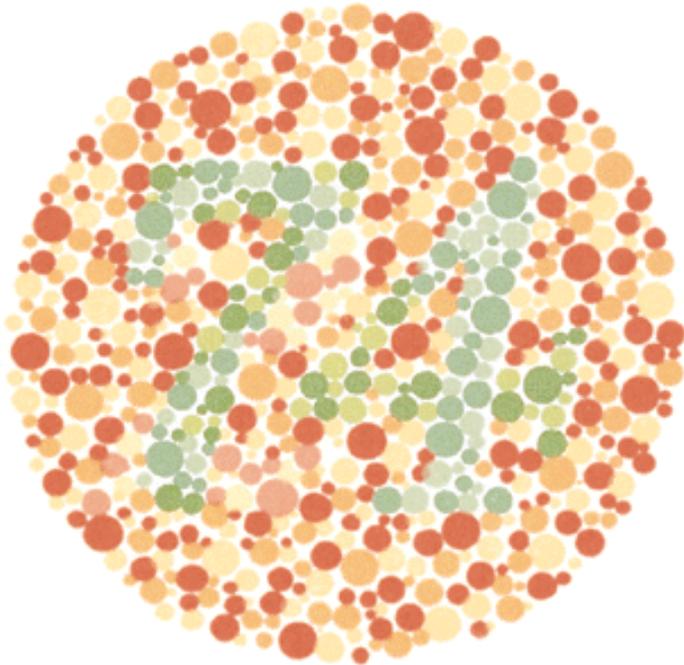


- Three types of cones:
  - Red
  - Blue
  - Green
- These three types of cones can make millions of combinations of colors.
- Does not explain afterimages or color blindness well.



# Color Blindness

Genetic disorder in which people are blind to green or red colors. This supports the Trichromatic theory. (Some people just don't have certain receptors.)



Ishihara Test

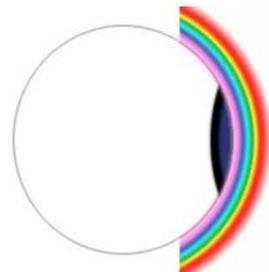
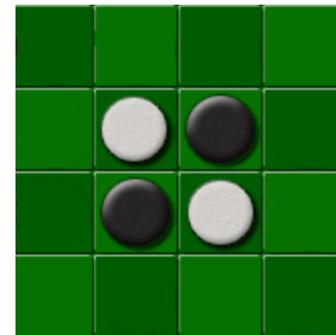
<http://www.color-blindness.com/coblis-color-blindness-simulator/>  
<http://www.webexhibits.org/causesofcolor/2.html>

Color blindness simulators

# Opponent-Process theory

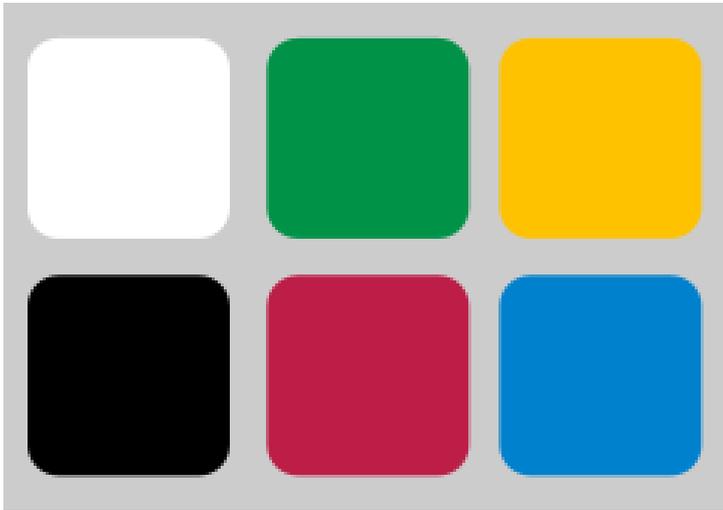
The sensory receptors come in pairs.

- Red/Green
- Yellow/Blue
- Black/White
- If one color is stimulated, the other is inhibited.



# Opponent-Process Theory

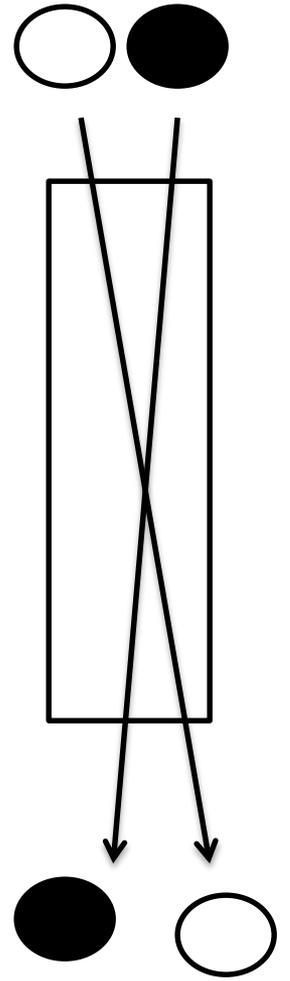
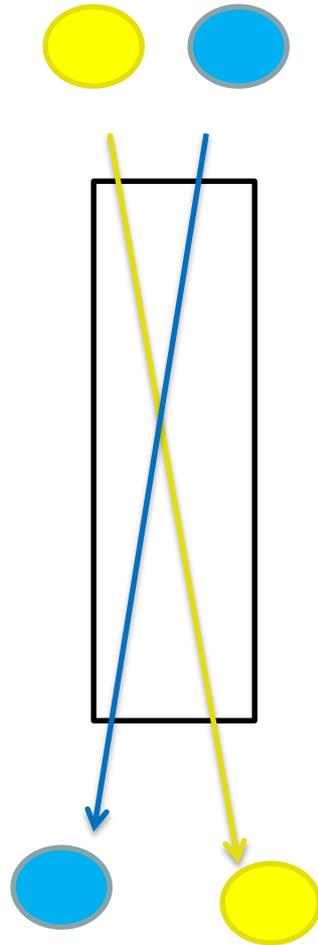
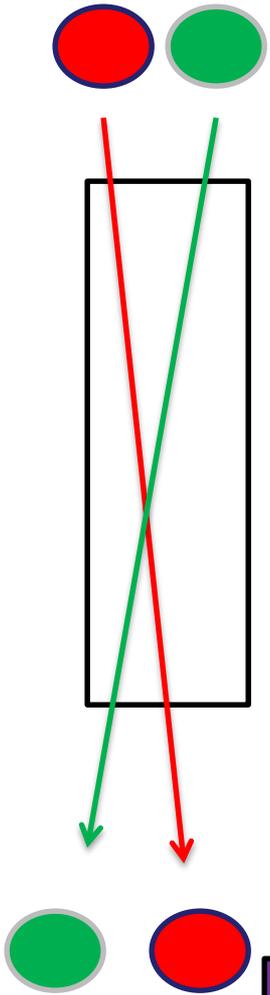
In essence, certain cones are turned "on" by red and turned "off" by green



The Black-White channel regulates intensity of the color

Behavioral evidence:

- Color afterimages and simultaneous color contrast show the opposing pairings
- Types of color blindness are red/green and blue/yellow.

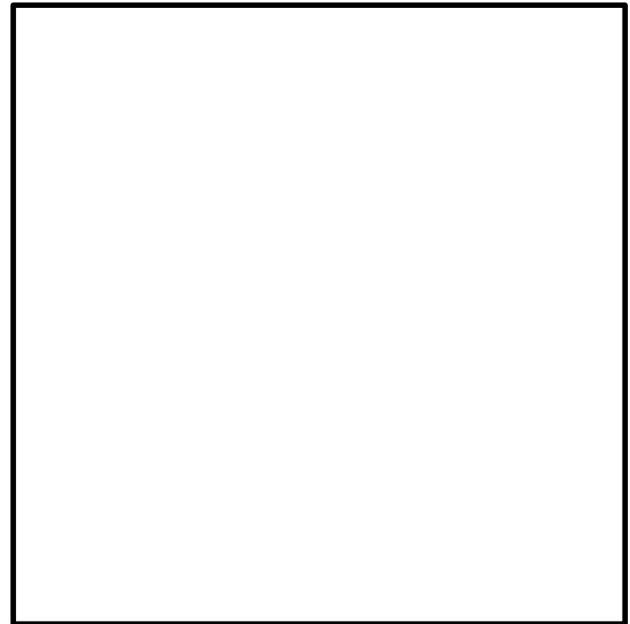
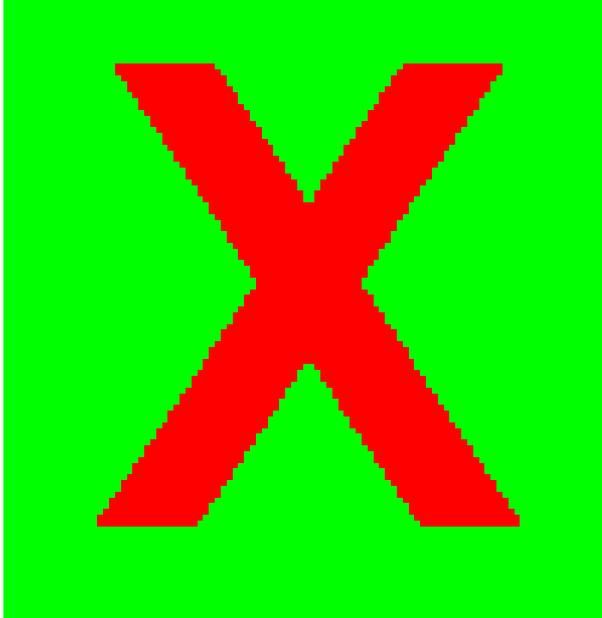






# Afterimages

- An optical illusion that causes a Sensation of sight to linger after the stimulus is removed.
- They are caused by fatigued cells in the retina responding to light.





# Opponent Colors



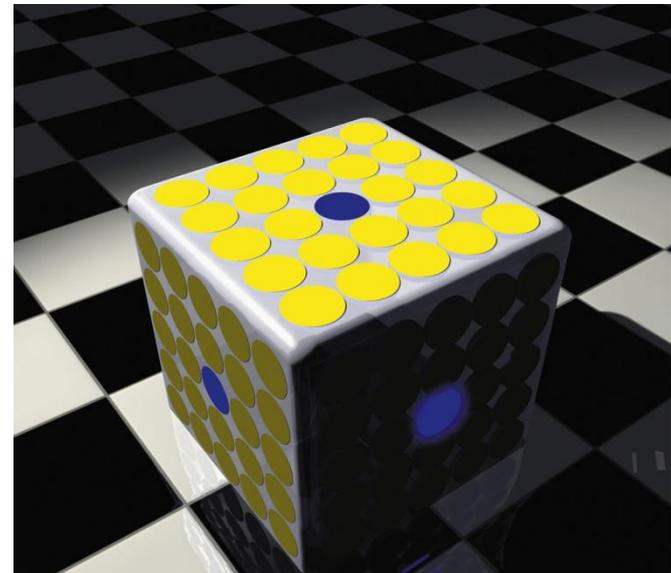
Gaze at the middle of the flag for about 30 Seconds. When it disappears, stare at the dot and report whether or not you see Britain's flag.

# Trichromatic and Opponent-Process Theories Combined

- Each theory describes physiological mechanisms in the visual system
  - Trichromatic theory explains the responses of the cones in the retina
  - Opponent-process theory explains neural response for cells connected to the cones further in the brain
- Essentially, the two theories together form the modern understanding of how we see the colors that we do.

# Color Constancy

Color of an object remains the same under different illuminations. However, when context changes the color of an object may look different.



R. Beau Lotto at University College, London

<http://www.youramazingbrain.org.uk/supersenses/astounding.htm>

**EYE CATCHING**

A human iris and pupil are magnified by photographer Suren Manvelyan's macro lens. The iris regulates the amount of light entering the pupil and the eye's interior, acting much like the aperture of a camera lens. "I love macro shooting," Manvelyan says, adding that it was a natural step for him to turn his camera to the human eye. He developed a special technique to capture the fine detail of the iris, and he was surprised when his pictures showed more complexity than he expected to see.

SUREN MANVELYAN

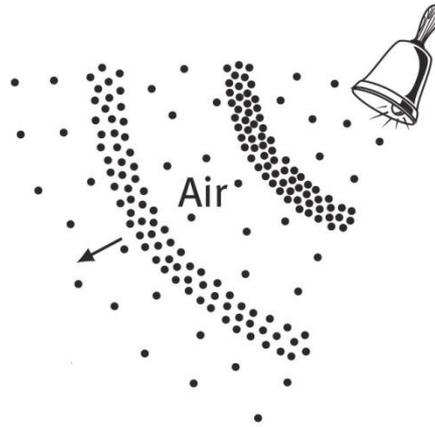
# Hearing



**Audition** – The sense or act of hearing

## The Stimulus Input: Sound Waves

Sound waves are composed of changes in air pressure unfolding over time.



**Acoustical transduction:** Conversion of sound waves into neural impulses in the hair cells of the inner ear.

# Frequency (Pitch)

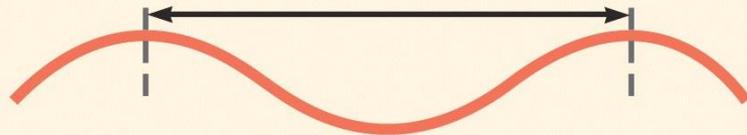
**Frequency (pitch):** The dimension of frequency determined by the wavelength of sound.  
- Measured in **Hertz (Hz)**

**Wavelength:** The distance from the peak of one wave to the peak of the next.

Short wavelength = high frequency  
(bluish colors, high-pitched sounds)



Long wavelength = low frequency  
(reddish colors, low-pitched sounds)



# Intensity (Loudness)

## Intensity (Loudness):

Amount of energy  
in a wave,  
determined by the  
amplitude, relates  
to the perceived  
loudness.

- Measured in  
**Decibels (dB)**

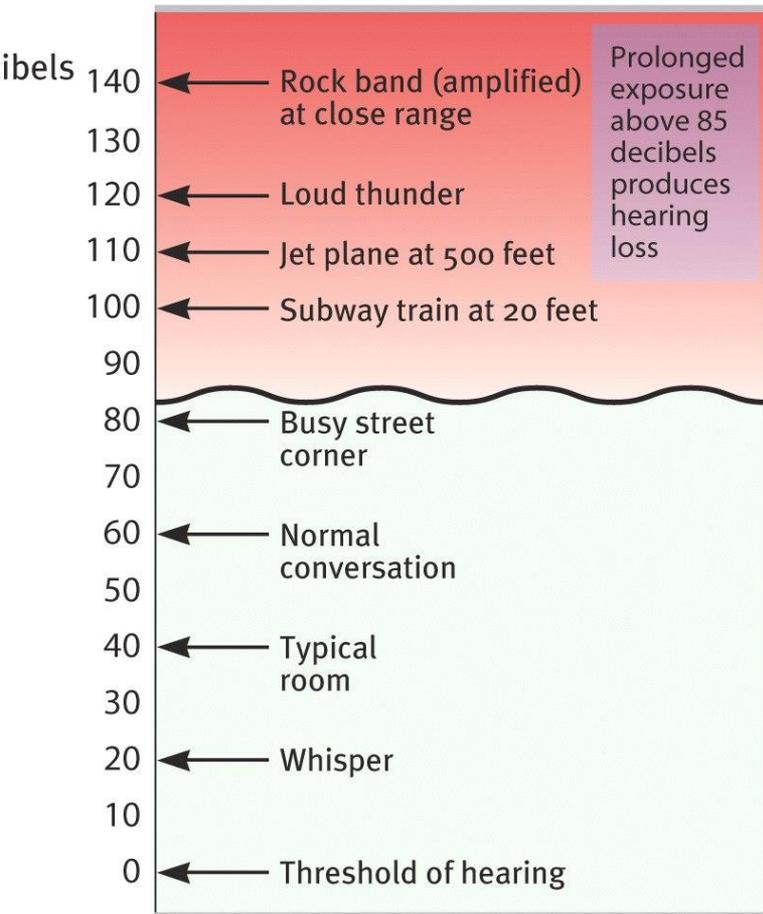
Great amplitude  
(bright colors, loud sounds)



Small amplitude  
(dull colors, soft sounds)

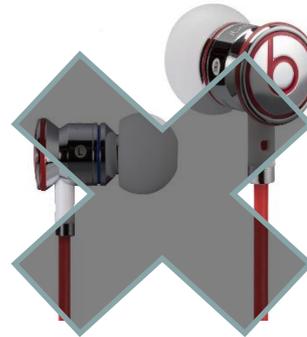


# Loudness of Sound



Tinnitus simulation

120dB



70dB



**Tinnitus**: the perception of sound within the human ear when no external sound is present. (So, another example of???)

- Latin for "ringing"
- "ringing" is only one of the sounds one may perceive.
- Result of prolonged exposure to loud sounds.

# The Ear

**Outer Ear:** Pinna. Collects sounds.

**Middle Ear:** Chamber between eardrum and cochlea containing three tiny bones (hammer, anvil, stirrup) that concentrate the vibrations of the eardrum on the cochlea's oval window.

**Inner Ear:** Innermost part of the ear, containing the cochlea, semicircular canals, and vestibular sacs.

