Sensory Adaptation

What is Sensory Adaptation?

- Sensory adaptation is a change in sensitivity to a stimulus that results from exposure to the stimulus.
- Examples include adapting to darkness, adapting to bright conditions, adapting to hot or cold conditions, adapting to the presence of odors, and many more.
- The next slides explore different forms of adaptation and the mechanisms involved.

Darkness Adaptation

- Move into a darkened theater and two changes occur to increase sensitivity to light:
  - The pupils enlarge. This admits more light onto the retina of the eye.
  - Light-sensitive chemicals in the photoreceptors increase their concentration. This makes each photoreceptor more sensitive to light.
The Dark-Adaptation Curve

The retina has two types of photoreceptor: cones (for color) and rods (for night vision).
- The cones are initially more sensitive but adapt only to a small degree, giving the first part of the curve.
- The rods are initially less sensitive but adapt to a great degree, giving the second part of the curve.

Light Adaptation
- Leaving the theater, you encounter bright light.
- Your pupils constrict immediately, reducing the light reaching the retina.
- The light-sensitive chemicals in the photoreceptors quickly bleach out, reducing the photoreceptors’ sensitivity to light.
- This all happens in a matter of seconds.
Preserving Dark-Adaptation
- Fully dark-adapted: 20-30 minutes
- Destroyed in seconds in light
- Rods blind to red light
- Solution: cover flashlight with red lens.
  - Read map using cone (color) vision.
  - Rods (night vision) remain dark adapted.

Adaptation to Loud Noise
- Very loud sound:
  - Small muscle in the inner ear contracts
  - Dampens sound vibrations being conducted by ossicles to the cochlea.
- Does not work well for sudden loud sounds, such as gun shots.

Adaptation to Hot and Cold
- Skin temperature receptors respond more to rate of change in temperature than to steady temperature.
- Explains why hot bath feels hot at first, then cooler.
- Explains why pool feels freezing at first, then comfortably cool.