

Discovering PSYCHOLOGY FIFTH EDITION  
HOCKENBURY HOCKENBURY

Chapter 3:  
Sensation and  
Perception

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Sensation → Perception

Energy from an environmental stimulus activates specialized receptor cells in the sense organs. Coated neural messages are sent along a specific sensory pathway to the brain. These neural messages are decoded and interpreted in the brain as a meaningful perception.

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Sensation  
The process of detecting a physical stimulus such as light, sound, heat, or pressure

Perception  
The process of integrating, organizing, and interpreting sensations

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### The 6 Major Senses

- vision
- hearing
- touch
- taste
- pain
- smell

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### Principles of Sensation

- Transduction—physical energy to neural signal

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### Principles of Sensation

- Absolute threshold—smallest strength of a stimulus that can be detected

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### Principles of Sensation

- Difference threshold—(just noticeable difference) smallest difference that can be detected

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### Principles of Sensation

- Weber's law—for each sense the size of a just noticeable difference is a constant proportion of the size of the initial stimulus

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### Principles of Sensation

- Sensory receptors—specialized cells unique to each sense organ that respond to stimulation

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### Principles of Sensation

- Subliminal perception—detection of stimuli just below conscious awareness

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### Principles of Sensation

- Mere exposure effect—repeated exposure to a stimulus increases a person's preference for it

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### Vision

#### Purpose of the Visual System

- transform light energy into an electrochemical neural response
- represent characteristics of objects in our environment such as size, color, shape, and location

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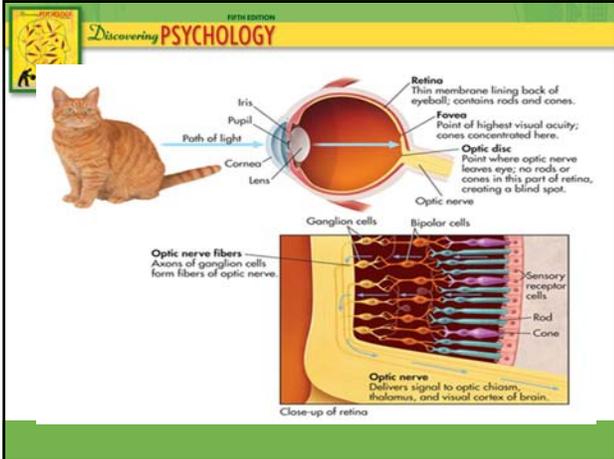
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**Vision Key Terms**

- Cornea—clear membrane that covers the front of the eye, helps gather and direct incoming light
- Pupil—the opening in the middle of the iris that changes size to let in different amounts of light
- Iris—the colored part of the eye; the muscle that controls the size of the pupil

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**Vision Key Terms**

- Lens—a transparent structure behind the pupil; bends light as it enters the eye

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### Vision Key Terms

- Accommodation—the process by which the lens changes shape to focus incoming light so that it falls on the retina

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### Light: The Visual Stimulus

The diagram illustrates the electromagnetic spectrum. At the top, it is divided into 'Invisible long waves' (AC circuits, Radio, TV, Microwaves) and 'Invisible short waves' (Infrared, Ultraviolet rays, X-rays, Gamma rays, Cosmic rays). A central box labeled 'Visible light' is shown with a downward arrow pointing to a rainbow spectrum. The spectrum is labeled with wavelengths in nanometers (billionsths of a meter): 750 (Red), 700 (Red), 600 (Yellow), 500 (Green), 400 (Blue-violet), and 350 (Blue-violet). A wave diagram above the spectrum shows amplitude and wavelength.

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### Light: The Visual Stimulus

- Light can be described as both a particle and a wave.

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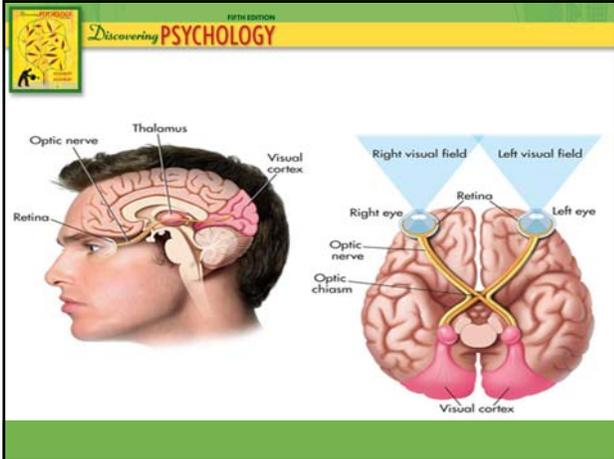
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**Differences Between Rods and Cones**

- **Cones**
  - bright light
  - fine spatial detail
  - different colors
- **Rods**
  - dim light
  - can not see fine spatial detail
  - can not see different colors

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**Color Vision**

- Rods are color blind, but the cones allow us to see different colors

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### Trichromatic Theory of Color Vision

- Researchers found that by mixing only three primary lights (usually red, green, and blue), they could create the perceptual experience of all possible colors.
- This led Young and Helmholtz to propose that we have three different types of photoreceptors, each most sensitive to a different range of wavelengths.

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### Opponent Process Theory of Color Vision

- Some aspects of our color perception are difficult to explain by the trichromatic theory alone.

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### Opponent-Process Theory

- To account for phenomena like complementary afterimages, Hering proposed that we have two types of color opponent cells.
  - red-green opponent cells
  - blue-yellow opponent cells

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## Complementary Afterimages




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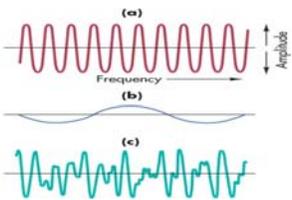
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High-pitched, loud  
(high frequency,  
high amplitude)

Low-pitched, soft  
(low frequency,  
low amplitude)

Complex  
(high and low  
frequency,  
high and low  
amplitude)



- Frequency of a sound wave is related the pitch of a sound
- Amplitude of a sound wave is related to loudness of a sound

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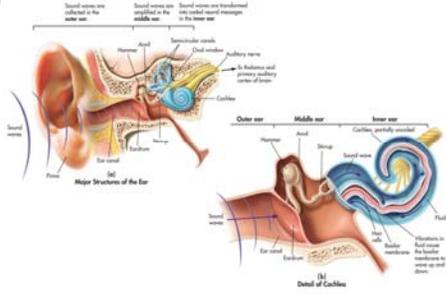
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## Anatomy of the Ear

Purpose of the structures in the ear:

- Measure the frequency (pitch) of sound waves
- Measure the amplitude (loudness) of sound waves

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## Chemical and Body Senses

- Olfaction (smell)
- Gustation (taste)
- Touch and temperature
- Pain
- Kinesthetic (location of body)
- Vestibular (balance)

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Brain  
Olfactory bulb  
Olfactory nerve  
Airborne odor molecules  
Foramen portion of skull  
Olfactory receptor cells

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### Specialized Sensory Receptors

- Taste buds
- Temperature
- Nocireceptors

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### Pain Systems

- Two types of nocireceptors—
  - A-delta fibers
  - C fibers
- Substance P

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### Elements of Pain

- Gate-control theory of pain

Pain is a product of both physiological and psychological factors that cause spinal gates to open and relay patterns of intense stimulation to the brain; the brain perceives them as pain.

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### Elements of Pain

- Phantom limb pain

When a person continues to experience intense painful sensations in a limb that has been amputated.

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### Movement, Position, and Balance

- Kinesthetic—sense of location of body parts in relation to one another
- Vestibular—sense of balance, receptors located in the inner ear
- Proprioceptors—receptors in muscles and joints that provide information about body position and movement

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### Perception

The process of integrating, organizing, and interpreting sensory information.

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### Perceptual Processing

- Bottom-up processing—emphasizes the importance of sensory receptors in detecting the basic features of a stimulus; moves from part to whole; also called data-driven processing
- Top-down processing—emphasizes importance of observer’s cognitive processes in arriving at meaningful perceptions; moves from whole to part; also called conceptually driven processing

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### Perceptual Organization

- Gestalt psychologists.
- “The whole is greater than the sum of the parts.”
- The global nature of perceptions.

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### Cultural Differences in Perception

- Collectivistic cultures
  - Tend to focus more on the background of a scene than the foreground object.
  - Reflects more “holistic” perceptual style characterizing collectivistic culture.
- Those from individualistic cultures show greater brain activation while making relative judgments.

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## Gestalt Grouping Principles

Gestalt theorists argued that our perceptual systems automatically organized sensory input based on certain rules.

- Proximity
- Similarity
- Closure
- Good continuation
- Common movement
- Good form

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## Figure and Ground

**Figure** - the object of interest

**Ground** - the background



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## Depth Perception

- One of our more important perceptual abilities involves seeing in three dimensions.
- Depth perception is difficult because we only have access to two-dimensional images.
- How do we see a 3-D world using only the 2-D retinal images?

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### Depth Perception Cues

- We are able to see in 3-D because the visual system can use depth cues that appear in the retinal images.

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### Types of Depth Cues

- Monocular—depth cues that appear in the image in either the left or right eye
- Binocular—depth cues that involve comparing the left and right eye images

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### Monocular Depth Cues

- Relative image size
- Overlap
- Aerial perspective
- Texture gradient
- Linear perspective
- Motion parallax

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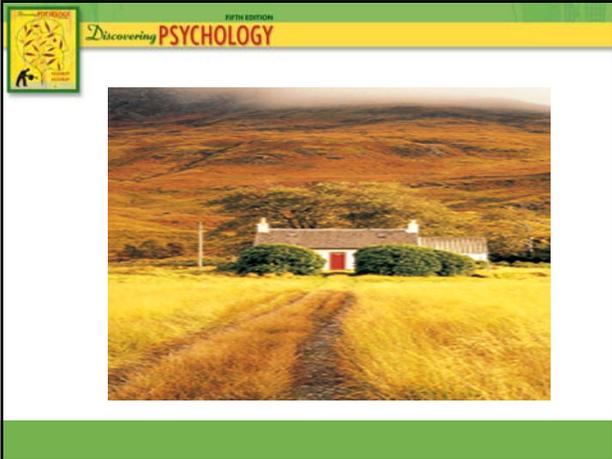
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### Binocular Depth Cues

- The difference between the image in the two eyes is known as binocular disparity.

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### Stereogram

- An stereogram is formed by repeating columns of patterns.

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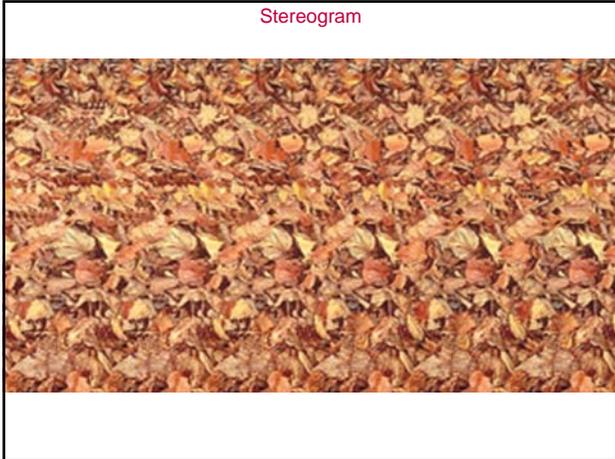
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Perceptual Constancy

- When viewing conditions change, the retinal image changes even if the objects being viewed remain constant.
- Important function of the perceptual system is to represent constancy in our environment even when the retinal image varies.

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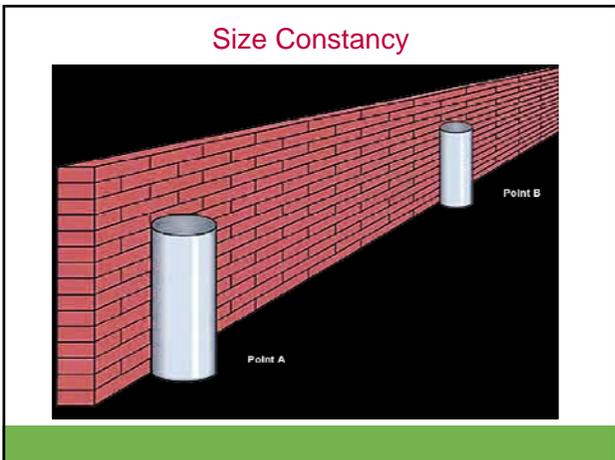
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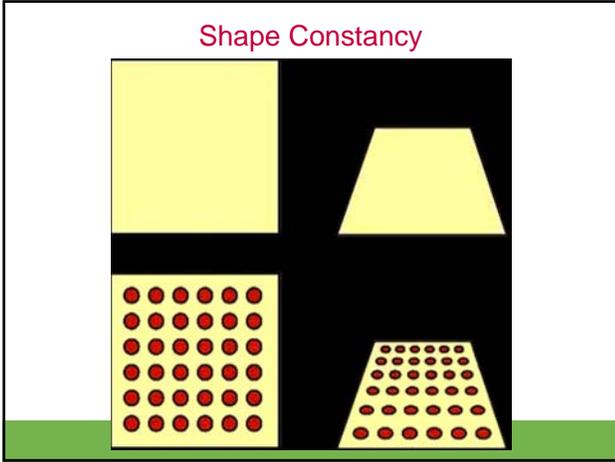
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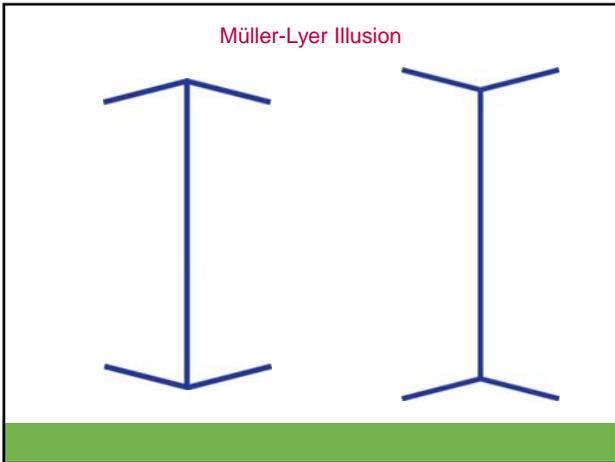
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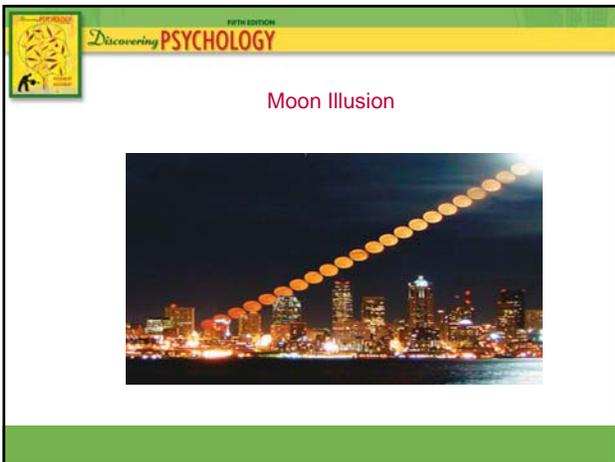
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**Perceptual Set**

- The influence of prior assumptions and expectations on perceptual interpretations.

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**Strategies to Control Pain**

- Self-Administered Strategies:
  - distraction,
  - imagery,
  - relaxation,
  - counter irritation,
  - positive self-talk

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**Strategies to Control Pain**

- Biofeedback
- Acupuncture

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