CHAPTER 3 LESSON PLAN
Oct 27-Nov 10

SENSATION AND PERCEPTION

THE NATURE OF SENSATION (TEXT PAGE 81)

Objective(s): Students will be able to explain the difference between absolute and difference thresholds and the effect of adaptation on sensory thresholds and summarize the evidence for subliminal perception and extrasensory perception (pp. 81-85).

VISION (TEXT PAGE 85)

Objective(s): Students will be able to describe the role of rods, cones, bipolar cells, ganglion cells, the optic nerve, the optic chiasm, and feature detectors in the brain in causing a visual experience (pp. 85-87, 88-90).

Objective(s): Students will be able to explain how dark and light adaptation affect our vision and how they cause afterimages (pp. 87-88).

HEARING (TEXT PAGE 93)

Objective(s):
- Students will be able to explain the characteristics of sound waves and their effect on the sensation we call sound (p. 94).
- Describe the path that information about sound travels from the ears to the brain (pp. 94-97).
- Explain place theory, frequency theory, and the volley principle (p. 97).

THE OTHER SENSES (TEXT PAGE 99)

Objective(s): Students will be able to
- Describe how stimuli give rise to smells and tastes (pp. 99-101).
- Distinguish between the kinesthetic and vestibular senses (pp. 101-102).
- Explain how sensory messages are sent from the skin to the brain. Summarize the sources of differences among people in the degree of pain they experience (pp. 102-105).

General/Comprehensive

A.1 Sensation and Perception Tutorials: http://psych.hanover.edu/Krantz/sen_tut.html
MUST SEE SITE!!!
This wonderful site created and maintained by John H. Krantz contains links to various tutorials and lots of visuals.
A.2 Seeing, Hearing, and Smelling the World — Howard Hughes Medical Institute: http://www.hhmi.org/senses/
MUST SEE SITE!!!
This site provides an excellent and current information about sensation, perception, and the brain.

Vision/Visual Illusions

B.1 3D Vision: http://www.vision3d.com
Contains links to 3-D eye exercises, vision therapy, optical illusions, and those Magic Eye 3-D things that seem to keep hanging around. Also explains some disorders related to vision. Review this site as a starting point for discussing the basic principles of visual perception.

Cute animation of caped golden retrievers and scuba divers passing through a Necker cube. Also includes links to other illusions.

B.3 Blind Spots: http://serendip.brynmawr.edu/bb/blindspot1.html
Quick demonstrations and explanations of the blind spot.

This is a very interactive “look” into the eye of a cow. Vivid displays of anatomy of the eye.

B.5 (Optional) The Exploratorium – Online Exhibits: http://www.exploratorium.edu/exhibits/f_exhibits.html
An online source for exhibits from the Exploratorium, San Francisco’s premiere science museum. Visual tests and illusions are the highlight.

Includes links to some great illusions with good explanations behind them.

B.7 How We See: http://www.accessexcellence.org/AE/AEC/CC/vision_background.html
This is a detailed text website complemented by helpful diagrams that explain the nature of human vision.

B.8 Magic Eye Images: http://www.magiceye.com/3dfun/stwkdisp.shtml
You either love them or you hate them. This page opens to an archive of Magic Eye images, including the Image of the Week.

A big, juicy, and colorful hamburger appears on your screen. You will soon discover that although you perceive green lettuce, yellow cheese, brown beef, and a red tomato, the entire image is composed of red and white light. This demonstration can serve as a springboard for a discussion of trichromatic theory of color vision.

This website allows the viewer to experience how things look to those who are color blind.

Links to various visual illusions, including negative afterimages.

Nice collection and online gift store.

Hearing

C.1 Auditory Illusions – The Exploratorium: http://www.exploratorium.edu/exhibits/highest_note/ex.about.fr.html
Digital recreations of three auditory illusions are featured on this site: the Shepard Scale, the Tritone Paradox, and the Risset Scale.

C.2 Virtual Tour of the Ear: http://ctl.augie.edu/perry/ear/hearmech.htm
A very extensive look at the anatomy of the ear.

Taste/Smell

D.1 Smell: http://sun.science.wayne.edu/~wpoff/cor/sen/smast.html
A review of major topics related to smell, including descriptions of anatomy, olfactory stimuli, types of smells, and damage to the olfactory system.

A review of major topics related to taste, including descriptions of anatomy, gustatory stimuli, types of tastes, learning, and damage to the olfactory system.

Touch/Other Senses

E.1 Other Senses: http://sun.science.wayne.edu/~wpoff/cor/sen/other.html
Provides an overview of kinesthetic and vestibular senses.

E.2 Touch: http://sun.science.wayne.edu/~wpoff/cor/sen/touch.html
A review of major topics related to touch, including descriptions of anatomy, tactile stimuli, heat, pressure, pain, and damage to the tactile system.

Subliminal Perception

F.1 (Optional) Subliminal Perception – Encyclopedia of Psychology
http://www.arts.uwaterloo.ca/~pmerikle/papers/SubliminalPerception.html
Philip M. Merikle from the University of Waterloo provides a nice summary and bibliography of subliminal perception.
Lesson plans

Oct 27 – overview, sensory thresholds and vision
Homework: Peruse website sections A and B, take notes
Lecture
Do check for understanding p. 85, complete for homework.

Oct 28 – review sensory thresholds, vision, hearing
Homework: Peruse website sections A and B, take notes
Homework: ‘Experience’ figures 3-6 through 3-13
Lecture
Do check for understanding p. 93, complete for homework.

Oct 31 – assess sensory thresholds, vision; and hearing
Homework: Peruse website section C, take notes
Homework: ‘Experience’ figures 3-6 through 3-13
Lecture
Quiz on sensory thresholds and vision
Do check for understanding p. 99, complete for homework.

Nov 1 – assess hearing; other senses
Homework: Peruse website sections D and E and F, take notes
Homework: ‘Experience’ figures 3-14 through 3-20
Lecture

Nov 2
Objectives: Assess sensation: Learn Perception
Test on Sensation

Nov 3 Perception
Lecture
Homework: Prepare brief presentation on sensation using handouts from binder: ch 3 presentations.docx

Nov 4 Brief presentation on sensation

Nov 7 Homework: Study sensation definitions

Nov 9 Review chapter
  3.1 Sensation
  3.2 Want a Cookie?
  3.3 Beware of What You Wish For
  3.6 Crossword Puzzle
  3.7 Fill in the Blank
Objective(s): Distinguish between sensation and perception. Explain the Gestalt principles of perceptual organization. Describe the several perceptual constancies (pp. 106-111).

Perception – the brain’s interpretation of sensory information so as to give it meaning.

- Distal stimulus – a real-world object with real-world properties.
- Proximal stimulus – information that reaches our sensory receptors. Usually, the proximal stimulus is a very accurate representation of the distal stimulus.
- Optical illusions – perceiving things that could possibly exist. The brain organizes perceptual experiences out of sensory data, and occasionally the sensory data is incompatible with our typical perceptions.

Perceptual Organization
Gestalt psychologists believed that the brain creates a coherent perceptual experience that is more than simply the sum of the available sensory information and that is does so in predictable ways.

One of the basic perceptual processes involves distinguishing the object of one’s attention (i.e., the “figure”) from the background (i.e., “ground”).

- See Figures 3-25 to 3-27 in the textbook (pp. 107-108)

Perceptual Constancies

- Perceptual constancy – a tendency to perceive objects as stable and unchanging despite changes in sensory stimulation.
- Size constancy – the perception of an object as the same size regardless of the distance from which it is viewed (see Figure 3-29 in the textbook, p. 110).
- Shape constancy – a tendency to see an object as the same shape no matter what angle it is viewed from (see Figure 3-30 in the textbook, p. 110).
- Color constancy – an inclination to perceive familiar objects as retaining their color despite changes in sensory information.
- Brightness constancy – the perception of brightness as the same, even though the amount of light reaching the retina changes.

Identify the major cues to distance and depth, distinguishing between monocular and binocular cues (pp. 111-113).

Perception of Distance and Depth
We use many cues to determine the distance and depth of objects, some of which can be processed using one eye (monocular cues) while other cues require two eyes (binocular cues).

- Monocular cues:
  - Interposition – monocular distance cue in which one object, by partly blocking a second object is perceived as being closer.
  - Linear perspective – monocular cues to distance and depth based on the fact that two parallel lines seem to come together at the horizon.
  - Aerial perspective – monocular cue to distance and depth based on the fact that more distant objects are likely to appear hazy and blurred.
  - Elevation – monocular cue to distance and depth based on the fact that the higher on the horizontal plane an object is, the farther away it appears. (See Figure 3-33 in the textbook, p. 112)
  - Shadowing – monocular cue to distance and depth based on the fact that shadows often appear on the parts of objects that are more distant. (See Figure 3-34 in the textbook, p. 112)
  - Motion parallax – monocular distance cue in which objects closer than the point of visual focus seem to move in the direction opposite to the viewer’s moving head, and objects beyond the focus point appear to move in the same direction as the viewer’s head.
  - Texture gradient – monocular cue to distance and depth based on the fact that objects seen at greater distances appear to be smoother and less textured. (See Figure 3-35 in the textbook, p. 113)
Binocular cues – visual cues requiring the use of both eyes.
  o Stereoscopic vision – combination of two retinal images to give a three-dimensional perceptual experience.
  o Retinal disparity – binocular distance cue based on the difference between the images cast on the two retinas when both eyes are focused on the same object.
  o Convergence – a visual depth cue that comes from muscles controlling eye movement as the eyes turn inward to view a nearby stimulus.

Explain how we can localize sound and perceive movement, distinguishing between real movement and apparent movement (pp. 113-114).

Localization of Sounds
We locate the source of sounds by using both monaural (single-ear) and binaural (two-ear) cues. (See Figure 3-36 in the textbook, p. 113)
One monaural cue involves loudness; loud sounds are perceived as closer than faint sounds, and changes in loudness are perceived as changes in distance.

One binaural cue also involves loudness. Sound signals arriving from a source off to one side of a person will be louder in the ear nearer to the source than the ear farther from the source (because the head partially blocks the sound). (See Figure 3-36 in the textbook, p. 113)

Another binaural cue involves the timing of sounds; sound signals will reach the ear closer to the source of the sound before they reach the other ear, indicating which direction from the person the source of the sound is located.

Perception of Movement
  • Autokinetic illusion – the perception that a stationary object is actually moving.
  • Stroboscopic motion – apparent movement that results from flashing a series of still pictures in rapid succession, as in a motion picture.
  • Phi phenomenon – apparent movement caused by flashing lights in a sequence as on a theater marquee.

Explain how visual illusions arise (pp. 115-116).

Visual Illusions
When we experience a visual illusion, we are fooled into “seeing” something that is not there. Perceptual illusions occur because the stimulus contains misleading cues that give rise to inaccurate or impossible perceptions.
  • See Figure 3-37 in the textbook on p. 115 for examples of reversible figures.
  • See Figure 3-38 in the textbook on p. 115 for examples of illusions based on misleading depth cues.

Describe how observer characteristics and culture can influence perception (pp. 116-117).

Observer Characteristics
Despite the fact that all humans have the same sense organs and perceptual capabilities, several personal factors can influence one’s perceptions.
  • Motivation and Emotion – people’s desires, needs and fears shape their perceptions.
  • Values – the value that people place on an object can influence their perception of the object.
  • Expectations – people see what they expect to see, overlooking stimuli that are inconsistent with their expectations.
  • Cognitive style – people develop ways of dealing with the environment that affect how they perceive the world. For example, field-dependent individuals tend to perceive the environment as a whole and do not tend to focus on individual features or objects in their visual field. Field-independent individuals tend to maintain perceptual distinctions among the various aspects of their visual environment.
  • Experience and Culture – cultural differences cause people to attend to different things while viewing the same image; a person’s attention is often drawn to what is novel. Also, a person with much experience or expertise in a subject can perceive more subtle features of a stimulus than someone with less experience or expertise.
  • Personality – personality characteristics can serve to prime individuals or make them more likely to perceive stimuli that are consistent with characteristics of their personality.
Sensation is initiated by the physical stimuli that surround and inhabit the body. As stimuli impinge on receptors, neural impulses are initiated and speed along specific pathways toward destinations in the brain. During sensation assorted influences come into play; the intensity of stimulation, its repetitiousness, and the range and mixture of stimuli. Stimulation may be subliminal, may produce sensory adaptation, or may be less than optimal. Below, explain the phenomenon being described in terms of the concept listed after it.

1. Different portions of the body vary in their sensitivity to touch. The fingertips and lips are especially sensitive and the lower back is relatively insensitive. The brain itself is completely indifferent to touch.

   Distribution of receptors: Sensitivity is associated with the number and concentration of receptors. The fingertips and lips have many densely packed touch receptors. The lower back has relatively few, and the brain has none.

2. Jane has prepared three cups of coffee but can’t recall how much sugar is in each. The cup with the smallest amount of sugar is easy to identify, but Jane can’t taste any difference between the other two cups even though she knows one has more sugar.

   Difference threshold:

3. A nurse notices that patients perform more poorly on auditory tests—tests involving the threshold of hearing—when they are tired as a result of loss of sleep.

   Signal detection theory:

4. John is looking all over for his glasses when his wife points them out at the top of his head.

   Sensory adaptation:

5. Bill was initially delighted to land a job at the post office, but recently he has become worried. By the end of his shift, he almost always feels edgy, nervous and confused. This is difficult for Bill to understand because his work makes few demands. He just sits there all day, alone in a room, putting thousands of letters into the numerous bins.

   Optimal levels of stimulation:
Want a Cookie?

Every Sunday afternoon, Craig Smith bakes cookies for his family. This particular Sunday afternoon, Craig is baking chocolate chip cookies. The aroma of the freshly baked cookies soon entices everyone into the kitchen, except Maggie, who happens to be in the kitchen already. J. J., his five-year-old daughter, bursts into the kitchen and says, “Those cookies smell great, can I have one now?” Craig, who can’t smell the cookies, says, “Sure, but be careful—they’re hot.” Zach, who has just finished eating a bag of candy, is the first to lay hold of a cookie, though. His only remark is: “Dad, these aren’t as chocolatey as usual!” Maggie, who has a cold, complains that the cookies have no taste. She says: “These cookies taste like cardboard!” Craig is wondering if it is really worth doing this every Sunday. Fortunately, his wife, Kim, after sampling her first cookie, says, “Honey, another great batch of cookies!” However, about a minute later, when she eats her second cookie, she thinks to herself that the first one seemed much sweeter.

1. The kind of candy that Zach ate before tasting the chocolate chip cookies was probably:
   a. lemon-flavored.
   b. caramel-flavored.
   c. strawberry-flavored.
   d. chocolate-flavored.

2. Maggie was likely to have a difficult time tasting the cookies’ flavor because:
   a. her taste buds weren’t sensitive to taste because of her cold.
   b. she couldn’t smell the cookies very well.
   c. she had cross-adapted to the flavor of the cookies.
   d. all of the above.

3. Kim’s second reaction to the cookies was probably due to the fact that:
   a. her taste buds had adapted to the flavor of the cookies.
   b. her taste buds had cross-adapted to the flavor of the cookies.
   c. the cookies had cooled off.
   d. she had caught Maggie’s cold.

4. Craig’s problem in smelling the cookies was likely due to:
   a. sensory adaptation.
   b. cross-adaptation.
   c. defective olfactory bulb.
   d. blocked olfactory receptors in the nasal cavity.
CHAPTER 3 SENSATION AND PERCEPTION

Beware of What You Wish For

Human beings do not have the most sensitive or acute sensory systems in the animal world. Some bats can hear frequencies that exceed 100,000 Hertz, dolphins receive auditory messages from great distances, and cats can probably localize sounds better than we do because they can rotate their ears. Rats see better at night than we can, eagles have more acute distance vision, and horses have a wider visual field. Rabbits have more taste buds than we do, and many animals have a keener sense of smell.

This exercise asks you to consider how you would perceive the world if your senses were more acute or sensitive than they actually are.

1. List a few things you would see, that you cannot see now, if your sense of vision were “better.”

   Instead of a world of substantial objects, you might see groups of colliding molecules, and as a result, you might hesitate to sit on a chair because it would not look solid. You might see through walls, like Superman. It would be disconcerting to see your lover’s liver and kidneys at work. You might lose the illusion of solid patches of color on TV, if yellow appeared as rows of red and green dots. You might lose the illusion of movement in movies and television, seeing the individual frames with pauses between. Spontaneous activity in the visual cortex might cause you to see flashes and spots of light when you close your eyes or are in complete darkness. You might see ultraviolet, infrared, and radio waves. You might see germs and bacteria on everyone; nothing would ever look clean again.

2. List a few things you would hear, that you cannot hear now, if you could hear “better.”

3. If your The Other Senses—taste and smell—were more sensitive, how might you be affected?

4. Why are our senses no more and no less acute or sensitive than they are?

5. If human beings continue to be urban creatures for the next few million years, in what ways might our sensory systems evolve or change?

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Crossword Puzzle Activity

Chapter 3: Sensation and Perception
Across

4. visual sensory receptor found at the back of the retina, responsible for color vision and sharpness of vision.
8. area in the retina where the axons of the three layers of retinal cells exit the eye to form the optic nerve.
10. the sensation of taste.
11. the study of ESP, ghosts, and other subjects that do not normally fall into the realm of ordinary psychology.
14. bundle of axons from the hair cells in the inner ear.
15. disorder in which the signals from the various sensory organs are processed in the wrong cortical areas.
16. the tendency to perceive objects that are close to each other as part of the same grouping.
17. the rotation of the two eyes in their sockets to focus on a single object.

Down

1. the ability to perceive the world in three dimensions.
2. the tendency to complete figures that are incomplete.
3. the sensations of movement, balance, and body position.
4. snail-like structure of the inner ear, filled with fluid.
5. images that occur when a visual sensation persists for a brief time even after the original stimulus is removed.
6. cues for perceiving depth based on both eyes.
7. visual sensory receptor found at the back of the retina, responsible for non-color sensitivity to low levels of light.
9. cues for perceiving depth based on one eye only.
11. the method by which the sensations experienced at any given moment are interpreted and organized in some meaningful fashion.
12. the activation of receptors in the various sense organs.
13. the sensation of smell.
1. _______________ is the activation of receptors in the various sense organs.

2. _______________ is the smallest difference between two stimuli that is detectable 50 percent of the time.

3. The smallest amount of energy needed for a person to consciously detect a stimulus 50 percent of the time it is present is called _______________.

4. The process by which subliminal stimuli act upon the unconscious mind, influencing behavior, is called _______________.

5. The process of converting physical energy, such as light or sound, into electrochemical codes is called _______________.

6. The tendency of sensory receptor cells to adjust to the level of stimulation that they are receiving is called _______________.

7. The vividness or richness of the color people see and it is called _______________.

8. The _______________ is a clear membrane that covers the surface of the eye; protects the eye and is the structure that focuses most of the light coming into the eye.

9. The _______________ is another clear structure behind the iris, suspended by muscles; it finishes the focusing process begun by the cornea.

10. The visual sensory receptors found at the back of the retina, responsible for color vision and sharpness of vision, are called _______________.

11. The _______________ is the recovery of the eye’s sensitivity to visual stimuli in light after exposure to darkness.

12. The thin section of skin that tightly covers the opening into the middle part of the ear, just like a drum skin covers the opening in a drum, is called the _______________.

13. The bundle of axons from the hair cells in the inner ear receives neural message from the organ of Corti in the _______________.

14. The olfactory cortex in the temporal cortex allows us to recognize and remember about _______________ different smells.

15. The areas of the brain located just above the sinus cavity and just below the frontal lobes that receive information from the olfactory receptor cells are called _______________.

16. The sense of the location of body parts in relation to the ground and each other is called _______________.

17. The ability to perceive the world in three dimensions is known as _______________.

18. _______________ cues for perceiving depth are based on one eye only.

19. _______________ cues for perceiving depth are based on both eyes.

20. _______________ occur when stimuli contain misleading cues that give rise to inaccurate or impossible perceptions.

21. _______________ is the claim of perception that occurs without the use of normal sensory channels such as sight, hearing, touch, taste, or smell.

22. The study of ESP, ghosts, and other subjects that do not normally fall into the realm of ordinary psychology is called _______________.

23. When we use two ears to locate the source of a sound, we are using _______________ cues.

24. When we read text that scrolls across an electronic marquee, words actually appear to be moving across the sign. This apparent motion, caused by lights that flash on and off in a programmed sequence, is called the _______________.

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Words to Use
21
10,000
absolute threshold
adaptation
afterimages
auditory nerve
binaural
binocular
closure
cones
cornea
deepth perception
eardrum
extrasensory perception
figure/ground
gustation
habituation
just noticeable difference
kinesthetic sense
lens
light adaptation
monocular
olfaction
olfactory bulbs
parapsychology
perception
perceptual illusion
phi phenomenon
proximity
saturation
sensation
subliminal perception
transduction
vestibular senses
1. Sensation
2. Just noticeable difference
3. absolute threshold
4. subliminal perception
5. transduction
6. adaptation
7. saturation
8. cornea
9. lens
10. cones
11. light adaptation
12. afterimages
13. eardrum
14. auditory nerve
15. 10,000
16. olfactory bulbs
17. kinesthetic sense
18. vestibular senses
19. 21
20. placebo effect
21. perception
22. figure/ground
23. proximity
24. closure
25. depth perception
26. Monocular
27. Binocular
28. perceptual illusion
29. Extrasensory perception
30. Parapsychology
31. binaural
32. phi phenomenon