

UNIT 4: SENSATION AND PERCEPTION

BASIC PRINCIPLES OF SENSATION AND PERCEPTION

OBJECTIVE 1: Contrast sensation and perception, and explain the difference between bottom-up and top-down processing.

1. The perceptual disorder in which a person has lost the ability to recognize familiar faces is _____.
2. The process by which we detect physical energy from the environment and encode it as neural signals is _____. The process by which sensations are organized and interpreted is _____.
3. Sensory analysis, which starts at entry level and works up, is called _____ - _____.
Perceptual analysis, which works from our experience and expectations is called _____ - _____.

OBJECTIVE 2: Discuss how our perceptions are directed and limited by selective attention, noting how we may or may not be affected by unattended stimuli.

4. When we focus our conscious awareness on a particular stimulus, we are using _____.
5. Your ability to attend to only one voice among many is called the _____. Failing to see a visible object when our attention is directed elsewhere is called _____.
6. When researchers distracted participants with a counting task, the participants displayed _____ and failed to notice a gorilla-suited assistant who passed through. Two specific forms of this phenomenon are _____ and _____. Another result of distraction involves not noticing that different people are speaking, called _____.
7. Some stimuli are so powerful they demand our attention, causing us to experience _____.

OBJECTIVE 3: Distinguish between absolute and difference thresholds, and discuss whether we can sense and be affected by subliminal or unchanging stimuli.

8. The study of relationships between the physical characteristics of stimuli and our psychological experience of them is _____.
9. The _____ refers to the minimum stimulation necessary for a

stimulus to be detected _____ percent of the time.

10. According to _____ theory, a person's experience, expectations, motivation, and alertness all influence the detection of a stimulus.
11. Some entrepreneurs claim that exposure to "below threshold," or _____, stimuli can be persuasive, but their claims are probably unwarranted.
12. Some weak stimuli may trigger in our sensory receptors a response that is processed by the brain, even though the response doesn't cross the threshold into _____ awareness.
13. Under certain conditions, an invisible image or word can _____ into a person's response to a later question. This illustrates that much of our information processing occurs _____.
14. The minimum difference required to distinguish two stimuli 50 percent of the time is called the _____. Another term for this value is the _____.
15. The principle that the difference threshold is not a constant amount, but a constant proportion, is known as _____. The proportion depends on the _____.
16. After constant exposure to an unchanging stimulus, the receptor cells of our senses begin to fire less vigorously; this phenomenon is called _____.

VISION

OBJECTIVE 4: Describe the characteristics of visible light, and explain the process by which the eye converts light energy into neural messages.

1. Stimulus energy is _____ (transformed) into _____ messages by our eyes.
2. The visible spectrum of light is a small portion of the larger spectrum of _____ energy.
3. The distance from one light wave peak to the next is called _____. This value determines the wave's color, or _____.
4. The amount of energy in light waves, or _____, is determined by a wave's _____, or height, influences the _____ of a light.
5. Light enters the eye through the _____, then passes through a small opening called the _____; the size of this opening is controlled by the colored _____.
6. By changing its curvature, the _____ can focus the image of an object onto the

- _____ , the light-sensitive inner surface of the eye.
- The process by which the lens changes shape to focus images is called _____.
 - The retina's receptor cells are the _____ and _____.
 - The neural signals produced in the rods and cones activate the neighboring _____ cells, which then activate a network of _____ cells. The axons of ganglion cells converge to form the _____ , which carries the visual information to the _____.
 - Where this nerve leaves the eye, there are no receptors; thus, the area is called the _____.
 - Most cones are clustered around the retina's point of central focus, called the _____ , whereas the rods are concentrated in more _____ regions of the retina. Many cones have their own _____ cells to communicate with the visual cortex.
 - It is the _____ (rods/cones) of the eye that permit the perception of color, whereas _____ (rods/cones) enable black-and-white vision.
 - Unlike cones, in dim light rods are _____ (sensitive/insensitive). Adapting to a darkened room will take the retina approximately _____ minutes.

OBJECTIVE 5: Discuss the different levels of processing that occur as information travels from the retina to the brain's cortex.

- Visual information percolates through progressively more _____ levels. In the brain, it is routed by the _____ to the cortex. Hubel and Wiesel discovered that certain neurons in the occipital lobe's _____ respond only to specific features of what is viewed. They call these neurons _____.
- Feature detectors pass their information to higher-level cells in the brain, which respond to specific visual scenes. Research has shown that in monkey brains such cells specialize in responding to a specific _____ , _____ , _____ , or _____ . In many cortical areas, teams of cells (_____) respond to complex patterns.

OBJECTIVE 6: Define *parallel processing*, and discuss its role in visual information processing.

- The brain achieves its remarkable speed in visual perception by processing several subdivisions of a stimulus _____ (simultaneously/sequentially). This procedure, called _____ , may explain why people who have suffered a stroke may lose just one aspect of vision.
- Other brain-damaged people may demonstrate _____ by responding to a stimulus that is not consciously perceived.

OBJECTIVE 7: Explain how the Young-Helmholtz and opponent-process theories help us understand color vision.

- An object appears to be red in color because it _____ the long wavelengths of red and because our mental _____ of the color.
- One out of every 50 people is color deficient; this is usually a male because the defect is genetically _____ .
- According to the _____ - _____ theory, the eyes have three types of color receptors: one reacts most strongly to _____ , one to _____ , and one to _____ .
- After staring at a green square for a while, you will see the color red, its _____ color, as an _____ .
- Hering's theory of color vision is called the _____ - _____ theory. According to this theory, after visual information leaves the receptors it is analyzed in terms of pairs of opposing colors: _____ versus _____ , _____ versus _____ , and _____ versus _____ .

Summarize the two stages of color processing.

HEARING

OBJECTIVE 8: Describe the auditory process, including the stimulus input and the structure and function of the ear.

- The stimulus for hearing, or _____ is sound waves, created by the compression and expansion of _____ .
- The amplitude of a sound wave determines the sound's _____ .
- The frequency of a sound wave determines the _____ we perceive.
- Sound energy is measured in units called _____ . The absolute threshold for hearing is arbitrarily defined as _____ such units.

5. The ear is divided into three main parts: the _____ ear, the _____ ear and the _____ ear.
6. The outer ear channels sound waves toward the _____, a tight membrane that then vibrates.
7. The middle ear transmits the vibrations through a piston made of three small bones: the _____, _____, and _____.
8. In the inner ear, a coiled, bony, fluid-filled tube called the _____ contains the receptor cells for hearing. The incoming vibrations cause the _____ to vibrate the fluid that fills the tube, which causes ripples in the _____, bending the _____ that line its surface. This movement triggers impulses in the adjacent nerve fibers that converge to form the auditory nerve, which carries the neural messages (via the _____) to the _____ lobe's auditory cortex.
9. The brain interprets loudness from the _____ of hair cells a sound activates.

OBJECTIVE 9: Contrast place and frequency theories, and explain how they help us to understand pitch perception.

10. One theory of pitch perception proposes that different pitches activate different places on the cochlea's basilar membrane; this is the _____ theory. This theory has difficulty accounting for how we hear _____-pitched sounds, which do not have such localized effects.
11. A second theory proposes that the frequency of neural impulses, sent to the brain at the same frequency as sound waves, allows the perception of different pitches. This is the _____ theory. This theory fails to account for the perception of _____-pitched sounds because individual neurons cannot fire faster than _____ times per second.
12. For the higher pitches, cells may alternate their firing to match the sound's frequency, according to the _____ principle.

OBJECTIVE 10: Describe how we pinpoint sounds, and contrast the two types of hearing loss.

13. We locate a sound by sensing differences in the _____ and _____ with which it reaches our ears.
14. A sound that comes from directly ahead will be _____ (easier/harder) to locate than a sound that comes from off to one side.
15. Problems in the mechanical conduction of sound waves through the outer or middle ear may cause

- _____.
16. Damage to the cochlea's hair cell receptors or their associated auditory nerves can cause _____ hearing loss. It may be caused by disease, but more often it results from the biological changes linked with _____ and prolonged exposure to ear-splitting noise or music.

OBJECTIVE 11: Describe how cochlear implants function, and explain why Deaf culture advocates object to these devices.

17. An electronic device that restores hearing among nerve-deafened people is a _____.
18. Advocates of _____ object to the use of these implants on _____ before they have learned to _____. The basis for their argument is that deafness is not a _____.
19. Sign language _____ (is/is not) a complete language, _____ (with/without) its own grammar, syntax, and semantics. People who lose one channel of sensation (such as hearing) _____ (seem to/do not seem to) compensate with a slight enhancement in their other sensory abilities.
20. (Close-Up) Deaf children raised in a household where sign language is used express higher _____ and feel more _____.

OTHER SENSES

OBJECTIVE 12: Describe the sense of touch, and distinguish between kinesthesia and the vestibular sense.

1. The sense of touch is a mixture of at least four senses: _____, _____, _____, and _____. Other skin sensations, such as tickle, itch, hot, and wetness are _____ of the basic ones.
2. The _____ - _____ influence on touch is illustrated by the fact that a self-produced tickle produces less activation in the _____ than someone else's tickle. This influence is also seen in the _____ - _____ illusion.
3. The system for sensing the position and movement of body parts is called _____. The receptors for this sense are located in the _____, _____, _____, and _____, as well as in your skin.
4. The sense that monitors the position and movement of the head (and thus the body) is the _____. The receptors for this sense are located in the _____.

_____ and
_____ of the
inner ear.

OBJECTIVE 13: State the purpose of pain, and describe the biopsychosocial approach to pain.

5. People born without the ability to feel pain may be unaware of experiencing severe _____. More numerous are those who live with _____ pain in the form of persistent headaches and backaches, for example.
6. Pain is a property of our _____ as well as our _____ and _____, and our surrounding _____.
7. The pain system _____ (is/is not) triggered by one specific type of physical energy. The body has specialized _____ that detect hurtful stimuli.
8. Melzack and Wall have proposed a theory of pain called the _____ - _____ theory, which proposes that there is a neurological _____ in the _____ that blocks pain signals or lets them through. It may be opened by activation of _____ (small/large) nerve fibers and closed by the activation of _____ (small/large) fibers or by information from the _____.
9. Pain-producing brain activity may be triggered with our without _____.
10. A sensation of pain in an amputated leg is referred to as _____. Another example is _____, experienced by people who have a ringing-in-the-ears sensation.

List some pain control techniques used in health care situations.

OBJECTIVE 14: Describe the senses of taste and smell, and comment on the nature of sensory interaction.

11. The basic taste sensations are _____, _____, _____, and a meaty taste called _____.
12. Taste, which is a _____ sense, is enabled by the 200 or more _____ on the top and sides of the tongue. Each contains a _____ that catches food chemicals.
13. Taste receptors reproduce themselves every _____. As we age, the number of taste buds _____ (increases/decreases/remains unchanged) and our taste sensitivity _____

(increases/decreases/remains unchanged). Taste is also affected by _____ and by _____ use.

14. When the sense of smell is blocked, as when we have a cold, foods do not taste the same; this illustrates the principle of _____. The _____ effect occurs when we _____ a speaker saying one syllable while _____ another.
15. In a few rare individuals, the senses become joined in a phenomenon called _____.
16. Like taste, smell, or _____, is a _____ sense. There _____ (is/is not) a distinct receptor for each detectable odor.
17. Odors are able to evoke memories and feelings because there is a direct link between the brain area that gets information from the nose and the ancient _____ centers associated with memory and emotion.

PERCEPTUAL ORGANIZATION

OBJECTIVE 15: Describe Gestalt psychology's contribution to our understanding of perception, and identify principles of perceptual grouping in form perception.

1. According to the _____ school of psychology, we tend to organize a cluster of sensations into a _____, or form.
2. When we view a scene, we see the central object, or _____, as distinct from surrounding stimuli, or the _____.
3. Proximity, similarity, closure, continuity, and connectedness are examples of Gestalt rules of _____.
4. The principle that we organize stimuli into smooth, continuous patterns is called _____. The principle that we fill in gaps to create a complete, whole object is _____. The grouping of items that are close to each other is the principle of _____; the grouping of items that look alike is the principle of _____. The tendency to perceive uniform or attached items as a single unit is the principle of _____.

OBJECTIVE 16: Explain the binocular and monocular cues we use to perceive depth.

5. The ability to see objects in three dimensions despite their two-dimensional representations on our retinas is called _____. It enables us to estimate _____.
6. Gibson and Walk developed the _____ to test depth perception in infants. They found that each species, by the time it is _____, has the perceptual abilities it needs.

Summarize the results of Gibson and Walk's studies of depth perception.

For questions 7-15, identify the depth perception cue that is defined.

7. Any cue that requires both eyes: _____.
8. The greater the difference between the images received by the two eyes, the nearer the object: _____
_____. 3-D movies simulate this cue by photographing each scene with two cameras.
9. Any cue that requires either eye alone: _____.
10. If two objects are presumed to be the same size, the one that casts a smaller retinal image is perceived as farther away: _____.
11. An object partially covered by another is seen as farther away: _____.
12. Objects lower in the visual field are seen as nearer: _____.
13. As we move, objects at different distances appear to move at different rates: _____.
14. Parallel lines appear to converge in the distance: _____.
15. The dimmer of two objects seems farther away: _____.

OBJECTIVE 17: State the basic assumption we make in our perceptions of motion, and explain how these perceptions can be deceiving.

16. Our brain normally computes motion based partially on the assumption that shrinking objects are _____ (approaching/retreating) and enlarging objects are _____ (approaching/retreating). Sometimes we are fooled because larger objects seem to move _____ (faster/more slowly) than smaller objects.
17. The brain interprets a rapid series of slightly varying images as _____. This phenomenon is called _____.
18. The illusion of movement that results when two adjacent stationary spots of light blink on and off in quick succession is called the _____.

OBJECTIVE 18: Explain how perceptual constancies help us to organize our sensations into meaningful patterns.

19. Our tendency to see objects as unchanging while the stimuli from them change in size, shape, and lightness is called _____.
20. Due to shape and size constancy, familiar objects _____ (do/do not) appear to change shape or size despite changes in our _____ images of them.
21. Several illusions, including the _____ and _____ illusions, are explained by the interplay between perceived _____ and perceived _____. When distance cues are removed, these illusions are _____ (diminished/strengthened).
22. The brain computes an object's brightness _____ (relative to/independent of) surrounding objects.
23. The amount of light an object reflects relative to its surroundings is called _____.
24. The experience of color depends on the surrounding _____ in which an object is seen. In an unvarying context, a familiar object is seen. In an unvarying context, a familiar object will be perceived as having consistent color, even as the light changes. This phenomenon is called _____.
25. We see color as a result of our brains' computations of light _____ by any object relative to its _____.

PERCEPTUAL INTERPRETATION

OBJECTIVE 19: Describe the contributions of restored vision, sensory deprivation, and perceptual adaptation research to our understanding of the nature-nurture interplay in our perceptions.

1. The idea that knowledge comes from inborn ways of organizing sensory experiences was proposed by the philosopher _____.
2. On the other side were philosophers who maintained that we learn to perceive the world by experiencing it. One philosopher of this school was _____.
3. Studies of cases in which vision has been restored to a person who was blind from birth show that, upon seeing tactilely familiar objects for the first time, the person _____ (can/cannot) recognize them.
4. Studies of sensory restriction demonstrate that visual experiences during _____ are crucial for perceptual development. Such experiences suggest that there is a _____ for normal sensory and perceptual development.
5. Humans given glasses that shift or invert the visual field _____ (will/will not) adapt to the distorted

perception. This is called _____
_____.

6. Animals such as chicks _____ (adapt/do not adapt) to distorting lenses.

Follow-up studies _____ (failed to replicate the results/found equally high levels of performance).

OBJECTIVE 20: Define *perceptual set*, and explain why the same stimulus can evoke different perceptions in different contexts.

7. A mental predisposition that influences perception is called a _____.
8. How a stimulus is perceived depends on the concepts, or _____, we form and the _____ in which the stimulus is experienced.
9. The context of a stimulus creates a _____ (top-down/bottom-up) expectation that influences our perception as we match our _____ (top-down/bottom-up) signal against it.
10. Our perception is also influenced by _____ about gender and the _____ context of our experiences.
11. To best understand perception, we need multiple levels of analysis because perception is a _____ phenomenon.

IS THERE EXTRASENSORY PERCEPTION?

OBJECTIVE 21: Identify the three most testable forms of ESP, and explain why most research psychologists remain skeptical of ESP claims.

1. Perception outside the range of normal sensation is called _____.
2. Psychologists who study ESP are called _____.
3. The form of ESP in which people claim to be capable of reading others' minds is called _____. A person who "senses" that a friend is in danger might claim to have the ESP ability of _____. An ability to "see" into the future is called _____. A person who claims to be able to levitate and move objects is claiming the power of _____.
4. Analyses of psychic visions and premonitions reveal _____ (high/chance-level) accuracy. Nevertheless, some people continue to believe in their accuracy because vague predictions often are later _____ to match events that have already occurred. In addition, people are more likely to recall or _____ dreams that seem to have come true.
5. Critics point out that a major difficulty for parapsychology is that ESP phenomena are not consistently _____.
6. Researchers who tried to reduce external distractions between a "sender" and a "receiver" in an ESP experiment reported performance levels that _____ (beat/did not beat) chance levels.