Myers’ Psychology for AP*

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PowerPoint Presentation Slides
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Germantown High School
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Unit 4:
Sensation and Perception
Unit Overview

- **Sensing the World: Some Basic Principles** (Qs 1-3)
- **Vision** (Qs 4-8)
- **Hearing** (Qs 9-13)
- **Other Senses** (Qs 14-16)
- **Perceptual Organization** (Qs 17-21)
- **Perceptual Interpretation** (Qs 22-24)
- **Is there Extrasensory Perception?** (Q 25)

Click on the any of the above hyperlinks to go to that section in the presentation.
Sensing the World: Some Basic Principles
Introduction

• Sensation
• Perception
  – Are one continuous process
Introduction

- **Bottom-up processing**
- **Top-down processing**
Selective Attention

- Selective Attention
  - Cocktail party effect
Selective Attention

Selective Attention and Accidents

• Cell phone use and car accidents
Selective Attention
Selective Inattention

• Inattentional blindness
Selective Attention
Selective Inattention

- **Change blindness**
  - Change deafness
  - Choice blindness
  - Choice-choice blindness

- Pop-out
Thresholds

- Psychophysics
Thresholds

Absolute Thresholds

- **Absolute threshold**
  - 50% of the time
Thresholds

Signal Detection

• **Signal-detection theory**
  – Ratio of “hits” to “false alarms”
Thresholds
Subliminal Stimulation

• **Subliminal** (below threshold)
• **Priming**
  – Masking stimulus
• Subliminal persuasion
Thresholds

*Difference Thresholds*

- **Difference threshold**
  - Just noticeable difference (jnd)

- **Weber’s Law**
The LORD is my shepherd; I shall not want.
He maketh me to lie down in green pastures:
he leadeth me
beside the still waters.
He restoreth my soul:
he leadeth me
Just noticeable difference

in the paths of righteousness for his name’s sake.
Yea, though I walk through the valley of the shadow of death,
Just noticeable difference

I will fear no evil:
for thou art with me;
thy rod and thy staff
they comfort me.
Just noticeable difference

Thou preparest a table before me
in the presence of mine enemies:
Just noticeable difference

thou anointest my head with oil, my cup runneth over.
Surely goodness and mercy shall follow me all the days of my life:
Just noticeable difference

and I will dwell in the house of the LORD for ever.
The LORD is my shepherd; I shall not want.
He maketh me to lie down in green pastures:
he leadeth me beside the still waters.
He restoreth my soul: he leadeth me
in the paths of righteousness for his name’s sake.
Yea, though I walk through the valley of the shadow of death,
I will fear no evil: for thou art with me;
thy rod and thy staff they comfort me.
Thou preparrest a table before me in the presence of mine enemies:
thou anointest my head with oil, my cup runneth over.
Surely goodness and mercy shall follow me all the days of my life:
and I will dwell in the house of the LORD for ever.
Sensory Adaptation

- Informative changes
- Reality versus usefulness
The Stimulus Input: Light Energy

- **Transduction** (transform)
- **Wavelength**
- **Hue** (color)
  - Wavelength
- **Intensity**
  - Wave amplitude
Electromagnetic Energy Spectrum
Electromagnetic Energy Spectrum
Electromagnetic Energy Spectrum
The Physical Property of Waves
The Physical Property of Waves

Short wavelength = high frequency (bluish colors)
The Physical Property of Waves

Short wavelength = high frequency (bluish colors)

Long wavelength = low frequency (reddish colors)
The Physical Property of Waves

Short wavelength = high frequency (bluish colors)

Long wavelength = low frequency (reddish colors)

Great amplitude (bright colors)
The Physical Property of Waves

Short wavelength = high frequency
(bluish colors)

Great amplitude
(bright colors)

Long wavelength = low frequency
(reddish colors)

Small amplitude
(dull colors)
The Eye

- Cornea
- Pupil
- Iris
- Lens
  - accommodation
- Retina
The Structure of the Eye
The Structure of the Eye

Cornea = outer covering of the eye.
The Structure of the Eye

Pupil = the adjustable opening in the center of the eye through which light enters.
The Structure of the Eye

Iris = a ring of muscle tissue that forms the colored portion of the eye around the pupil and controls the size of the pupil opening.

- The iris dilates/constricts in response to changing light intensity
Lens = the transparent structure behind the pupil that changes shape to help focus images on the retina.
Retina = the light-sensitive inner surface of the eye, containing the receptor rods and cones plus layers of neurons that begin the processing of visual information.
The Eye
The Retina

• **Rods** and **Cones**
Rods versus Cones

<table>
<thead>
<tr>
<th>Receptors in the Human Eye: Rod-Shaped Rods and Cone-Shaped Cones</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Cones</strong></td>
</tr>
<tr>
<td>Number</td>
</tr>
<tr>
<td>Location in retina</td>
</tr>
<tr>
<td>Sensitivity in dim light</td>
</tr>
<tr>
<td>Color sensitivity</td>
</tr>
<tr>
<td>Detail sensitivity</td>
</tr>
</tbody>
</table>
The Retina’s Reaction to Light
The Retina’s Reaction to Light

Cross section of retina
Optic nerve

To the brain’s visual cortex via the thalamus

Light

Cone
Rod
Neural impulse

Ganglion cell
Bipolar cell
The Retina’s Reaction to Light

1. Light entering eye triggers photochemical reaction in rods and cones at back of retina.

- Light
- Cone
- Rod
- Ganglion cell
- Bipolar cell
- Neural impulse
- Cross section of retina
- Optic nerve
- To the brain’s visual cortex via the thalamus
The Retina’s Reaction to Light

1. Light entering eye triggers photochemical reaction in rods and cones at back of retina.
2. Chemical reaction in turn activates bipolar cells.

Cross section of retina
Optic nerve
To the brain’s visual cortex via the thalamus
The Retina’s Reaction to Light

1. Light entering the eye triggers a photochemical reaction in rods and cones at the back of the retina.

2. Chemical reaction in turn activates bipolar cells.

3. Bipolar cells then activate the ganglion cells, the axons of which converge to form the optic nerve. This nerve transmits information to the visual cortex (via the thalamus) in the brain.
The Eye

The Retina

- **Optic nerve**
- **Blind spot**
- **Fovea**
The Structure of the Eye

Blind Spot = the point at which the optic nerve leaves the eye, creating a “blind” spot because no receptor cells are located there.
Fovea = the central focal point in the retina, around which the eye’s cones cluster.
Optic Nerve = the nerve that carries neural impulses from the eye to the brain.
Visual Information Processing

Visual Cortex
Pathways from the eyes to the visual cortex
Pathways from the eyes to the visual cortex
Pathways from the eyes to the visual cortex
Pathways from the eyes to the visual cortex
Visual Information Processing

*Feature Detection*

- **Feature detectors**
Visual Information Processing

Parallel Processing

- Parallel processing
  - Blind sight
Visual information processing
Visual information processing
Visual information processing
Visual information processing

- Feature detection: Brain’s detector cells respond to specific features—edges, lines, and angles.
- Retinal processing: Receptor rods and cones → bipolar cells → ganglion cells

Scene
Visual information processing

Parallel processing: Brain cell teams process combined information about color, movement, form, and depth.

Feature detection: Brain's detector cells respond to specific features—edges, lines, and angles.

Retinal processing: Receptor rods and cones → bipolar cells → ganglion cells.
Visual information processing

Parallel processing:
Brain cell teams process combined information about color, movement, form, and depth.

Feature detection:
Brain’s detector cells respond to specific features—edges, lines, and angles.

Recognition:
Brain interprets the constructed image based on information from stored images.

Retinal processing:
Receptor rods and cones → bipolar cells → ganglion cells.

Scene
Color Vision

• **Young-Helmholtz trichromatic (three color) theory**
  – Red – Green - Blue
  – Monochromatic vision
  – Dichromatic vision
Color Vision

• **Opponent-process theory**
  – Three sets of colors
    • Red-green
    • Blue-yellow
    • Black-white
  – Afterimage
This slide is intentionally left blank.
Hearing
The Stimulus Input: Sound Waves

- **Audition**
- **Amplitude**
  - loudness
- **Frequency**
  - Pitch
The Ear

- Outer ear
  - Auditory canal
  - Ear drum
The structure of the ear

The ear is divided into the outer, middle and inner ear.
The structure of the ear

The sound waves travel down the auditory canal to the eardrum.
The structure of the ear

Eardrum = tight membrane that vibrates when struck by sound waves.
The structure of the ear

Eardrum
The Ear

- **Middle ear**
  - Hammer, anvil, stirrup
The structure of the ear

Bones of the middle ear = the hammer, anvil, stirrup which vibrate with the eardrum.
The structure of the ear

Hammer
The structure of the ear

- Hammer
- Anvil
- Eardrum
- Sound Waves

Anvil
The structure of the ear

Oval window = where the stirrup connects to the cochlea.
Cochlea = a coiled, bony, fluid-filled tube in the inner ear through which sound waves trigger nerve impulses.
The Ear

- Inner ear
  - Oval window
  - Cochlea
    - Basilar membrane
  - Auditory nerve
  - Auditory cortex
The structure of the ear

Oval Window
The structure of the ear

Cochlea
The structure of the ear

Fluid in the cochlea
The structure of the ear

Hair cells in the cochlea
The structure of the ear

Auditory nerve = nerve which sends the auditory message to the brain via the thalamus.
Semicircular Canals

Diagram of the human ear showing the outer ear, middle ear, and inner ear. Key components include:
- Sound waves
- Auditory canal
- Eardrum
- Oval window (where stirrup attaches)
- Bones of the middle ear
- Semicircular canals
- Auditory nerve
- Cochlea
The structure of the ear

- **Sound waves**
- **Eardrum**
- **Stirrup**
- **Oval window**
- **Cochlea, partially uncoiled**
- **Nerve fibers to auditory nerve**
- **Protruding hair cells**
- **Motion of fluid in the cochlea**

**Nerve fibers**
The structure of the ear

- Sound waves
- Eardrum
- Stirrup
- Oval window
- Cochlea, partially uncoiled
- Protruding hair cells
- Motion of fluid in the cochlea
- Nerve fibers to auditory nerve
- Auditory nerve
Neural impulse to the brain
The Ear

*Perceiving Loudness*

- Basilar membrane’s hair cells
  - Compressed sound
Cochlea and loud sounds

Decibels

- Rock band (amplified) at close range
- Loud thunder
- Jet plane at 500 feet
- Subway train at 20 feet
- Busy street corner
- Normal conversation
- Whisper
- Threshold of hearing

Prolonged exposure above 85 decibels produces hearing loss.
The Ear

Perceiving Pitch

• **Place theory**
  – High pitched sounds

• **Frequency theory**
  – Low pitched sounds
  – Volley principle
The Ear

*Locating Sounds*

- Stereophonic hearing
- Localization of sounds
  - Intensity
  - Speed of the sound
Hearing Loss and Deaf Culture

• Hearing loss
  – Conduction hearing loss
  – Sensorineural hearing loss
  – Cochlea implant

• Signing
Other Senses
Touch

• Types of touch
  – Pressure
  – Warmth
  – Cold
  – Pain

• Sensation of hot
Touch

• Rubber hand illusion
Touch

- **Kinesthesia**
- **Vestibular sense**
  - Semicircular canals
Understanding Pain

- Biological Influences
  - Noiceptors
  - Gate-control theory
  - Endorphins
  - Phantom limb sensations
  - Tinnitus
The pain circuit
The pain circuit
The pain circuit
The pain circuit
The pain circuit
Pain

Understanding Pain

- Psychological Influences
  - Rubber-hand illusion
  - Memories of pain
Pain

Understanding Pain

• Social-Cultural Influences
Biopsychosocial approach to pain

Biological influences:
- activity in spinal cord's large and small fibers
- genetic differences in endorphin production
- the brain's interpretation of CNS activity
Biopsychosocial approach to pain

**Biological influences:**
- activity in spinal cord's large and small fibers
- genetic differences in endorphin production
- the brain's interpretation of CNS activity

**Psychological influences:**
- attention to pain
- learning based on experience
- expectations
Biopsychosocial approach to pain

Biological influences:
- activity in spinal cord's large and small fibers
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- attention to pain
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- expectations

Social-cultural influences:
- presence of others
- empathy for others’ pain
- cultural expectations
Biopsychosocial approach to pain

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- expectations

Social-cultural influences:
- presence of others
- empathy for others’ pain
- cultural expectations

Personal experience of pain
Pain
Controlling Pain

- Physical methods
- Psychological methods
Taste

- Sweet, sour, salty and bitter
  - Umami
- Taste buds
  - Chemical sense
- Age and taste

<table>
<thead>
<tr>
<th>Taste</th>
<th>Indicates</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sweet</td>
<td>Energy source</td>
</tr>
<tr>
<td>Salty</td>
<td>Sodium essential to physiological processes</td>
</tr>
<tr>
<td>Sour</td>
<td>Potentially toxic acid</td>
</tr>
<tr>
<td>Bitter</td>
<td>Potential poisons</td>
</tr>
<tr>
<td>Umami</td>
<td>Proteins to grow and repair tissue</td>
</tr>
</tbody>
</table>
Taste

Sensory Interaction

- Sensory interaction
- Interaction of smell and taste
  – McGurk Effect
- Interaction of other senses
Smell

- Olfaction
  - Chemical sense
  - Odor molecules
  - Olfactory bulb
  - Olfactory nerve
Smell and age
Smell and age

Number of correct answers

Women

Men

Age group

Smell and age

The graph shows the number of correct answers by gender and age group. The x-axis represents age groups ranging from 10-19 to 90-99, and the y-axis represents the number of correct answers. The graph indicates that women and young adults have the best sense of smell. The lines for women and men show a slight decrease in correct answers as age increases.
Smell and age

The graph shows the number of correct answers for identifying different scents over age groups for both men and women. The graph indicates that women and young adults generally have a better sense of smell compared to older age groups. The trend shows a decline in the number of correct answers with age for both genders.
Smell and age

The graph shows the number of correct answers for identifying scents in relation to age groups for both men and women. The graph indicates that women and young adults have the best sense of smell, with the number of correct answers remaining relatively high compared to men across all age groups. As age increases, both women and men show a decrease in the number of correct answers, but women maintain a higher number of correct answers across different age groups.
Perceptual Organization
Introduction

• Gestalt (form or whole)
Form Perception

Figure and Ground

• Figure-ground
Form Perception

Grouping

- Proximity
- Similarity
- Continuity
- Connectedness
- Closure
Form Perception

Grouping

- Proximity
- Similarity
- Continuity
- Connectedness
- Closure
Form Perception
Grouping - Proximity

Proximity
Form Perception

Grouping - Similarity

Similarity
Form Perception
Grouping - Continuity

Continuity
Form Perception

Grouping - Connectedness

Connectedness
Form Perception
Grouping - Closure
Depth Perception

- Depth perception
- Visual-cliff
Depth Perception

*Binocular Cues*

- **Binocular cues**
  - **Retinal disparity**
Depth Perception

*Monocular Cues*

- **Monocular cues**
  - Horizontal-vertical illusion
Depth Perception

Monocular Cues

• **Monocular cues**
  – Relative height
  – Relative size
  – Interposition
  – Linear perspective
  – Relative motion
  – Light and shadow
Depth Perception

Monocular Cues – Relative Height
Depth Perception
Monocular Cues – Relative Size

I have no depth perception. Is there a cop standing on the corner, or do you have a tiny person in your hair?
Depth Perception
Monocular Cues - Interposition
Depth Perception

Monocular Cues – Linear Perspective

THE FREIGHT ELEVATOR FOR THE MAN WHO HAS EVERYTHING
Depth Perception
Monocular Cues – Relative Motion

Direction of passenger's motion
Depth Perception

Monocular Cues – Light and Shadow
Motion Perception

• Stroboscopic movement
• Phi phenomenon
Perceptual Constancy

• Perceptual Constancy
Perceptual Constancy

*Shape and Size Constancies*

- Shape constancy
Perceptual Constancy
Shape and Size Constancies

• Size constancy
• Moon illusion
• Ponzo illusion
Ames Room
Ames Room
Perceptual Constancy

Lightness Constancy

- Lightness constancy
  - Brightness constancy
  - Relative luminance
Perceptual Constancy

Color Constancy

- Color constancy
  - Surrounding context
  - Surrounding objects
Perceptual Interpretation
Sensory Deprivation and Restored Vision

- Experiments on sensory deprivation
  - Critical period
Perceptual Adaptation

- **Perceptual adaptation**
  - Displacement goggles
Perceptual Set

- **Perceptual set**
  - Mental predisposition
  - Schemas
Perceptual Set

Context Effects

• Context effects
Perceptual Set

Emotion and Motivation

- Motivation on perception
- Emotions on perception
Perception is a Biopsychosocial Phenomenon

Perception: Our version of reality
Perception is a Biopsychosocial Phenomenon

- Biological influences:
  - sensory analysis
  - unlearned visual phenomena
  - critical period for sensory development

Perception: Our version of reality
Perception is a Biopsychosocial Phenomenon

Biological influences:
- sensory analysis
- unlearned visual phenomena
- critical period for sensory development

Psychological influences:
- selective attention
- learned schemas
- Gestalt principles
- context effects
- perceptual set

Perception: Our version of reality
Perception is a Biopsychosocial Phenomenon

**Biological influences:**
- sensory analysis
- unlearned visual phenomena
- critical period for sensory development

**Psychological influences:**
- selective attention
- learned schemas
- Gestalt principles
- context effects
- perceptual set

**Social-cultural influences:**
- cultural assumptions and expectations

**Perception:** Our version of reality
Is There Extrasensory Perception?
Claims of ESP

- **Parapsychology**
- **Extrasensory Perception**
  - Telepathy
  - Clairvoyance
  - Precognition
- **Psychokinesis (PK)**
Parapsychology

Purported paranormal phenomena ("psi")

[Diagram with three sections under "Purported paranormal phenomena"]
Parapsychology

Purported paranormal phenomena ("psi")

ESP
Extrasensory perception

[Diagram showing three blank sections below ESP and Extrasensory perception]
Parapsychology

Purported paranormal phenomena ("psi")

ESP
Extra sensory perception

Telepathy

Clairvoyance
Parapsychology

Purported paranormal phenomena ("psi")

- ESP
  - Extrasensory perception
    - Telepathy
    - Clairvoyance
    - Precognition
Parapsychology

Purported paranormal phenomena ("psi")

- ESP
  - Extrasensory perception
  - Telepathy
  - Clairvoyance
- PK
  - Psychokinesis
  - Precognition
Premonitions or Pretensions?

- Psychic predictions
  – Nostradamus
Putting ESP to Experimental Test

• ESP Experiments
The End
Teacher Information

• Types of Files
  – This presentation has been saved as a “basic” Powerpoint file. While this file format placed a few limitations on the presentation, it insured the file would be compatible with the many versions of Powerpoint teachers use. To add functionality to the presentation, teachers may want to save the file for their specific version of Powerpoint.

• Animation
  – Once again, to insure compatibility with all versions of Powerpoint, none of the slides are animated. To increase student interest, it is suggested teachers animate the slides wherever possible.

• Adding slides to this presentation
  – Teachers are encouraged to adapt this presentation to their personal teaching style. To help keep a sense of continuity, blank slides which can be copied and pasted to a specific location in the presentation follow this “Teacher Information” section.
Hyperlink Slides - This presentation contain two types of hyperlinks. Hyperlinks can be identified by the text being underlined and a different color (usually purple).

- **Unit subsections hyperlinks**: Immediately after the unit title slide, a page (slide #3) can be found listing all of the unit’s subsections. While in slide show mode, clicking on any of these hyperlinks will take the user directly to the beginning of that subsection. This allows teachers quick access to each subsection.

- **Bold print term hyperlinks**: Every bold print term from the unit is included in this presentation as a hyperlink. While in slide show mode, clicking on any of the hyperlinks will take the user to a slide containing the formal definition of the term. Clicking on the “arrow” in the bottom left corner of the definition slide will take the user back to the original point in the presentation.

These hyperlinks were included for teachers who want students to see or copy down the exact definition as stated in the text. Most teachers prefer the definitions not be included to prevent students from only “copying down what is on the screen” and not actively listening to the presentation.

For teachers who continually use the Bold Print Term Hyperlinks option, please contact the author using the email address on the next slide to learn a technique to expedite the returning to the original point in the presentation.
Teacher Information

• Continuity slides
  – Throughout this presentation there are slides, usually of graphics or tables, that build on one another. These are included for three purposes.
    • By presenting information in small chunks, students will find it easier to process and remember the concepts.
    • By continually changing slides, students will stay interested in the presentation.
    • To facilitate class discussion and critical thinking. Students should be encouraged to think about “what might come next” in the series of slides.

• Please feel free to contact me at kkorek@germantown.k12.wi.us with any questions, concerns, suggestions, etc. regarding these presentations.
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Division title (green print) subdivision title (*blue print*)

- xxx
- xxx
- xxx
Division title (green print)
subdivision title (blue print)

Use this slide to add a table, chart, clip art, picture, diagram, or video clip. Delete this box when finished
Definition Slide

= add definition here
Definition
Slides
Sensation

= the process by which our sensory receptors and nervous system receive and represent stimulus energies from our environment.
Perception

= the process of organizing and interpreting sensory information, enabling us to recognize meaningful objects and events.
Bottom-up processing

= analysis that begins with the sensory receptors and works up to the brain’s integration of sensory information.
Top-down processing

= information processing guided by higher-level mental processes, as when we construct perceptions drawing on our experience and expectations.
Selective attention

= the focusing of conscious awareness on a particular stimulus.
Inattentional blindness

= failing to see visible objects when our attention is directed elsewhere.
Change blindness

= failing to notice changes in the environment
Psychophysics

= the study of relationships between the physical characteristics of stimuli, such as their intensity, and our psychological experience of them.
Absolute threshold

= the minimum stimulation necessary to detect a particular stimulus 50% of the time.
Signal detection theory
= a theory predicting how and when we detect the presence of a faint stimulus (signal) amid background stimulation (noise). Assumes there is no absolute threshold and that detection depends partly on a person’s experience, expectations, motivation, and alertness.
Subliminal

= below one’s absolute threshold for conscious awareness.
Priming

= the activation, often unconsciously, of certain associations, thus predisposing one’s perception, memory, or response.
Difference threshold

= the minimum difference between two stimuli required for detection. We experience the difference threshold as a just noticeable difference (jnd).
Weber’s law

= the principle that, to be perceived as different, two stimuli must differ by a constant percentage (rather than a constant amount).
Sensory adaptation

= diminished sensitivity as a consequence of constant stimulation.
Transduction

= conversion of one form of energy into another. In sensation, the transforming of stimulus energies, such as sights, sounds, and smells into neural impulses our brains can interpret.
Wavelength

= the distance from the peak of one light or sound wave to the peak of the next. Electromagnetic wavelengths vary from the short blips of comic rays to the long pulses of radio transmission.
Hue

= the dimension of color that is determined by the wavelength of light; what we know as the color names *blue, green*, and so forth.
Intensity

= the amount of energy in a light or sound wave, which we perceive as brightness or loudness, as determined by the wave’s amplitude.
Pupil

= the adjustable opening in the center of the eye through which lights enters.
Iris

= a ring of muscle tissue that forms the colored portion of the eye around the pupil and controls the size of the pupil opening.
Lens

= the transparent structure behind the pupil that changes shape to help focus the images on the retina.
Retina

= the light-sensitive inner surface of the eye, containing the receptor rods and cones plus layers of neurons that begin the processing of visual information.
Accommodation

= the process by which the eye’s lens changes shape to focus near or far objects on the retina.
Rods

= retinal receptors that detect black, white, and gray; necessary for peripheral and twilight vision, when cones don’t respond.
Cones

= retinal receptor cells that are concentrated near the center of the retina and that function in daylight or in well-lit conditions. The cones detect fine detail and give rise to color sensations.
Optic Nerve

= the nerve that carries neural impulses from the eye to the brain.
Blind Spot

= the point at which the optic nerve leaves the eye, creating a “blind” spot because no receptor cells are located there.
Fovea

= the central focal point in the retina, around which the eye’s cones cluster.
Feature detectors

= nerve cells in the brain that respond to specific features of the stimulus, such as shape, angle, or movement.
Parallel processing

= the processing of many aspects of a problem simultaneously; the brain’s natural mode of information processing for many functions, including vision. Contrasts with the step-by-step (serial) processing of most computers and of conscious problem solving.
Young-Helmholtz trichromatic (three-color) theory

= the theory that the retina contains three different color receptors – one most sensitive to red, one to green, one to blue – which, when stimulated in combination can produce the perception of any color.
Opponent-process theory

= the theory that opposing retinal processes (red-green, yellow-blue, white-black) enable color vision. For example, some cells are stimulated by green and inhibited by red; others are stimulated by red and inhibited by green.
Audition

= the sense or act of hearing.
Frequency

= the number of complete wavelengths that pass a point in a given time (i.e. per second).
Pitch

= a tone’s experienced highness or lowness; depends on frequency.
Middle Ear

= the chamber between the eardrum and cochlea containing three tiny bones (hammer, anvil, and stirrup) that concentrate the vibrations of the eardrum on the cochlea’s oval window.
Cochlea

= a coiled, bony, fluid-filled tube in the inner ear through which sound waves trigger nerve impulses.
Inner ear

= the innermost part of the ear, containing the cochlea, semicircular canals, and vestibular sacs.
Place theory

= in hearing, the theory that links the pitch we hear with the place where the cochlea’s membrane is stimulated.
Frequency theory

= in hearing, the theory that the rate of nerve impulses traveling up the auditory nerve matches the frequency of a tone, thus enabling us to sense its pitch.
Conduction hearing loss

= hearing loss caused by damage to the mechanical system that conducts sound waves to the cochlea.

- Problems with the eardrum or three bones of the middle ear.
Sensorineural hearing loss

= hearing loss caused by damage to the cochlea’s receptor cells or to the auditory nerves; also called nerve deafness.
Cochlea implant

= a device for converting sounds into electrical signals and stimulating the auditory nerve through electrodes threaded into the cochlea.
Kinesthesia

= the system for sensing the position and movement of individual body parts.
Vestibular sense

= the sense of body movement and position, including the sense of balance.
Gate-control theory

= the theory that the spinal cord contains a neurological “gate” that blocks pain signals or allows them to pass on to the brain. The “gate” is opened by the activity of pain signals traveling up small nerve fibers and is closed by activity in larger fibers or by information coming from the brain.
Sensory interaction

= the principle that one sense may influence another, as when the smell of food influences its taste.
Gestalt

= an organized whole. Gestalt psychologists emphasized our tendency to integrate pieces of information into meaningful wholes.
Figure-ground

= the organization of the visual field into objects (the figures) that stand out from their surroundings (the ground).
Grouping

= the perceptual tendency to organize stimuli into coherent groups.
Depth perception

= the ability to see objects in three dimensions although the images that strike the retina are two-dimensional; allows us to judge distance.
Visual cliff

= a laboratory device for testing depth perception in infants and young animals.
Binocular cues

= depth cues, such as retinal disparity, that depend on the use of two eyes.
Retinal disparity

= a binocular cue for perceiving depth. By comparing images from the retinas in the two eyes, the brain computes distance – the greater the disparity (difference) between the two images, the closer the object.
Monocular cues

= depth cues, such as interposition and linear perspective, available to either eye alone.
Phi phenomenon

= an illusion of movement created when two or more adjacent lights blink on and off in quick succession.
Perceptual constancy

= perceiving objects as unchanging (having consistent shapes, size, lightness, and color) even as illumination and retinal images change.
Color constancy

= perceiving familiar objects as having consistent color, even if changing illumination alters the wavelengths reflected by the object.
Perceptual adaptation

= in vision, the ability to adjust to an artificially displaced or even inverted visual field.
Perceptual set

= a mental disposition to perceive one thing and not another.
Extrasensory perception (ESP) = the controversial claim that perception can occur apart from sensory input; includes telepathy, clairvoyance, and precognition.
Parapsychology

= the study of paranormal phenomena, including ESP and psychokinesis.