Chapter 4: Sensation and Perception

Case Study: Out of Darkness and Silence

The life of Helen Keller is an example of how people can compensate for the loss of one or more senses.

Helen Keller and Anne Sullivan

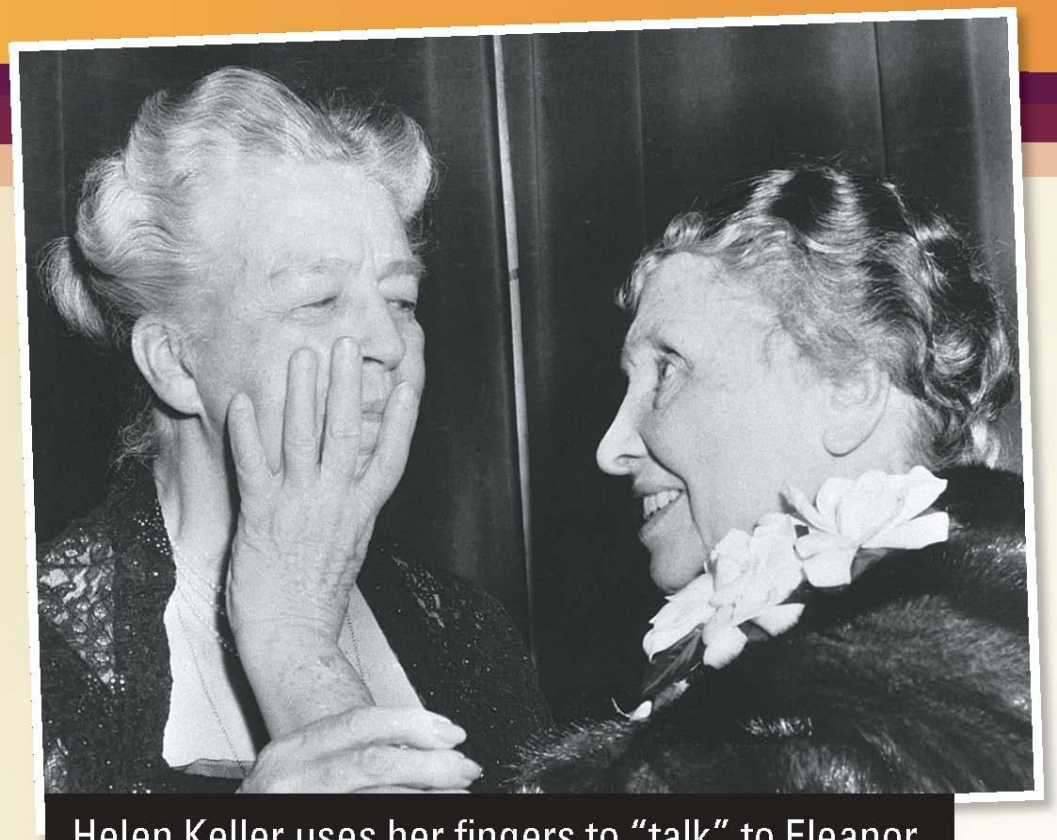
- A childhood illness left Helen Keller deaf and blind at the age of 19 months.
- When Keller was nearly seven, Anne Sullivan became her teacher.
- Keller learned to communicate through the manual alphabet.

Learning and Teaching

- Keller learned to speak.
- She learned to “listen” to others speak.
- She attended Radcliffe College.
- She and Sullivan traveled and lectured around the world, focusing attention on the deaf and blind.

What do you think?

- How do people compensate for lost senses?
- How do you think you might deal with losing one or more of your five senses?



Helen Keller uses her fingers to “talk” to Eleanor Roosevelt at a party in 1954.

Inspired by Keller's legacy, Filipino students developed a device that converts text messages into Braille, the writing system of the blind.

Section 1 at a Glance

Understanding Sensation and Perception

- The stimulation and interpretation of our senses are limited by variable thresholds.
- Our senses adapt to changing conditions and environments.
- Physical and psychological factors affect our perception of stimuli.

Understanding Sensation and Perception

Main Idea

Sensation is the process by which our five senses gather information and send it to the brain. Perception is the way in which we interpret this information.

Reading Focus

- What processes and concepts affect the stimulation of the senses?
- How does the process of sensory adaptation work?
- What is signal-detection theory?

PSYCHOLOGY CLOSE UP

Sensory OVERLOAD

Can you ever see, hear, and feel too much?

Stimulation of the Senses

Sensation is the stimulation of sensory receptors and the transmission of sensory information to the central nervous system. Stimulation of the senses is automatic. **Perception** is the psychological process through which we interpret sensory stimulation.

Absolute Threshold

- **Absolute threshold** is the weakest amount of a stimulus that can be sensed.
- Absolute thresholds differ from humans to animals and also from person to person.

Difference Threshold

- The minimum amount of difference that can be detected between two stimuli is knows as the **difference threshold**.
- People's individual difference thresholds vary slightly.

ABSOLUTE THRESHOLDS FOR SENSORY PERCEPTION

QUICK FACTS

This chart shows the absolute threshold for each of our five senses.

Sense	Stimulus	Receptors	Absolute Threshold
Vision	Electromagnetic energy	Rods and cones in the retina	A candle flame viewed from a distance of about 30 miles on a dark night
Hearing	Sound waves	Hair cells of the inner ear	The ticking of a watch from about 20 feet away in a quiet room
Smell	Chemical substances in the air	Receptor cells in the nose	About one drop of perfume diffused throughout a small house
Taste	Chemical substances in saliva	Taste buds on the tongue	About 1 teaspoon of sugar dissolved in 2 gallons of water
Touch	Pressure on the skin	Nerve endings in the skin	The wing of a fly falling on a cheek from a distance of less than half an inch

Reading Check

Analyze

What is the relationship between the absolute threshold and the difference threshold?

Answer: *absolute threshold—weakest amount of stimulus that can be sensed; difference threshold—minimum amount of difference that can be detected between two stimuli*

Sensory Adaptation

- Our sensory systems adapt to a changing environment.
- **Sensory adaptation** is the process by which we become more sensitive to weak stimuli and less sensitive to unchanging stimuli.
- Examples:
  - When your eyes adapt to the darkness.
  - When people adapt to the sounds of city traffic.
- Some stimuli do not display this kind of adaptation.
  - We do not usually adapt to pain.

Quick Lab

Light-Dark Adaptation

Our eyes are designed to adapt to changing conditions in our environment. Try this experiment to test your sensory adaptation.

PROCEDURE

1. While seated at your desk, close or cover one eye with your hand. Read, write, or study using your uncovered eye for about five minutes.
2. After five minutes, ask your teacher to turn off the light. Uncover your eye, and look at your book and around the room.
3. With both eyes still uncovered, ask your teacher to turn the light back on. Again, look at your surroundings.

ANALYSIS

1. Think about what happened when the light was turned off and you uncovered your eye. What differences in visibility did you note in each eye?
2. Think about how your eyes responded when the light was turned back on. How long did it take for the eye you had covered to adapt to the light? How long did it take for your uncovered eye to adapt to the light?
3. Discuss your findings as a class. Did everyone have the same experience? Why do you think your eyes respond this way?

Reading Check

Draw Conclusions

What sensory adaptation probably occurs after you rest your hand on a table's surface for a moment?

Answer: *less aware of the unchanging stimulus of the hard surface of the table*

Signal-Detection Theory

- **Signal-detection theory** is a method of distinguishing sensory stimuli that takes into account not only the stimuli's strengths but also such variables as:
  - the setting
  - your physical state
  - your mood
  - your attitudes
- It also considers psychological factors such as:
  - motivations
  - expectations
  - learning

Reading Check

Summarize

What factors can affect the signals we receive?

Answer: *signal strength and variable elements, such as setting, individual's physical state, mood, attitudes*

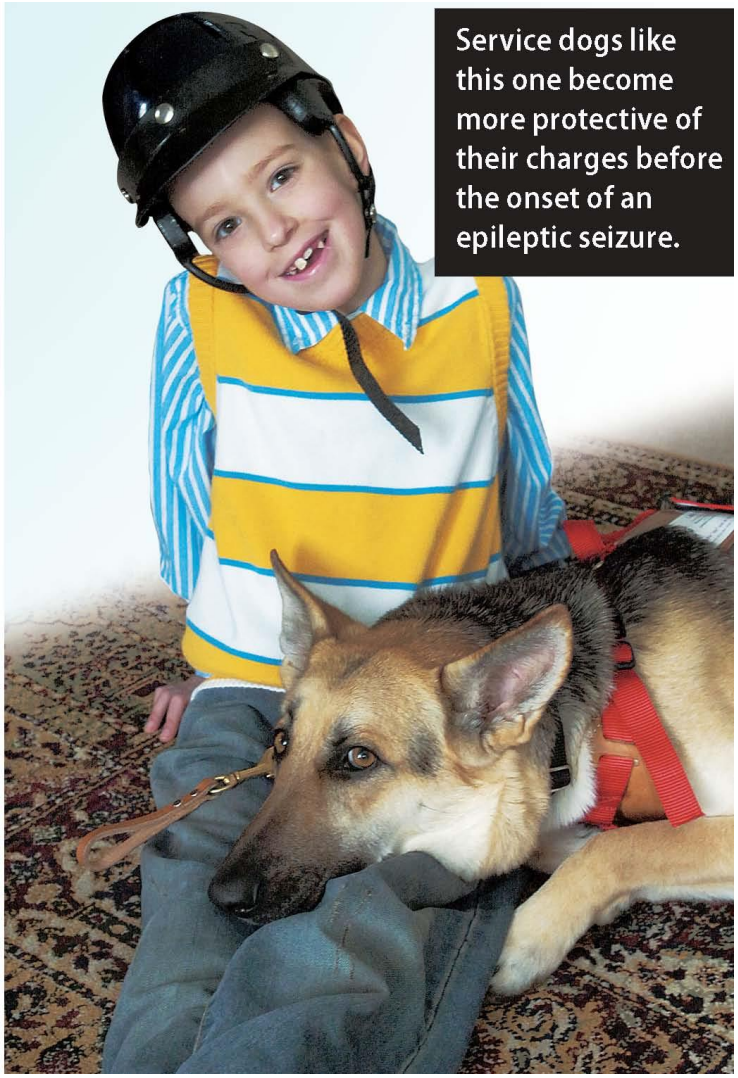
Psychology in Today's World

Animal Senses

Over the centuries, people have reported that animals appear to have a sixth sense for detecting earthquakes, hurricanes, volcanic eruptions, and tsunamis. In more recent times, animals' acute senses have been used to help the disabled, find missing persons, and sniff out bombs and drugs.

- In December 2004, animals sensed an impending tsunami in the Indian Ocean that struck dozens of Asian and African countries.
- Alan Rabinowitz of the Wildlife Conservation Society says that many animals can detect changes in the environment that humans cannot.
- Dogs have been shown to accurately predict epileptic seizures.
- Dogs can sniff out survivors after a disaster.
- A recent study trained wasps to detect many different odors. The training may be used to sniff out bombs and drugs.

Sheep can recognize about 50 sheep and 10 human faces and remember them for two years. Specialized areas of the sheep brain, similar to those in humans, encode facial identity. By studying these areas, scientists may help people who have lost the ability to recognize faces as a result of brain injury.



Thinking Critically

- In what ways do people benefit from animals' super senses?
- How might animals supplement disaster warning systems?

Section 2 at a Glance

Vision

- Light enters the eye, which relays information to the brain and allows us to see.
- People with normal color vision can see all colors in the spectrum of visible light.
- People who do not have normal color vision are said to be “color blind.”

Vision

Main Idea

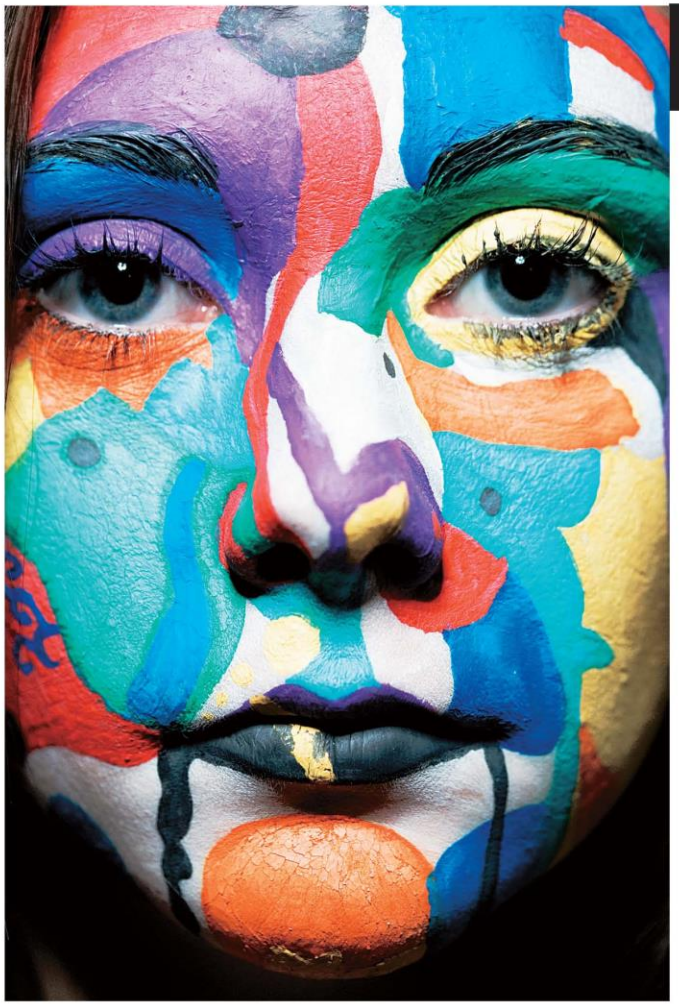
Light interacting with the eye allows us to see. People with normal vision can adapt to changing light conditions and can see any color in the spectrum of visible light.

Reading Focus

- How does light work?
- What are the main parts of the eye?
- What allows us to have color vision?
- What causes color blindness?

PSYCHOLOGY CLOSE UP

COLOR Psychology



What color are you feeling?

Light

- Light: electromagnetic energy described in wavelengths
- Electromagnetic spectrum: light that is visible to humans and light that is not
- The light that humans can see makes up only a small part of the spectrum.
- The main colors of the spectrum are:
  - red
  - orange
  - yellow
  - green
  - blue
  - indigo
  - violet

Reading Check

Summarize

What is light?

Answer: *Light is electromagnetic energy. The electromagnetic spectrum is made up of light that is visible to humans and light that is not.*

The Eye

- The amount of light that enters the eye is determined by the size of the opening in the colored part of the eye, which is the **pupil**.
- The **lens** adjusts to the distance of objects by changing its thickness.
- The **retina** is a sensitive surface that consists of neurons.
- Neurons that are sensitive to light are called **photoreceptors**.

The Blind Spot

- When light hits the point where the optic nerve leaves the eye, the eye registers nothing because that area lacks photoreceptors.
- The area that does not have photoreceptors is called the **blind spot**.
- Everyone has a blind spot.

Rods and Cones

- The two kinds of photoreceptors are rods and cones.
- Rods are sensitive only to brightness and allow us to see black and white.
- Cones provide color vision.
- Rods are more sensitive to light than are cones.

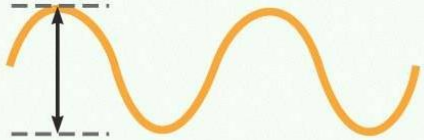
Wavelength

Short wavelength = high frequency
(bluish colors, high-pitched sounds)

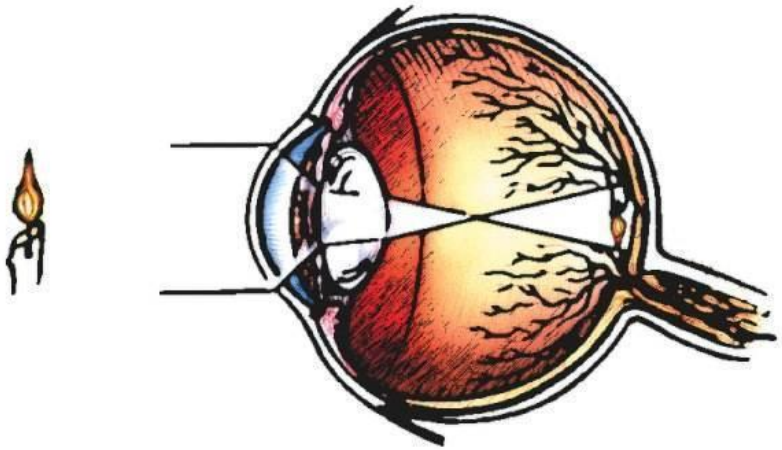
Long wavelength = low frequency
(reddish colors, low-pitched sounds)

Amplitude

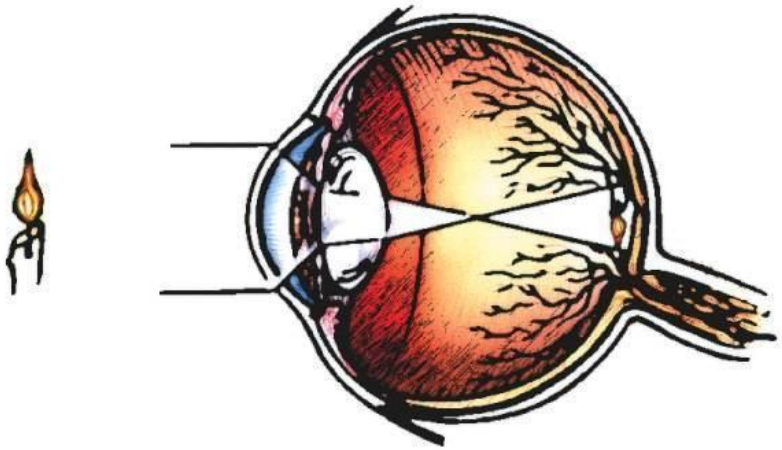
Great amplitude
(bright colors, loud sounds)



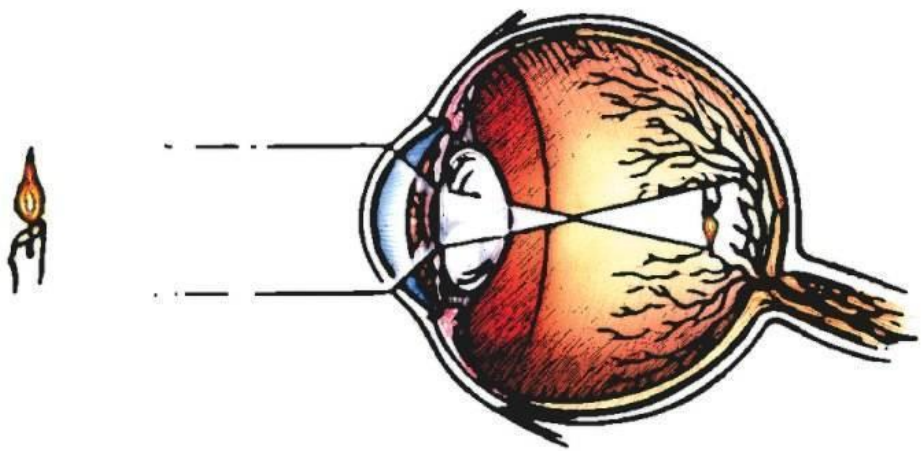
Small amplitude
(dull colors, soft sounds)



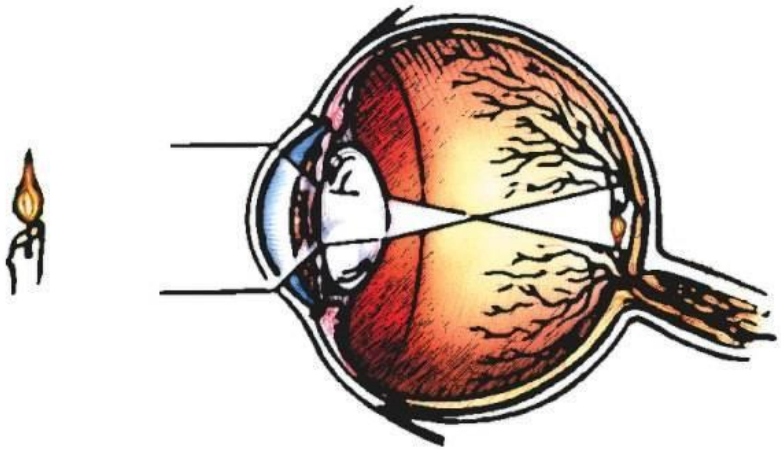
Normal vision



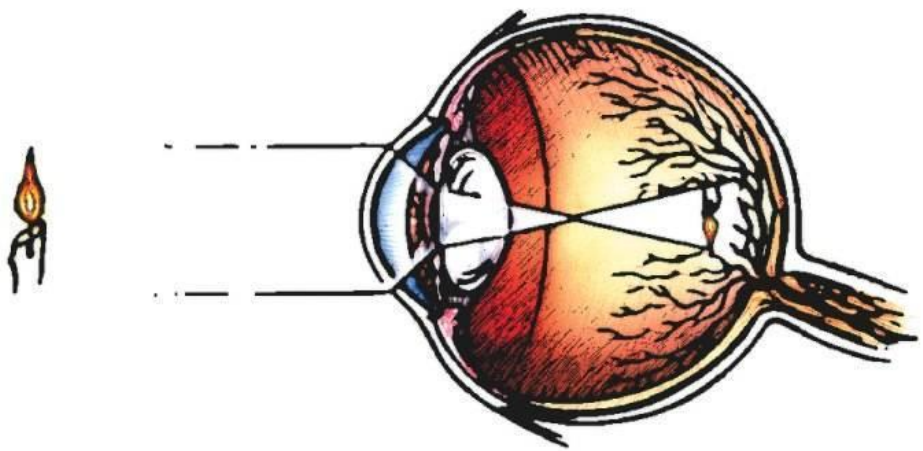
Normal vision



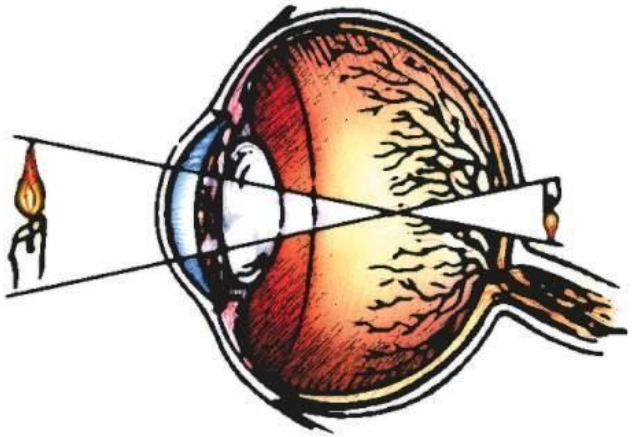
Nearsightedness



Normal vision

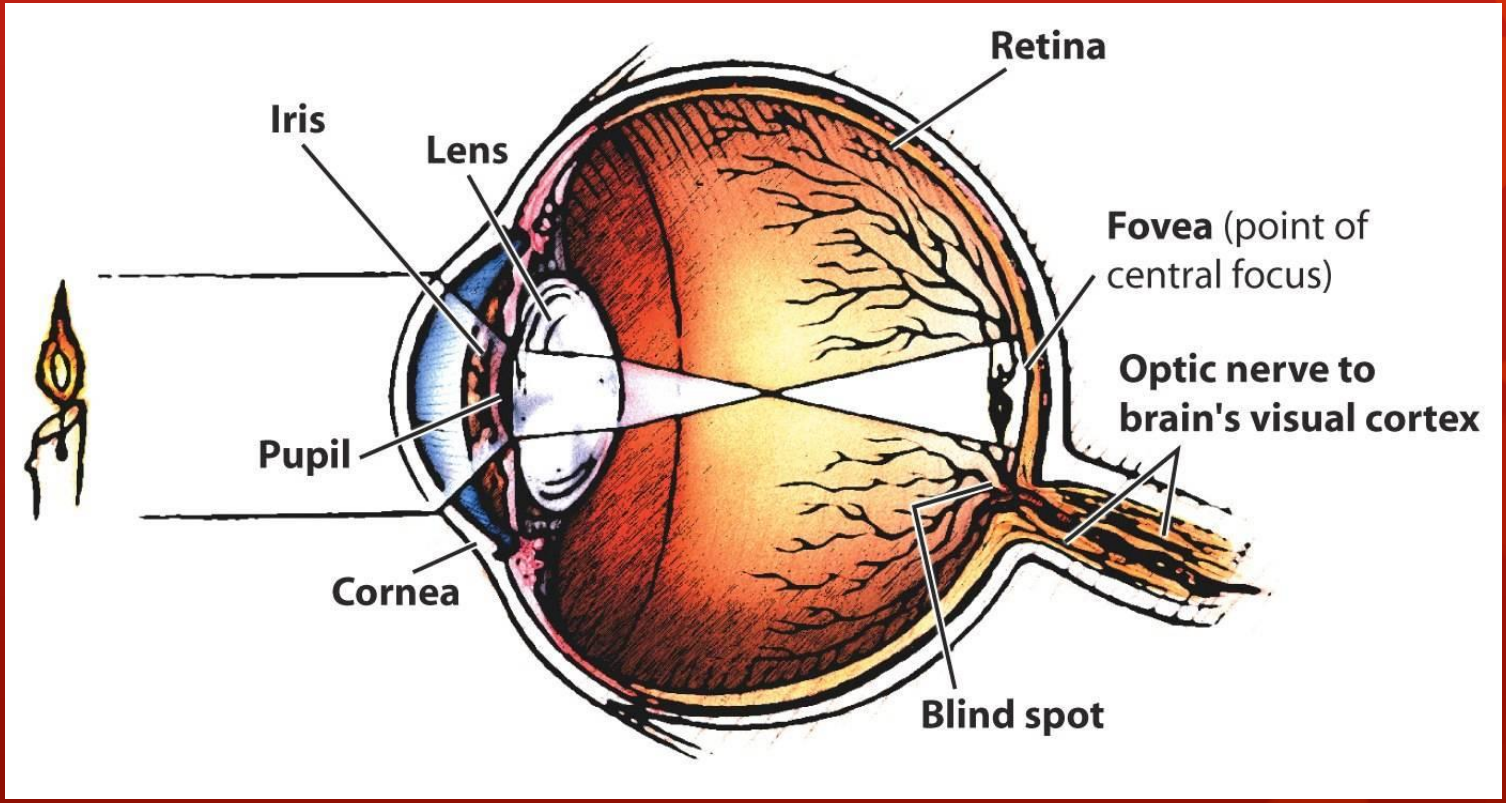


Nearsightedness



Farsightedness

Parts of the Eye – Blind Spot



BLIND SPOT DETECTOR

- A blind spot exists where the optic nerve exits through the retina, because there are no rods or cones at this point. To find your blind spot, close your right eye and look at the cookie monster. Maintain your focus on the cookie monster and slowly adjust the distance of the screen from your eyes until the cookie disappears. Under normal circumstances, you are unaware of your blind spot because one eye sees what the other does not.

Dark and Light Adaptation

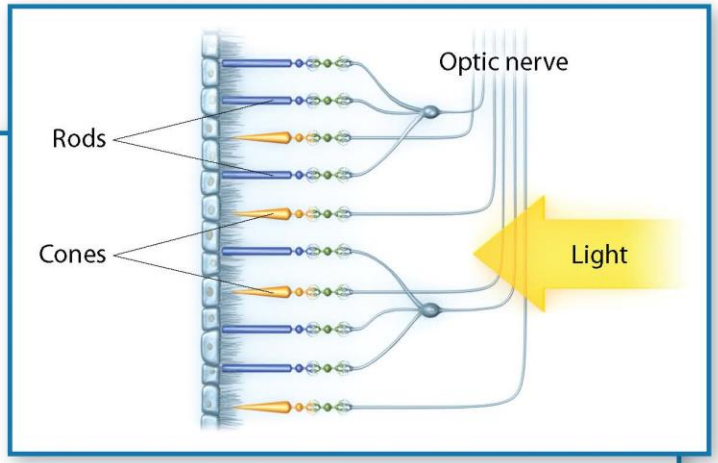
- The adjustment to lower levels of light is called dark adaptation.
- The ability to see in low light continues to improve for up to 45 minutes.
- Adaptation to bright light occurs within a minute or two.
- Adaptation to bright light happens much more quickly than adaptation to the dark.

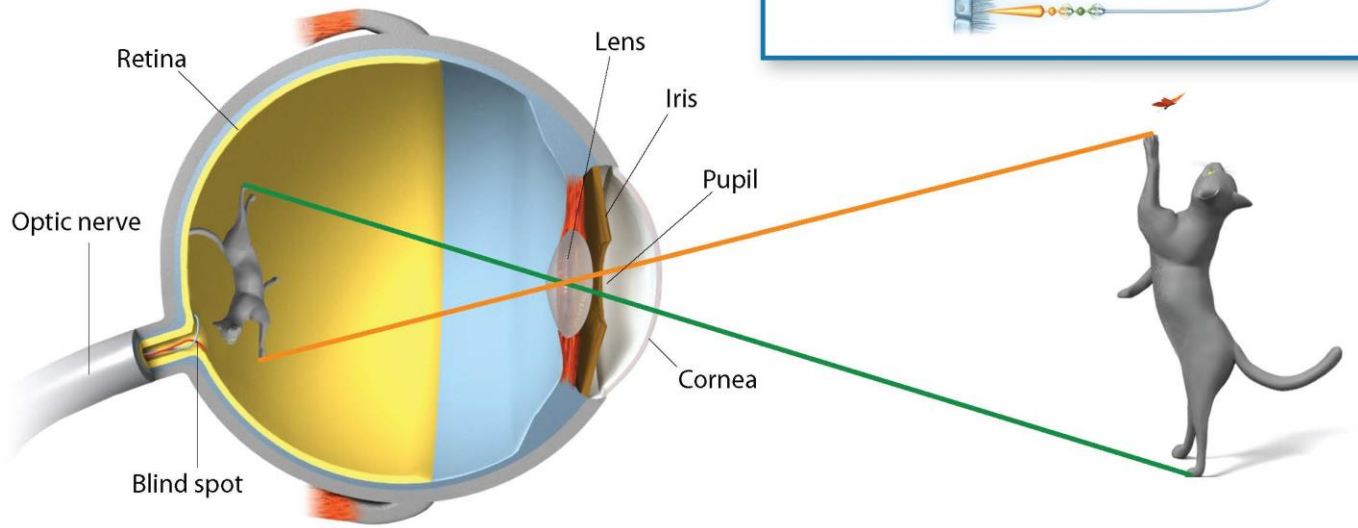
Visual Acuity

- **Visual acuity** is the sharpness of vision.
- It is determined by the ability to see visual details in normal light.
- Eye charts are used to measure visual acuity.
- Being nearsighted means a person has to be close to an object to make out its details.
- Being farsighted means a person has to be farther away from an object to make out its details.
- As people age, they become more farsighted.

THE HUMAN EYE

In the human eye, light travels through the pupil to the lens and is then reflected onto the retina. The optic nerve sends the visual information to the brain. The rods and cones are light receptors within the retina.





Reading Check

Compare

In what way is the eye like a camera?

Answer: *As in a camera, light enters an opening; in the eye, it is the pupil, which adjusts automatically to the light. The lens adjusts to the distance of objects, a clear image is projected, and then the retina acts like the film in a camera.*

Color Vision

The Color Wheel

- The color wheel is made up of the colors of the spectrum bent into a circle.
- Complementary colors are the colors across from each other on the color wheel.
- Color visions refers to light. It does not refer to pigments.
- When complementary colors of light mix, they form gray.

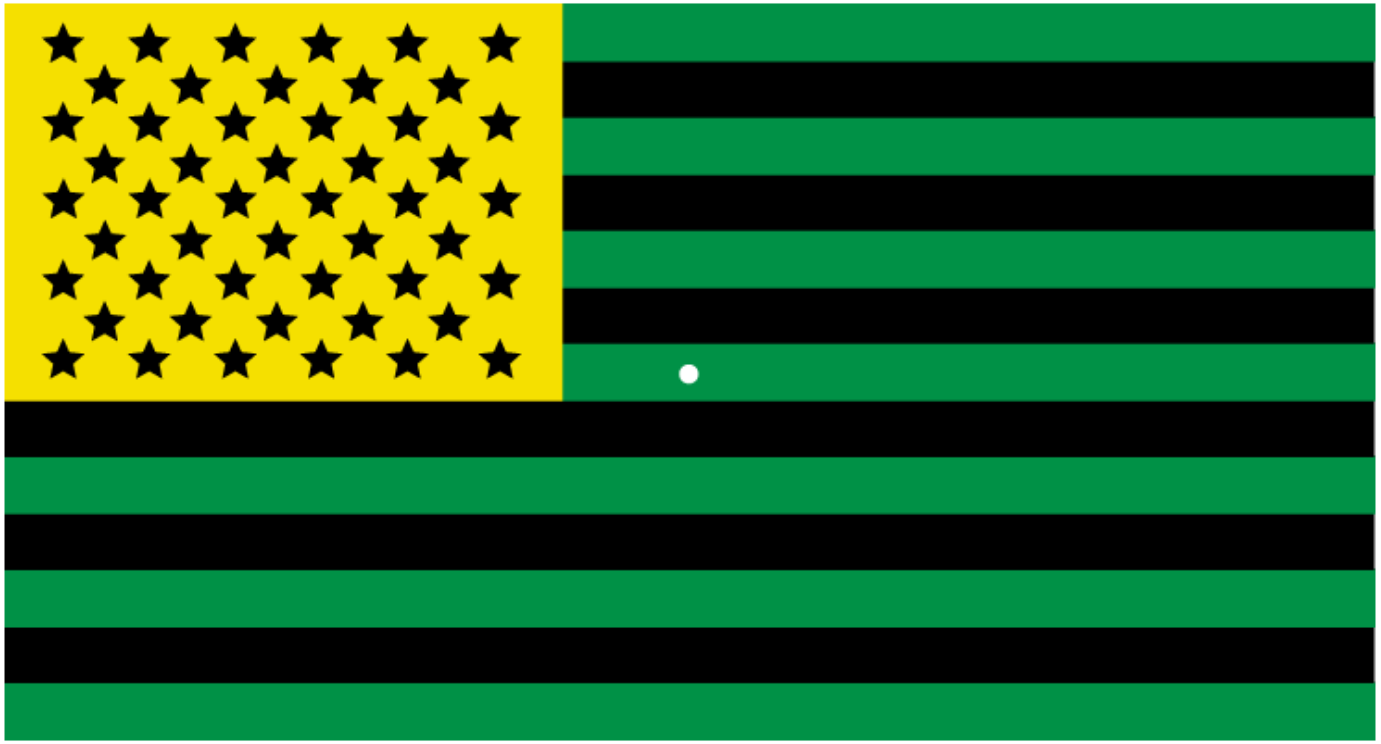
Cones and Color Vision

- In humans, some cones are sensitive to blue, some to green, and some to red.
- When more than one kind of cone is stimulated, we perceive other colors.
- Human color vision differs from that of many animals.
- Fish have no cones and see no color.
- Dogs have two types of cones and see fewer colors than humans.
- Birds have four or more cones and see a wide variety of colors.

Afterimages

- An **afterimage** is the visual impression that remains after the original image is removed.
  - The afterimage is the complementary color of the color of the original image.
  - The afterimage of black is white.
  - The afterimage of white is black.
- Most afterimages last a few seconds up to a minute.
  - They occur when the cones of the eye become tired after staring intensely at a single color.
  - The size of an afterimage depends of the distance from which it is viewed.

Afterimage Effect

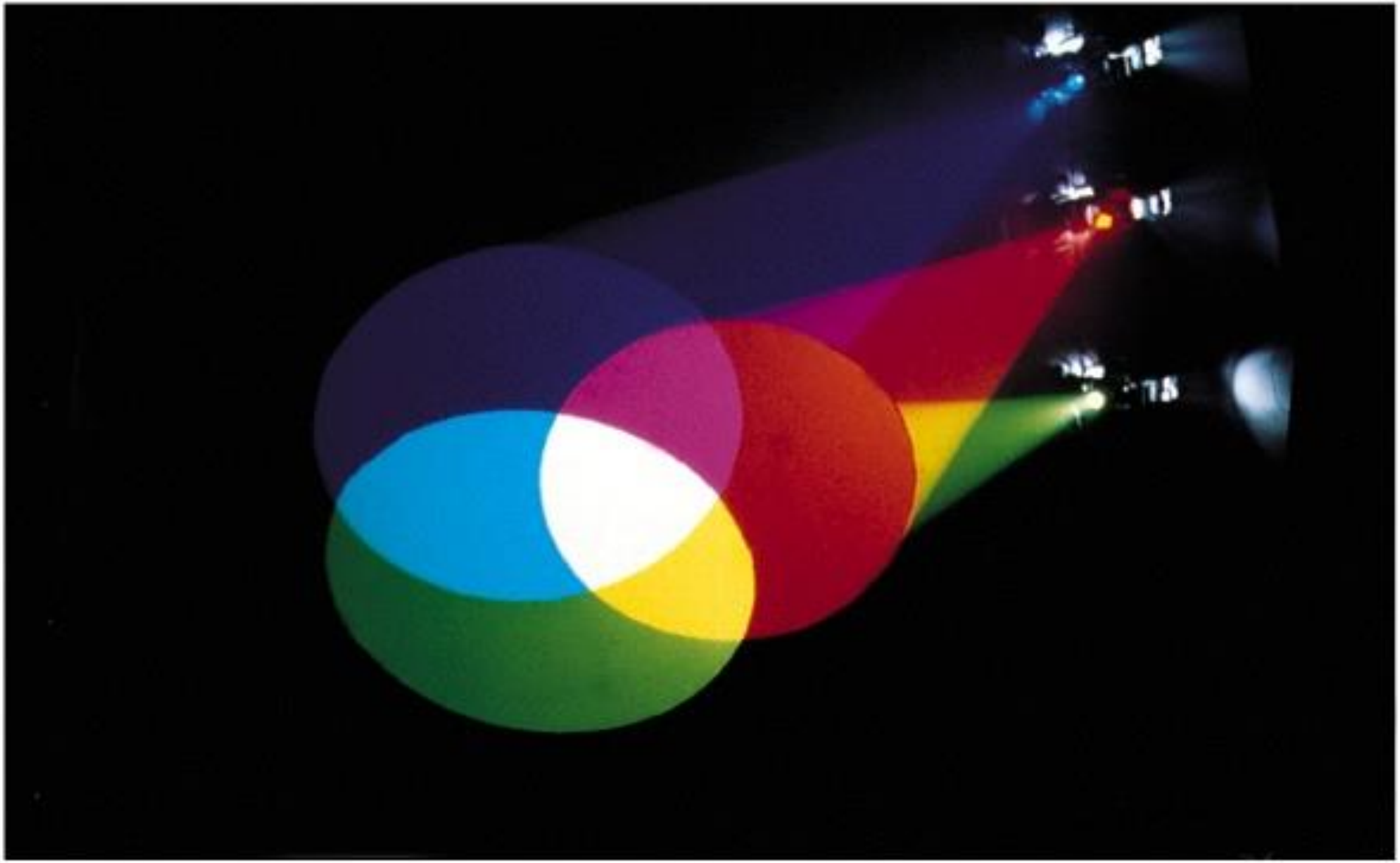


Additive Color Mixing

- When mixing colored lights, each new color ADDS another wavelength.
- Red, green, and blue combine to make white light.

THE COLOR WHEEL

Gray is in the middle of the wheel because when complementary colors of light mix, they form gray.



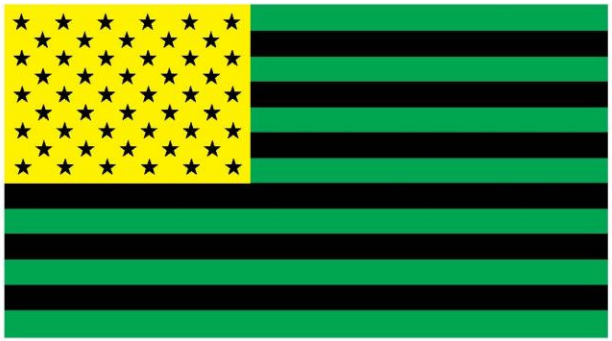
Additive color mixing

Subtractive Color Mixing

- When mixing colored paints, each new color SUBTRACTS (soaks up) another wavelength.
- Red, blue, and yellow combine to make black paint.

Subtractive color mixing

Quick Lab



Afterimages

An afterimage is a type of optical illusion. In this lab, you will experiment with afterimage by staring at the strangely colored flag above.

PROCEDURE

1. Place a piece of blank white paper on your desk.
2. Stare at the center of the flag above for 30 seconds. Try not to look away.
3. After 30 seconds, direct your gaze to the piece of paper.
4. Repeat the experiment, but this time, look at a distant wall after you've stared at the flag.

ANALYSIS

1. Describe what you saw when you looked at the piece of paper.
2. Why did you see those colors?
3. How long did the afterimage last when you looked at the piece of paper? at the wall?
4. Compare the size of the afterimage you saw on the paper with the one you saw on the wall. Which was bigger?

Reading Check

Identify Cause and Effect

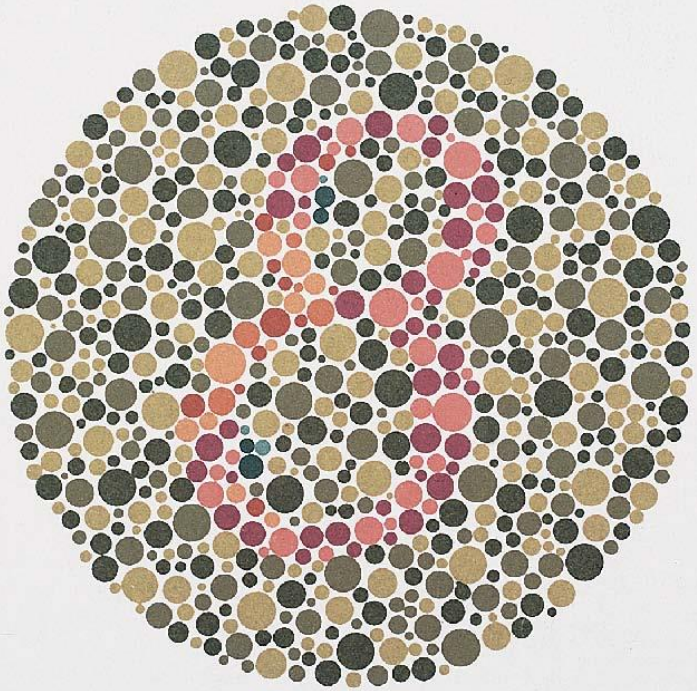
What happens after you look intensely at a single color?

Answer: *The afterimage will appear, and it will be the complementary color, not the color that was focused on.*

Color Blindness

- Normal color vision: when a person can see colors of the visible spectrum
- Color blindness: when people do not have normal color vision due to a malfunction in the cones
- Partial color blindness is common; total color blindness is rare.
- Most people who are color blind have red-green color blindness.
- Color blindness is almost always inherited.
- Males are more likely to inherit color blindness.
- There is no cure for color blindness, but it does not cause any great impairment.

TEST FOR COLOR BLINDNESS



This image resembles a test for color blindness. In the actual test, which would be conducted by a trained professional, a person with normal color vision would see an 8, a person with red-green color blindness would see a 3, and a person with total color blindness would see no number.

Normal vision

Red-Blind/ Protanopia

Green-Blind/ Deuteranopia

Blue-Blind/Tritanopia

Monochromacy/ Achromatopsia

Red-Weak/ Protanomaly

Green-Weak/ Deuteranomaly

Blue-Weak/ Tritanomaly

Simulator: http://www.colblindor.com/coblis-color-blindness-simulator/

Reading Check

Draw Conclusions

What difficulties might a person with red-green color blindness encounter when cooking red meat?

Answer: *unable to detect shades of red, raw, rare, and medium rare meat*

Section 3 at a Glance

Hearing

- The ear allows us to hear and locate sounds, which have their own pitch and loudness.
- Deafness may be inherited or caused by disease, injury, or old age.

Hearing

Main Idea

The ear is the human instrument for sensing sounds. When parts of the ear are damaged, deafness can occur.

Reading Focus

- What two characteristics does every sound have?
- What are the main parts of the ear, and how do they work?
- What are some of the causes of deafness?

PSYCHOLOGY CLOSE UP

Hearing in COLOR

What does color sound like?

Some synesthetes agree that certain sounds always elicit the same color. They tend to see the notes of the harp, for instance, in a golden color.

Sound

- Sound is caused by changes in air pressure that result from vibration.
- Each vibration is called a cycle or a sound wave.
- Every sound has its own pitch and loudness.

Pitch

- The pitch of a sound is how high or low it is.
- Pitch depends on the frequency of sound.
- Frequency is the number of cycles per second.
- The more cycles per second, the higher the pitch of a sound.

Loudness

- Loudness is determined by the height, or amplification, of sound waves.
- The higher the amplification, the louder the sound.
- Loudness is measured in decibels.

Reading Check

Find the Main Idea

How do we hear sound?

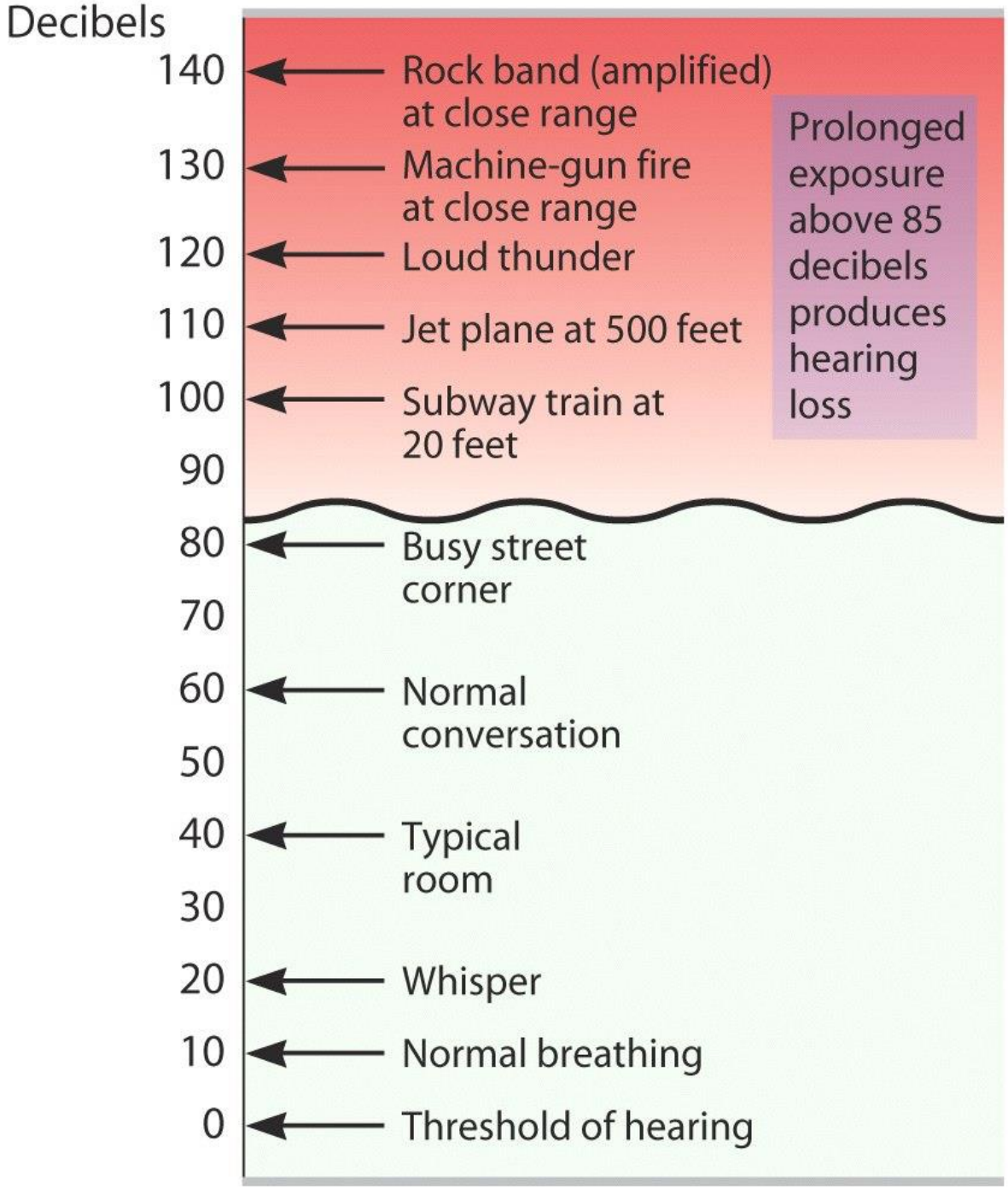
Answer: *changes in air pressure that result from vibration*

DECIBEL RATINGS FOR SOME FAMILIAR SOUNDS

QUICK FACTS

Zero decibel is the threshold for hearing. Prolonged exposure to sounds greater than 85 dB will cause some hearing loss. Sounds of 130 dB can cause immediate hearing loss.

Sound	Pain Level	Decibels
• Jet engine (close) • Shotgun blast	Severe Pain	150 140
• Rock concert • Thunder	Pain Threshold	120 110
• Subway train • Average car	Loud	90 80
• Conversation at 3 feet • Leaves rustling	Moderate	60 40
• 2 people whispering • Watch ticking	Hearing Threshold	20 0


Decibels
140
Rock band (amplified) at close range
130
Machine-gun fire at close range
120
Loud thunder
110
Jet plane at 500 feet
100
Subway train at 20 feet
90
80
Busy street corner
70
60
Normal conversation
50
40
Typical room
30
20
Whisper
10
Normal breathing
0
Threshold of hearing
Prolonged exposure above 85 decibels produces hearing loss

The Ear

The ear is shaped to recognize and capture sound waves. The brain and nervous system actually hear the sounds.

The ear has three parts: the outer ear, the middle ear, and the inner ear.

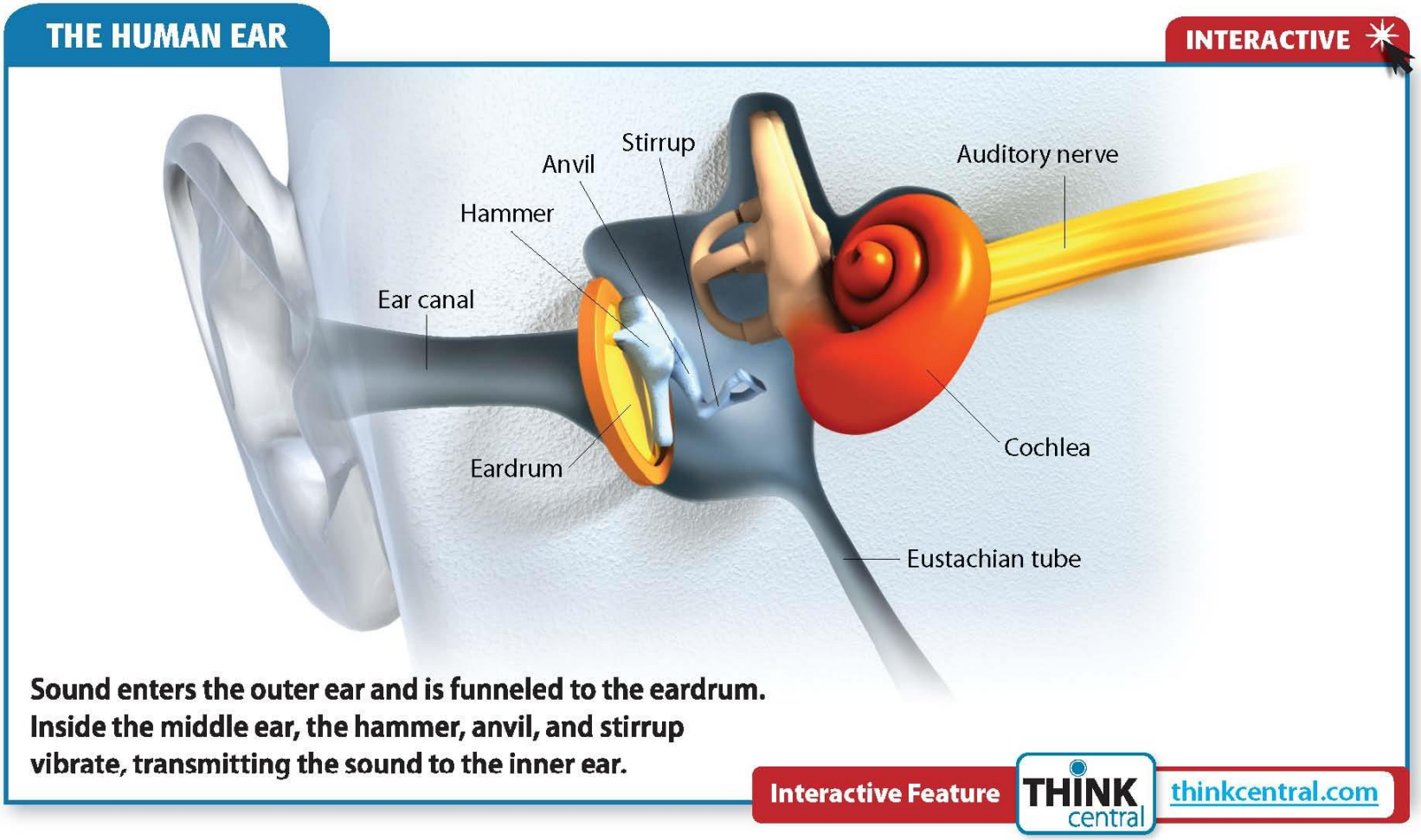
Anatomy

- The eardrum transmits sound to the bones in the middle ear, which then transmit sound to the inner ear.
- The inner ear consists of the **cochlea**. Sound makes the fluid within the cochlea vibrate, sending neuron impulses to the brain via the **auditory nerve**.

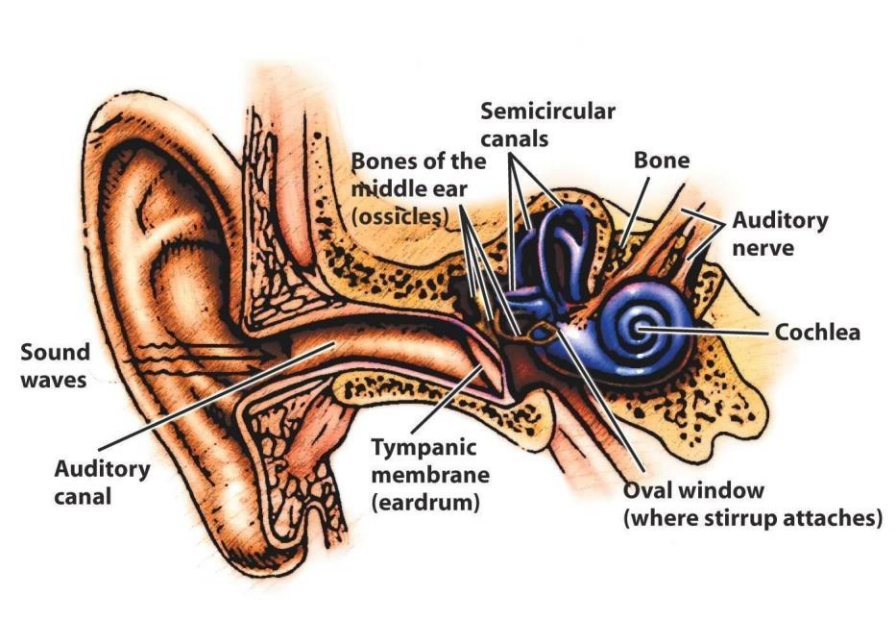
Locating Sound

- We can locate sound by turning the head to increase the sound.
- We use visual cues to locate sound.

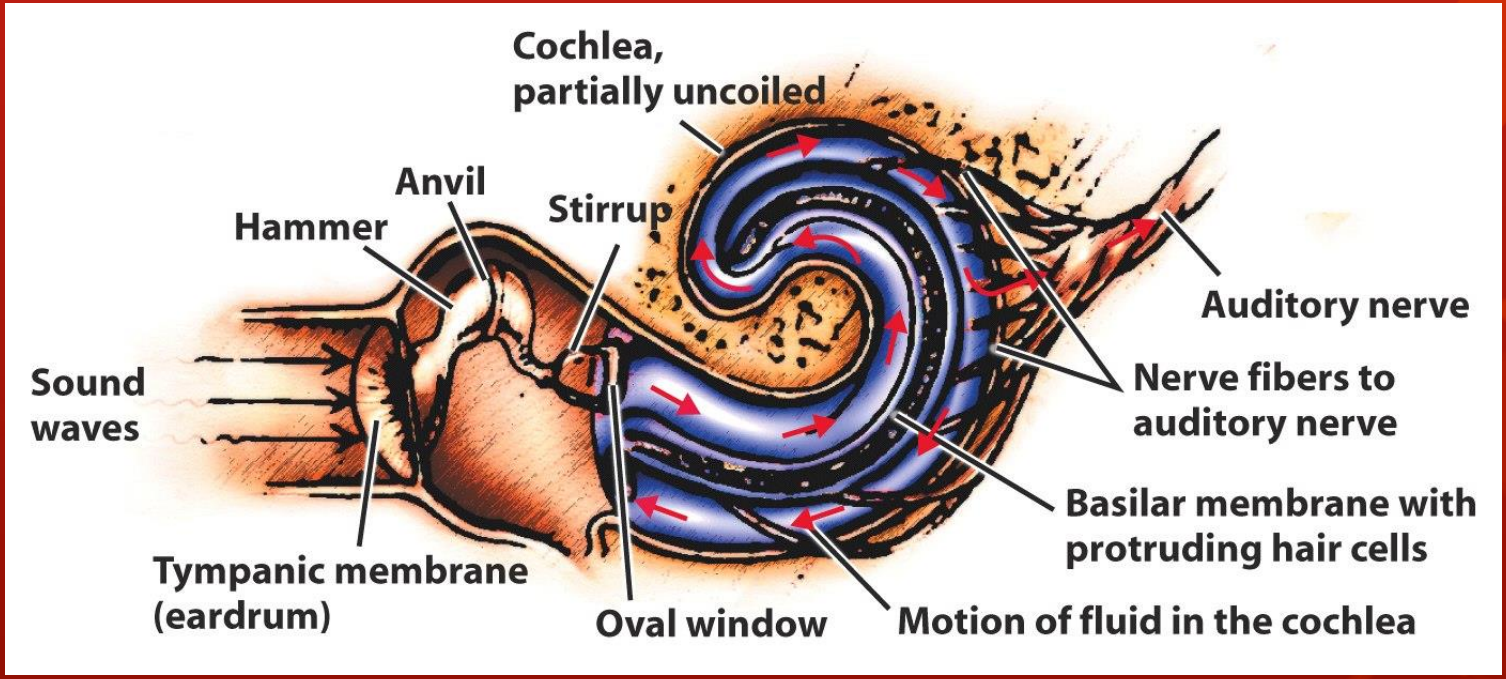
Click on the image to play the Interactive.



Parts of the Ear – Semicircular Canals



Parts of the Ear - Hair Cells



Reading Check

Summarize

How does the cochlea carry sound to the brain?

Answer: *The fluid within the cochlea vibrates, sending neuron impulses to the brain.*

Deafness

Conductive Deafness

- **Conductive deafness** occurs because of damage to the middle ear, which is the part that amplifies sound.
- Hearing aids can provide for the function of the middle ear by amplifying sound.

Sensorineural Deafness

- **Sensorineural deafness** occurs when sounds of certain frequencies are not heard.
- It is usually caused by damage to the inner ear.
- Loud sounds can destroy neurons in the ear.
- Cochlear implants can help people with sensorineural deafness.

Deafness in the World Today

- In recent years, deaf people have been able to come more into the mainstream of sensory experience.
- Some deaf people choose not to enter into the mainstream of sensory experience.
- Society has recently become more sensitive to the needs of deaf people through the use of the following:
  - interpreters
  - more courses in American Sign Language
  - “close captioned” television shows
  - advances in repairing damage inside the ear

Reading Check

Contrast

What are some of the differences between conductive and sensorineural deafness?

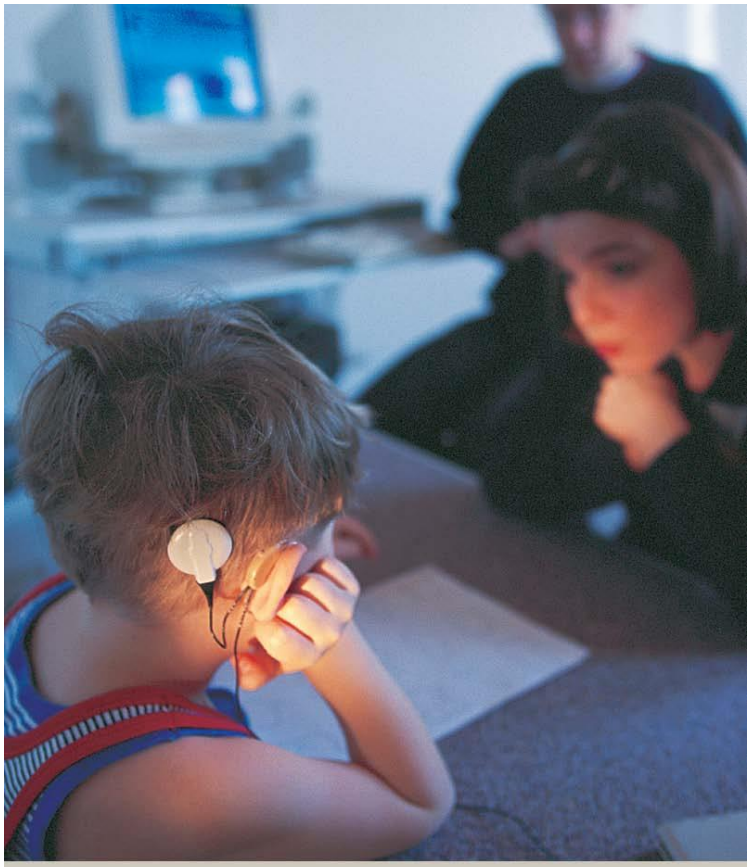
Answer: *Conductive deafness occurs when there is damage to the middle ear and it affects not being about to hear sounds loud enough. Sensorineural deafness occurs with damage to the inner ear and it affects hearing sounds of certain frequencies.*

Current Research in Psychology

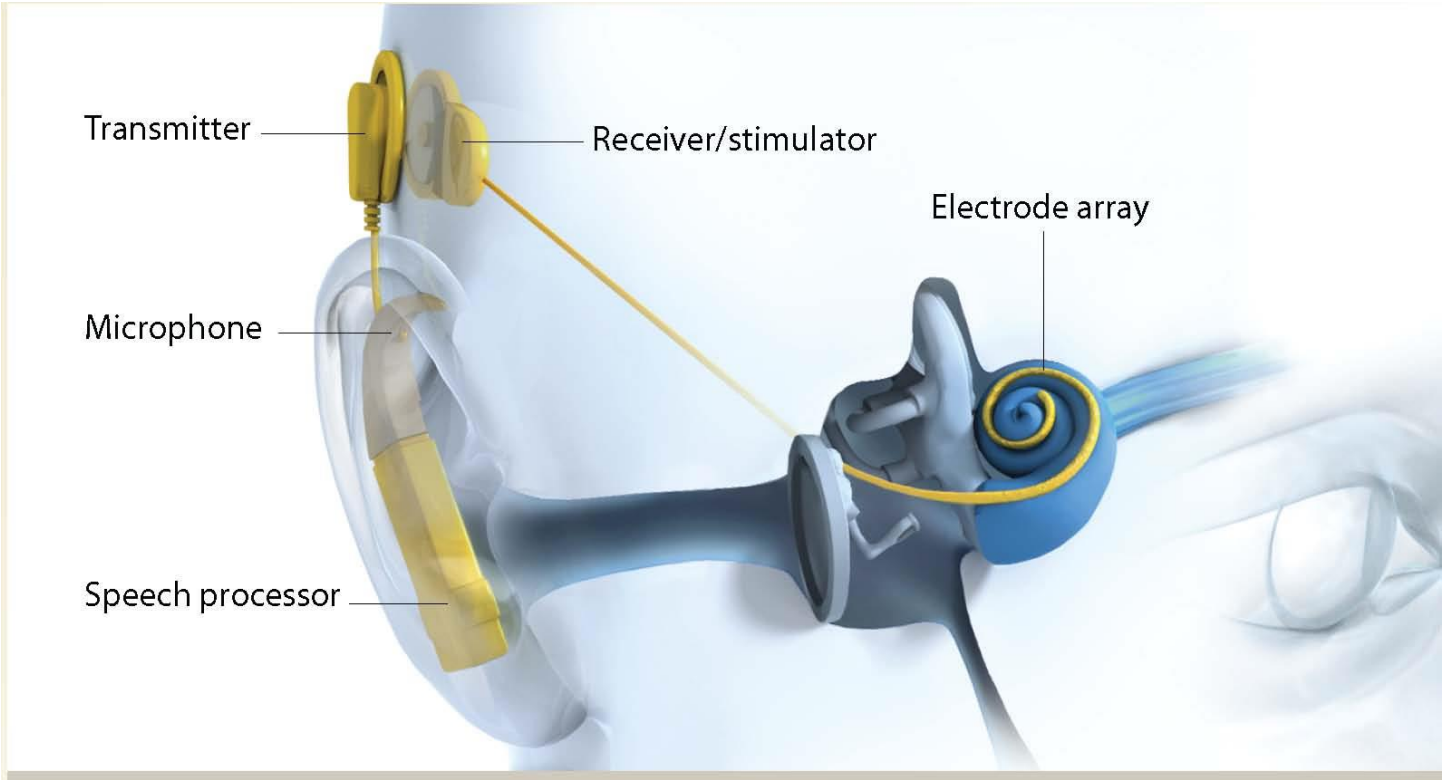
The Bionic Ear

For those who are severely hard of hearing or profoundly deaf, the world is mostly a silent place. But in 1985, when the cochlear implant was approved for testing, the technology held out great hope for the deaf. Since its introduction, however, the device has been a source of controversy and has divided the deaf community.

- A cochlear implant is a small electronic device that is surgically placed behind the ear.
- The device generates signals that the auditory nerve conveys to the brain.
- The recipient must learn how to understand the sounds it transmits.
- Some deaf people questioned the psychological impact of the device on children.
- In recent years, opposition to the implant has decreased.
- The implant has support from many members of the deaf community.



Children who receive an implant during the period when they would normally learn speech and language skills usually hear very well with a cochlear implant.



The microphone, speech processor, and transmitter are placed behind the ear. The receiver/stimulator and electrode array are implanted in the skull and inner ear.

Thinking Critically

- How does a cochlear implant differ from a hearing aid?
- How do you think you would feel about cochlear implants if you were deaf?

Section 4 at a Glance

Other Senses

- We perceive smell and taste by sensing the molecules of certain substances.
- Sensory receptors on our skin allow us to sense pressure, temperature, and pain.
- Body senses help us keep our balance and stand up straight.

Other Senses

Main Idea

In addition to vision and hearing, people possess the senses of smell and taste. We also have skin and body senses.

Reading Focus

- How do people sense smell and taste?
- What are the skin senses?
- What body senses allow us to stand upright and coordinate our movements?

PSYCHOLOGY CLOSE UP

Supertasters

What's on the tip of your tongue?

Imagine how supertasters would react to this. The salty seared tuna topped with strips of seaweed—not to mention the raspberry sauce—would send their taste buds reeling.

Smell and Taste

Smell

- People do not have as strong a sense of smell as many animals do.
- Odors are detected by receptor neurons in the nose.
- The receptors send information about the odors to the brain via the **olfactory nerve**.

Taste

- Most researchers agree on four basic taste qualities: sweet, sour, salty, and bitter.
- We sense taste through receptor neurons located on taste buds on the tongue.
- Taste cells reproduce rapidly.

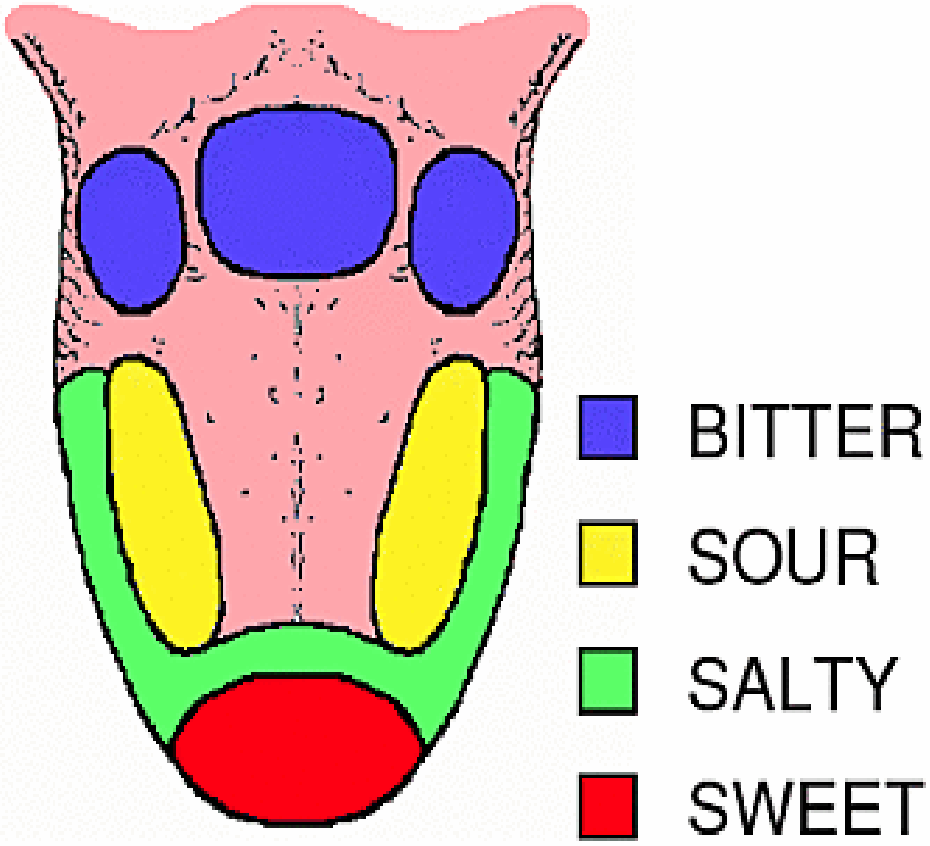
Supertasters

- People with an abundance of taste receptors
- Approximately 25% of the population

Nontasters

- People with a minimum of taste receptors
- Taste with less intensity than the rest of the population
- Approximately 25% of the population

Location of taste



Reading Check

Identify Supporting Details

What are the four basic taste qualities?

Answer: *sweet, salty, sour, and bitter*

The Skin Senses

Pressure

- The body is covered with hairs, some very tiny.
- Sensory receptors in the hair cells fire where the skin is touched.
- Other structures beneath the skin are also sensitive to pressure.
- The sense of pressure undergoes rapid adaptation.

Temperature

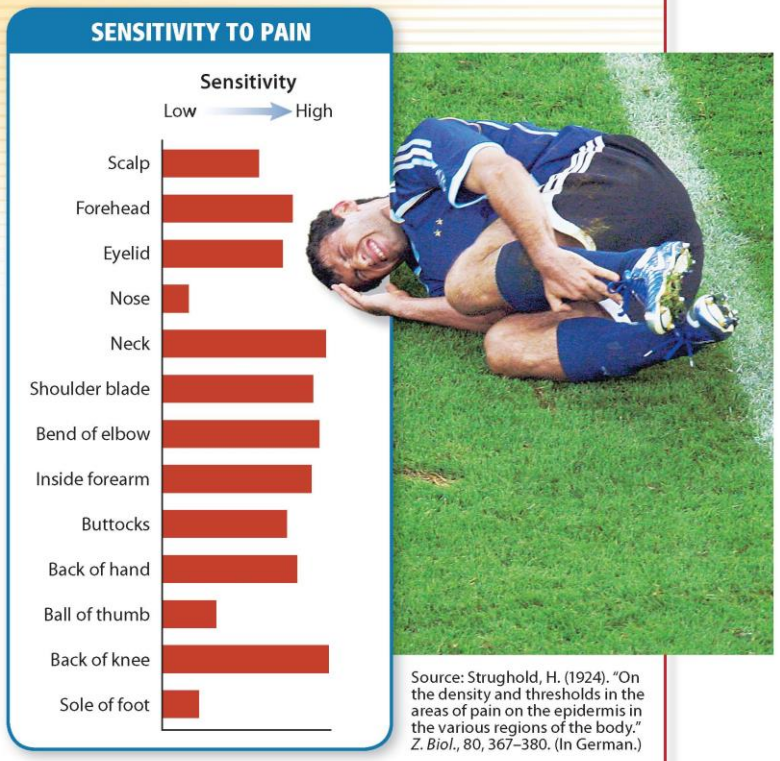
- Sensations of temperature are relative.
- Neurons beneath the skin's surface are receptors for temperature.
- As with the sense of pressure, people adapt rapidly to the sense of temperature.

Pain

- The more pain receptors located in a particular area, the more sensitive that area is.
- Pain moves from the point of contact to the spinal cord and then to the thalamus in the brain.
- It is then projected to the cerebral cortex, where the person registers the location and severity of the pain.
- Chemicals called prostaglandins help transmit pain messages to the brain.
- The **gate theory** of pain suggests that only a certain amount of information can be processed by the nervous system at a time. Rubbing or scratching an injured area transmits sensations to the brain that compete with the pain messages. This can have the effect of relieving pain.

Statistically Speaking...

Pain Distribution Our ability to experience pain helps protect us from further injury. As this graph shows, however, some parts of the body are more sensitive to pressure and pain than others.



Source: Strughold, H. (1924). "On the density and thresholds in the areas of pain on the epidermis in the various regions of the body." *Z. Biol.*, 80, 367–380. (In German.)

Skills Focus **INTERPRETING GRAPHS** Which part of the body is most sensitive to pain? Which is least sensitive?

Reading Check

Summarize

How do our bodies deal with changing pressure and temperature?

Answer: *After a while, our bodies adapt to changes in temperature and pressure.*

Body Senses

The Vestibular Sense

- **Vestibular sense** tells you whether you are physically upright without having to use your eyes.
- It works via sensory organs in the ear that monitor the body's motion and position in relation to gravity.

Kinesthesis

- **Kinesthesis** is the sense that informs people about the position and motion of their bodies.
- It works via sensory organs in the joints, tendons, and muscles that send information to the brain.

Reading Check

Draw Conclusions

What prevents you from falling over when you stand up?

Answer: *vestibular sense and kinesthesis*

Section 5 at a Glance

Perception

- Perception allows us to organize and make sense of our sensory impressions.
- Cues help people perceive movement and motion and judge depth and perspective.
- The brain can trick the eye through visual illusions.

Perception

Main Idea

Perception is the way in which we organize our sensory impressions. Movement, depth, and constancy are some of the ways in which we make sense of these impressions.

Reading Focus

- What are the main rules of perceptual organization?
- How is movement perceived?
- What cues do we use for depth perception?
- What are perceptual constancies?
- Why do we see visual illusions?

PSYCHOLOGY CLOSE UP

Depth

Misperception

How do you feel when you look down?

Rules of Perceptual Organization

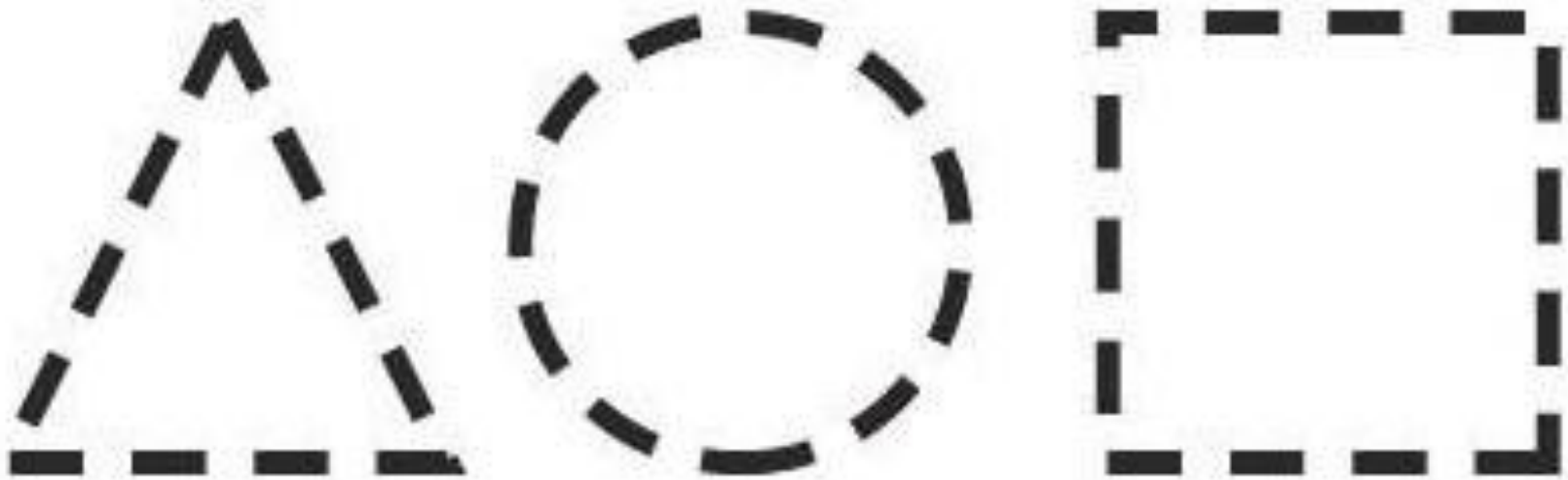
Closure

- **Closure** is the tendency to perceive a complete or whole figure even when there are gaps in what your senses tell you.
- It works when you try to fit pieces of information into a familiar pattern.

Figure-Ground Perception

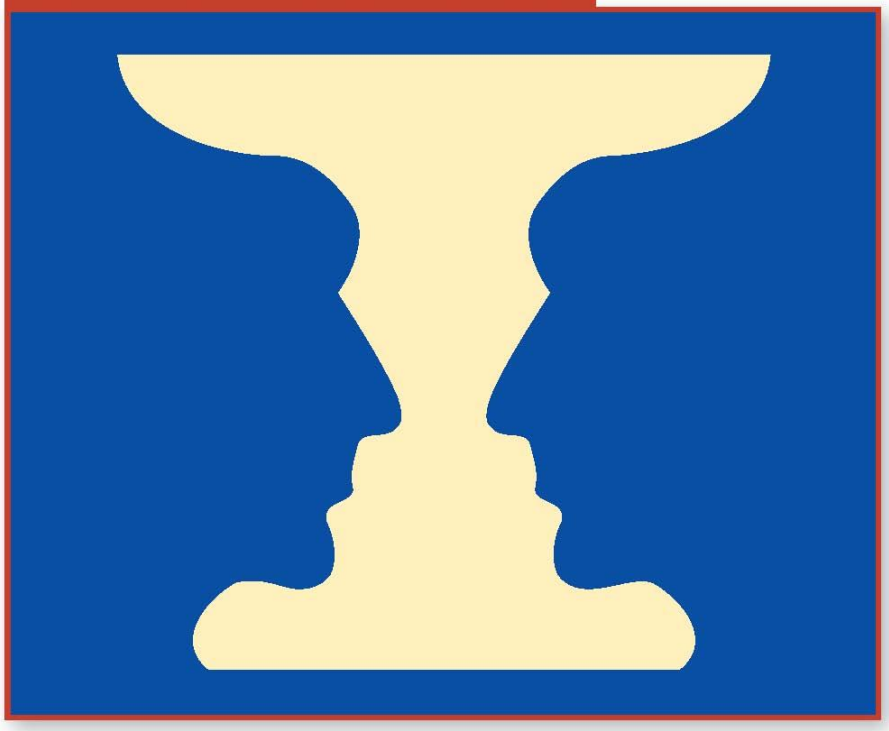
- Figure-ground perception is the perception of figures against a background.

CLOSURE



Closure

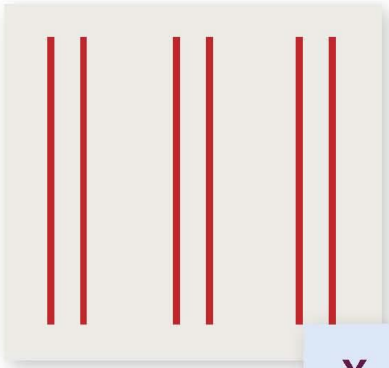
FIGURE-GROUND PERCEPTION



Other Rules of Organization

- **Proximity** is the nearness of objects or figures to each other.
- The law of **similarity** says that people think of similar objects as belonging together.
- The law of **continuity** says that people usually prefer to see smooth, continuous patterns rather than disrupted ones.
- The law of **common fate** says that people assume things have the same purpose when they are part of the same group.

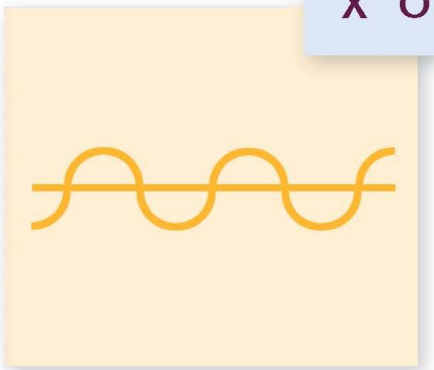
OTHER RULES OF ORGANIZATION



A. Proximity

B. Similarity

X O X O X O
X O X O X O
X O X O X O
X O X O X O
X O X O X O



C. Continuity

Reading Check

Find the Main Idea

What principle did psychologists apply when they developed the rules of perceptual organization?

Answer: *The whole is more than the sum of its parts.*

Movement

Perception of Movement

- To sense movement, humans need to see an object change its position relative to other objects.

Stroboscopic Motion

- In **stroboscopic motion,** the illusion of movement is produced by showing the rapid progression of images or objects that are not moving.
- Movies are an example of stroboscopic motion.

Reading Check

Summarize

How does the law of continuity affect stroboscopic motion?

Answer: *Perception smoothes over the interruptions and fills in the gaps.*

Depth Perception

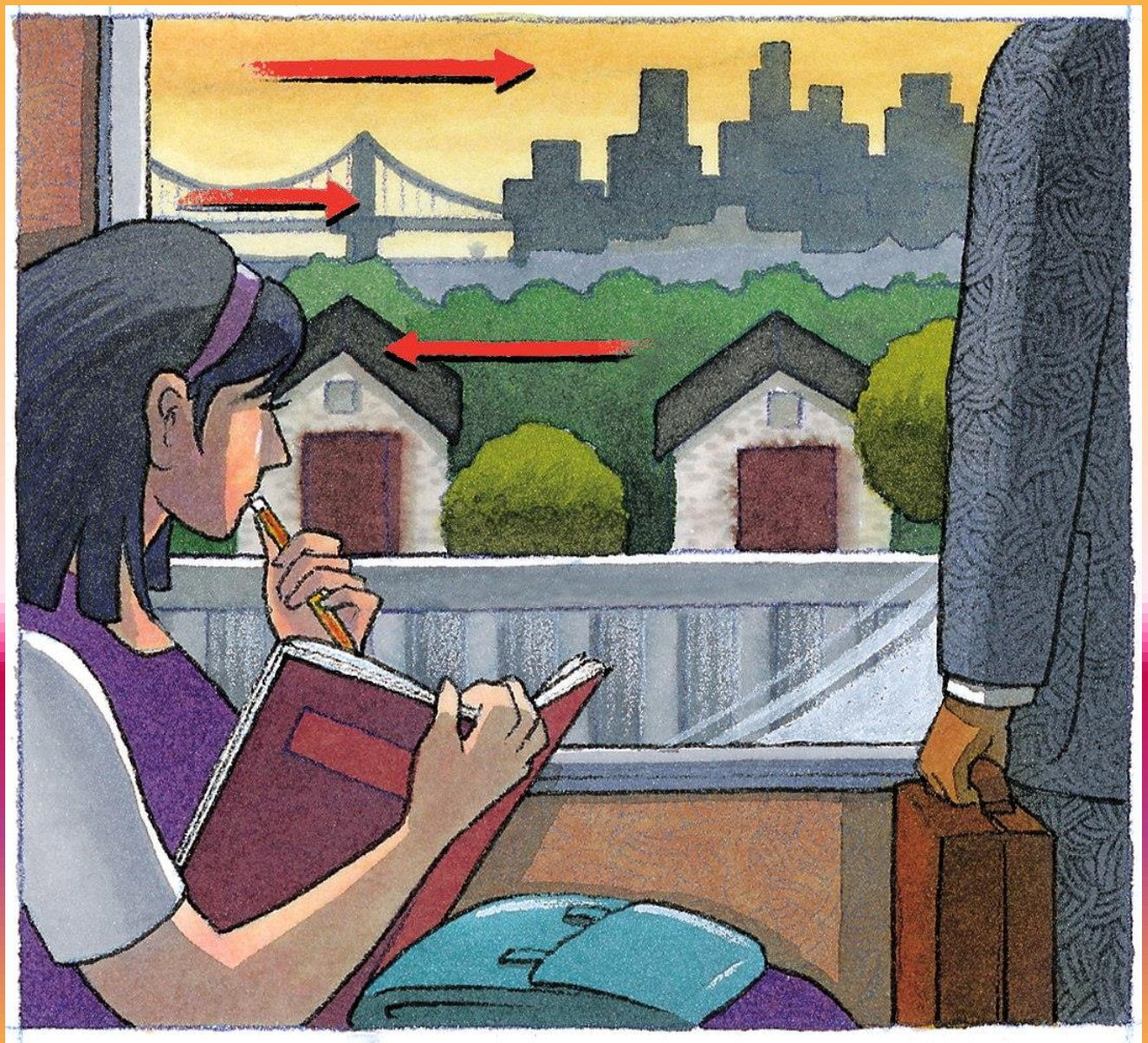
Monocular Cues for Depth

- **Monocular cues** need only one eye to be perceived.
- Monocular cues include perspective, clearness, overlap, shadow, and texture gradient.
- The most complex monocular cue is motion parallax.
- Motion parallax is the tendency of objects to seem to move forward or backward depending on how far away they are from the viewer.

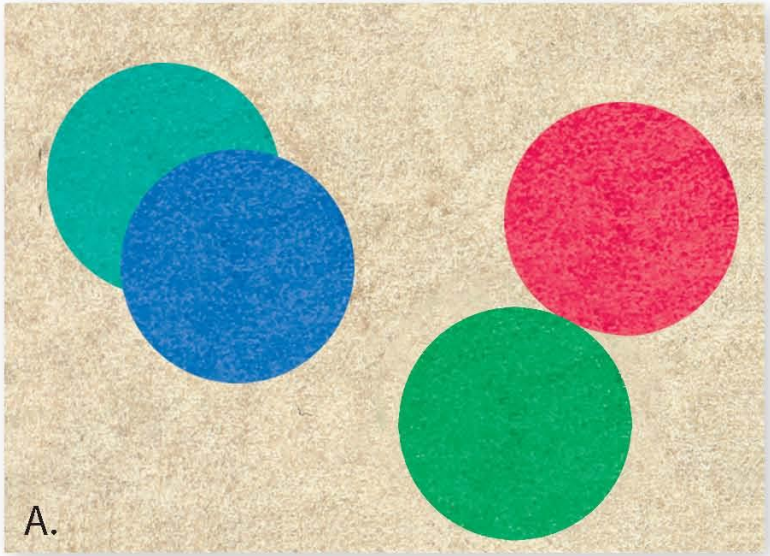
Binocular Cues for Depth

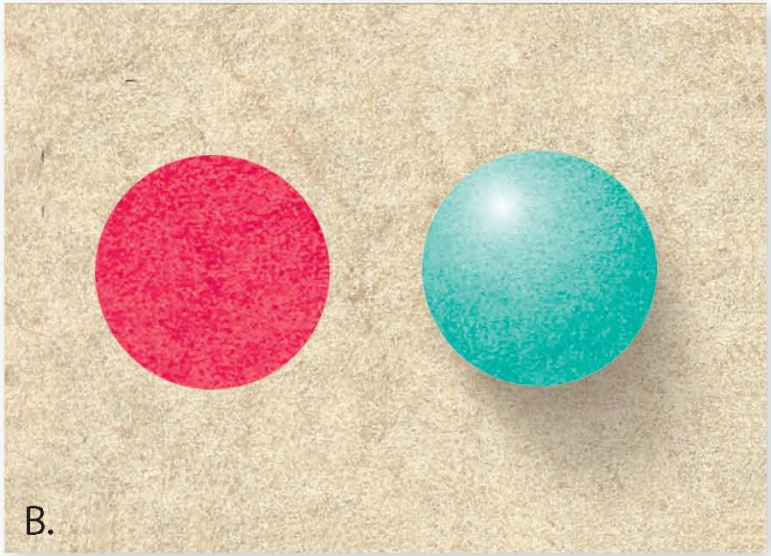
- **Binocular cues** require both eyes to be perceived.
- **Retinal disparity** is a binocular cue for perceiving depth based on the difference between the two images of an object that the retina receives as the object moves closer.
- Convergence is a binocular cue associated with feelings of tension in the eye muscles.

Relative Motion



MONOCULAR CUES FOR DEPTH





Reading Check

Contrast

What is the difference between monocular and binocular cues?

Answer: *Monocular cues need only one eye to be perceived. Binocular cues require both eyes for perception.*

Perceptual Constancies

Size Constancy

- The tendency to perceive an object as being of one size no matter how far away the object is.
- Learned through experience

Color Constancy

- The tendency to perceive objects as keeping their color even though different light might change the appearance of their color.
- Learned through experience

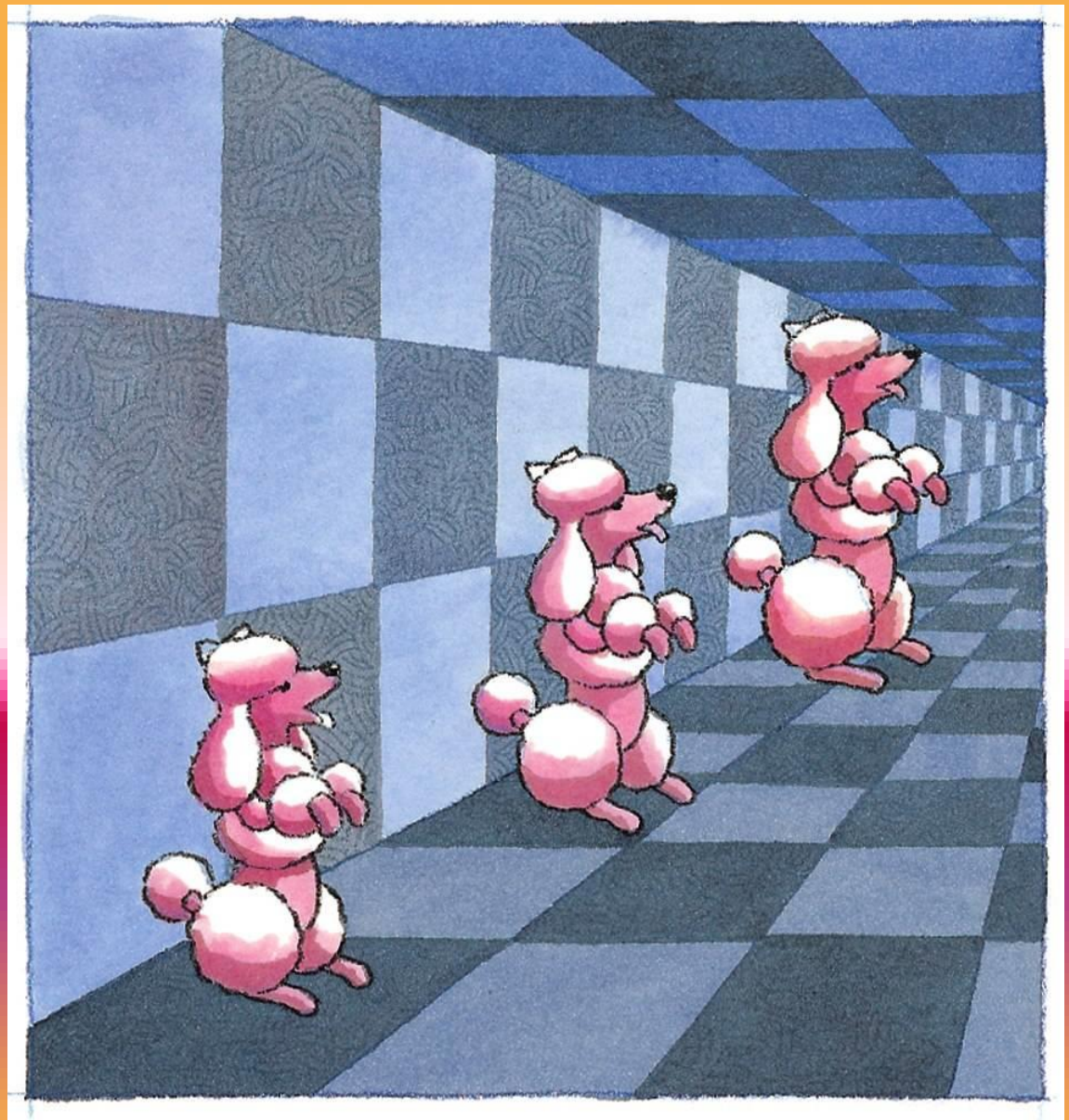
Shape Constancy

- The knowledge that an item has only one shape no matter what angle you view it from.
- Learned through experience

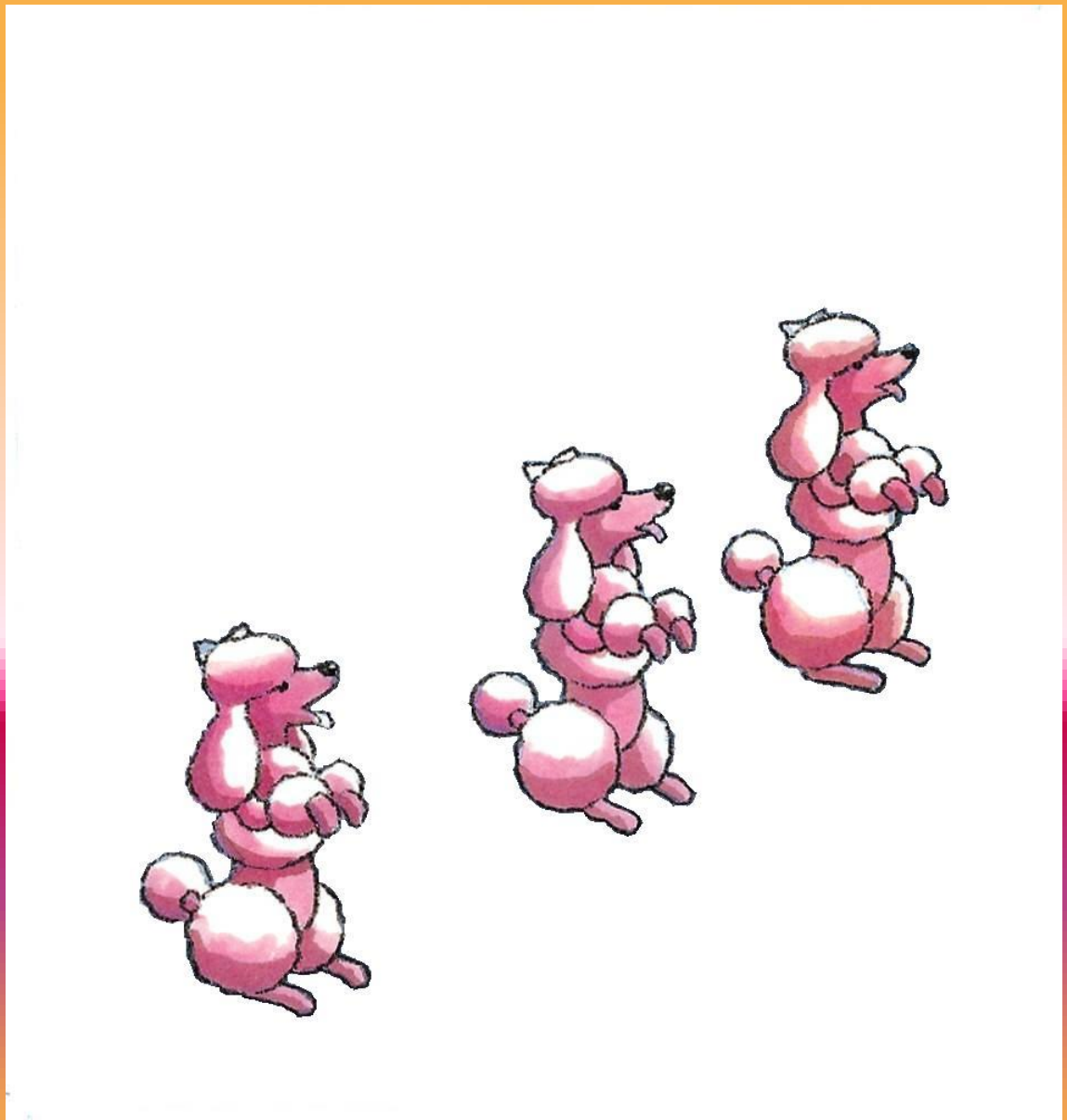
Brightness Constancy

- The tendency to perceive an object as being equally bright even when the intensity of the light around it changes.
- Learned through experience

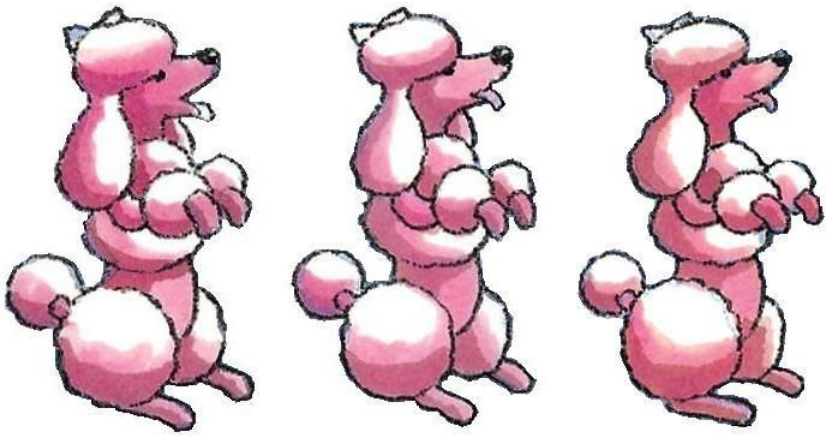
Size Distance Relationship



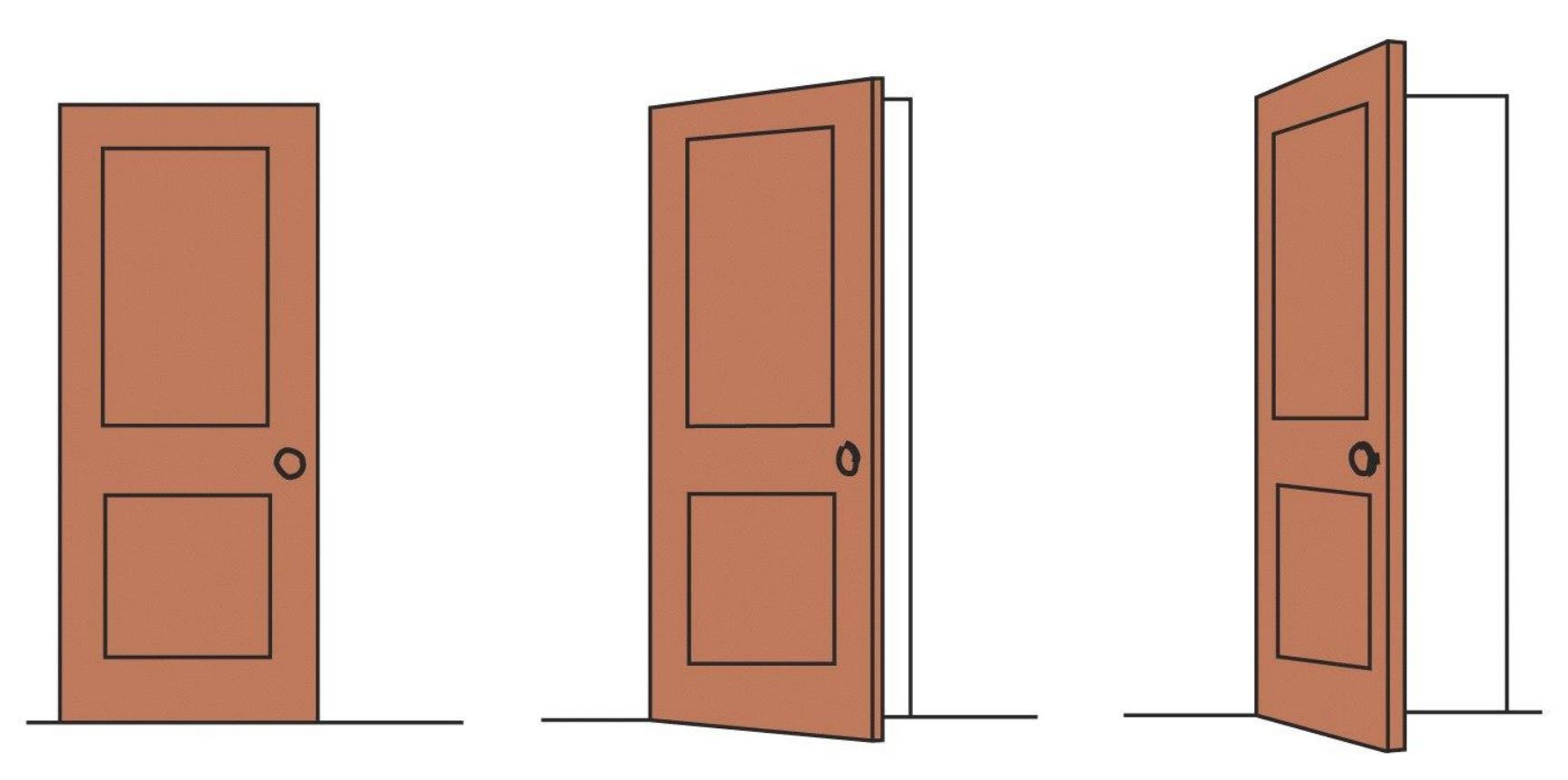
Size Distance Relationship



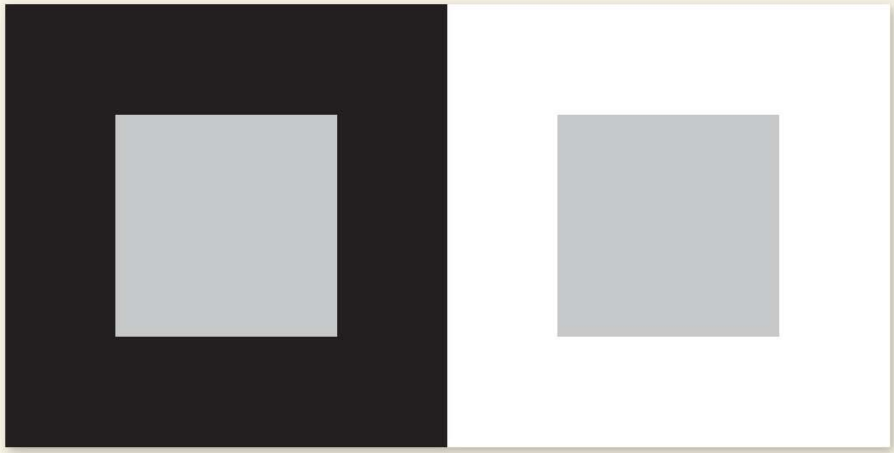
Size Distance Relationship



Shape Constancy



BRIGHTNESS CONSTANCY



Reading Check

Identify Supporting Details

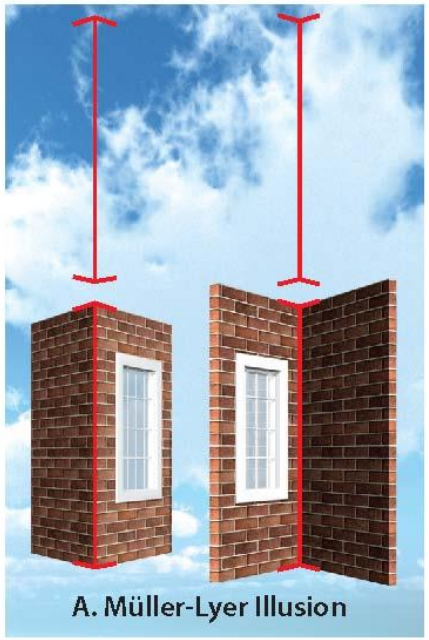
How do people develop perceptual constancies?

Answer: *Each person's experience creates perceptual constancies.*

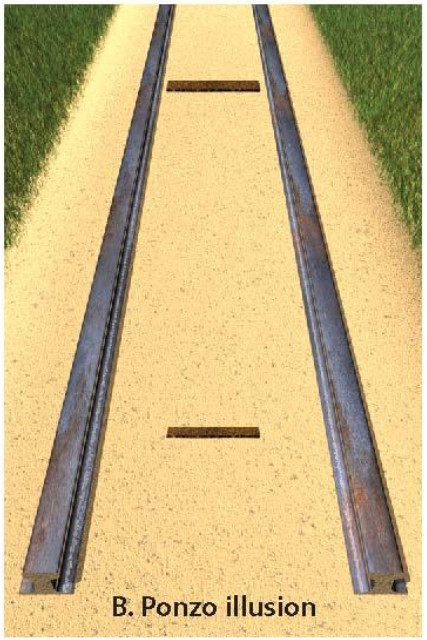
Visual Illusions

- The brain's use of perceptual constancies can trick the eye through visual illusions.
- Two visual illusions used by psychologists are:
  - Müller-Lyer illusion
  - Ponzo illusion

VISUAL ILLUSIONS



A. Müller-Lyer Illusion



B. Ponzo illusion

Reading Check

Make Generalizations

How does culture influence our perception of visual illusion?

Answer: *Visual illusions are based on experience; culture affects one's experience.*

Lab: Applying What You've Learned

Sensory Thresholds and Perceptual Organization

What sensory impressions do you receive—and which ones do you filter out?

1. Introduction

- You will work with a group to record the sensations you perceive in a normal setting.
- You will discuss your experiences with your group members.
- You will take part in a class discussion in which you compare the results of the lab.

2. Record and Illustrate

- A sensory recorder will record the sensations he or she feels during the lab.
- Illustrators will draw pictures that demonstrate some rules of perceptual organization.

Lab (con't.)

3. Group Discussion

- After completing the lab, discuss your experiences with your group.
- Share your illustrations.
- Have the sensory recorder read what he or she recorded.
- Have the sensory recorder relate what he or she experienced.
- Have the illustrators relate what they experienced.

4. Class Discussion

- As a class, have each group take turns presenting their illustrations and recordings.
- Have a class discussion about the lab, answering the questions in your textbook.

Which rule of perceptual organization do these drawings illustrate? How do you know that the people in each drawing are the same height?