

**“Thus the same object may supply a practical perception to one person and a speculative one to another, or the same person may perceive it partly practically and partly speculatively.**

Samuel Alexander, Austrian Philosopher, 1859-1938

**“People don't use their eyes. They never see a bird, they see a sparrow. They never see a tree, they see a birch. They see concepts.”**

Joyce Cary, English Novelist, 1888-1957

**Notes on Sensation and Perception – Chapter 3**

*Essential Questions:*

- How do the 5 senses receive and translate signals to the brain for processing?
- How does each of the senses affect behavior?
- What are the limitations of each sense and how do those limitations affect behavior?
- How do sensation and perception differ?
- How does the brain process sensory signal accurately? Inaccurately?

*Unit Objectives:*

- Determine the significance of signal detection theory in modern psychology.
- Identify the major components of the visual system and the function of each.
- Identify the major components of the auditory system and the function of each.
- Identify the four basic tastes.
- Discuss the differences among the senses of taste, smell, and flavor.
- Identify the two body senses and contrast one with the other.
- Identify the views of the Gestalt psychologists related to perceptual phenomena.
- Understand how depth perception influences behavior.
- Appreciate the effect of constancy and context on daily life.
- Analyze the effect of perceptual set on everyday sensory experience.

**I. Sensation**

- A. *Sensation* is the process in which sense organs’ receptor cells are stimulated and relay initial information to brain centers for further processing
1. Psychophysics, founded by *Gustav Fechner*, is the study of the relationship between physical stimuli and people’s conscious experiences of them.
  2. Sensory thresholds
    - a. *Absolute threshold* – the smallest amount of given stimuli a person detect with their senses (minimal amount of stimulus that we can detect about 50% of the time)
      1. Problems with psychophysics:
        - a. impossible to quantify if something is sour
        - b. Fechner argued that we can only make relative comparisons [is one stimulus more sour or louder than another?]
        - c. Led to the study of difference thresholds
      2. *subliminal* – sensory stimuli below absolute threshold

Sense	Stimulus	Receptors	Absolute Threshold
Vision	Light energy	Rods and cones in the eye	The flame from a single candle flickering about 30 miles away on a dark, clear night
Hearing	Sound waves	Hair cells in the inner ear	The ticking of a watch placed about twenty feet away from the listener in a quiet room
Taste	Chemical substances that contact the tongue	Taste buds on the tongue	About one teaspoon of sugar dissolved in two gallons of water

Smell	Chemical substances that enter the nose	Receptor cells in the upper nostrils	About one drop of perfume dispersed in a small house
Touch	Movement of, or pressure on, the skin	Nerve endings in the skin	The wing of a bee falling on the cheek from about one centimeter away

3. Difference threshold (or just-noticeable difference/JND) – the smallest amount of change needed in a stimulus before we detect a change
  - a. Ernst Weber and Weber’s Law –
    1. the amount of change necessary for an observer to report more than 50% of the time that the stimulus has changed or is different
    2. the change needed is proportional to the original intensity of the stimulus
    3. ex. – you might notice a change if someone adds a small amount of cayenne pepper to a dish that is normally not very spicy, but you would have to add much more hot pepper to five-alarm-chili before anyone would notice a difference
    4. Weber noticed that senses vary to a constant

<u>Sensation</u>	<u>Weber’s Constant</u> (approx)
Saltiness of food	1/5
Pressure on skin	1/7
Loudness of sounds	1/10
Odor	1/20
Heaviness of weights	1/50
Brightness of lights	1/60
Pitch of sounds	1/333

4. Signal Detection theory –
  - a. investigates the effects of distractions and interference as we perceive the world
  - b. the belief that the ability to detect a signal varies with the characteristics of the perceiver (motivation, experiences, expectations), the background, and the stimulus itself (intensity).
    1. response criteria –
      - a. how motivated we are to detect certain stimuli and what we expect to perceive
      - b. ex. – a quarterback looking down field for an open receiver with a lineman rushing on a blitz
    2. false positive –
      - a. is when we think we perceive a stimulus that is not there
      - b. you may think that you see your friend on a crowded street and end up waving at a total stranger

<b>TABLE 4.2 THE FOUR POSSIBLE OUTCOMES OF THE DETECTION EXPERIMENT</b>		
	<b>STIMULUS PRESENT</b>	<b>STIMULUS ABSENT</b>
<b>RESPONDS YES</b>	<b>Hit</b>	<b>False alarm</b>
<b>RESPONDS NO</b>	<b>Miss</b>	<b>Correct negative</b>

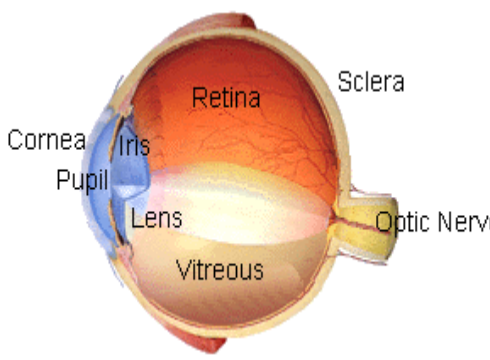
Table 4-2 Psychology 7/e  
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5. Sensory Adaptation –

- a. the process by which sensory systems adapt to constant stimuli by becoming less sensitive to them (ex. The smell of perfume)
- b. “getting used to it”

B. *Visual System* –

1. vision is the dominant sense in human beings
2. *Structure of the eye:*

	<u>Structure</u>	<u>Purpose</u>
	Cornea	A transparent covering on the eye’s surface
	Iris	The pigmented, circular muscle in the eye that regulates the size of the pupil to adjust to changes in the level of illumination
	Pupil	The black opening inside the iris that allows for light to enter the eye (dilate)
	Lens	The structure in the eye that focuses light rays on the retina
	Retina	The light-sensitive layer of the inner surface of the eye that contains photoreceptors
	Fovea	Near the center of the retina where only cones (most cones are found here) are stored, (center focus for clearest and most colorful vision)
	Photo-receptors	Light-sensitive receptors (cones and rods) in the eye upon which light registers
	Rods	Photoreceptors that are sensitive only to the intensity of light (light and dark, peripheral vision)
	Cones	Photoreceptors that are sensitive only to color
	Bipolar cells	A layer of interconnecting cells in the eye that connect photoreceptors to ganglion cells
	Ganglion cells	Nerve cells in the back of the eye that transmit neural impulses in response to light stimulation, the axons of which make up the optic nerve
	Optic nerve	The nerve that carries neural impulses generated by light stimulation from the eye to the brain
	Blind spot	The area in the retina where the optic nerve leaves the eye and that contains no photoreceptor cells
	Accommodation	The eye’s ability to change focus from far to near
	Presbyopia	Accommodation disorder as people get older
	Myopia	Nearsightedness (perception of objects is better nearer)
	Hyperopia	Farsightedness (perception of objects is better farther)

3. How do we see?

a. Step One: Gathering the Light

1. Light is reflected off objects and gathered by the eye
2. The color we see depends on two factors: intensity of light (brightness) and the energy light contains (light wavelength or hue)
  - a. From shortest to longest wavelength – violet, indigo, blue, green, yellow, orange, and red

- b. Step Two: Inside the Eye
    1. Reflected light first enters through the cornea which also helps to focus the light
    2. Light then goes through the pupil that is like a shutter on a camera. The muscles that control the pupil (iris) open (or dilate) to let more light in or smaller to let less light in
    3. Light that enters the pupil is then focused by the lens as an inverted image onto the retina (like a screen on the back of the eye). In the retina, specialized neurons are activated by different wavelengths of light
  - c. Step Three: Transduction
    1. the first cells activated in the retina are the cones (color) and rods (black and white – brightness) Rods outnumber cones 20 to 1
    2. peripheral vision – relies on mostly rods (people have a tough time with color in their peripheral vision)
    3. If enough cones and rods fire, they activate the next layer of bipolar cells
    4. If enough bipolar cells fire, they activate the ganglion cells which make up the optic nerve
      - a. The ganglion cells then translate the incoming stimuli into neural signals
  - d. Step Four: The Brain
    1. this is where some believe sensation ends and perception begins
    2. the optic nerve sends neural signals to the lateral geniculate nucleus of the thalamus
    3. from the thalamus, messages are sent to the visual cortex (mostly the occipital lobe)
    4. *Feature detectors* – specialized neurons in the visual cortex part of the brain that receive and responded only to particular features of visual stimuli, such as horizontal or vertical line, edges, angles, and movement. They perform an incredible amount of fine processing and each is so specialized that it only fired for one type of visual stimuli
      - a. *Hubel and Wiesel*
      - b. Won the Nobel Prize for their study that showed the existence of feature detectors
      - c. The study took cats (with tiny electrodes implanted in their visual cortex) were shown a line with a particular orientation – horizontal, vertical, or diagonal and what we see in a combination of these features
      - d. Hubel and Wiesel flashed different visual stimuli on a screen within the cat's field of vision and observed which cells fired in response to what stimuli.
      - e. Hubel and Wiesel opened a door to individual feature detectors and others have built on this knowledge to look at how neurons work together so we do not see just lines but meaningful patterns
      - f. Well-developed “super cells” – in some people feature detectors process information more quickly [for example, some soccer players have quicker processing feature detectors than others players and can process visual information about movements, positions, and angles of shots very quickly]
4. *Parallel Processing* –
- a. our brains engage in several things at once and we construct our perceptions by integrating the work of different visual “teams” working at once such as color, motion, form, and depth.
  - b. when one of these “teams” is not working properly, it can lead to peculiar visual disabilities
    1. An artist suffers a concussion at age 65 and no longer perceived color, only shades of gray. Tomatoes look black and flowers are an assortment of grays. Over time his vivid imagination of color is now gone.
    2. Mrs. M. having had a stroke near the rear part of both sides of her brain can no longer perceive movement. People in a room “suddenly appear here or there but I have not seen them moving.” She adds that it is difficult to complete daily tasks like

pouring tea because the fluid appears frozen and she cannot perceive the rising in the cup.

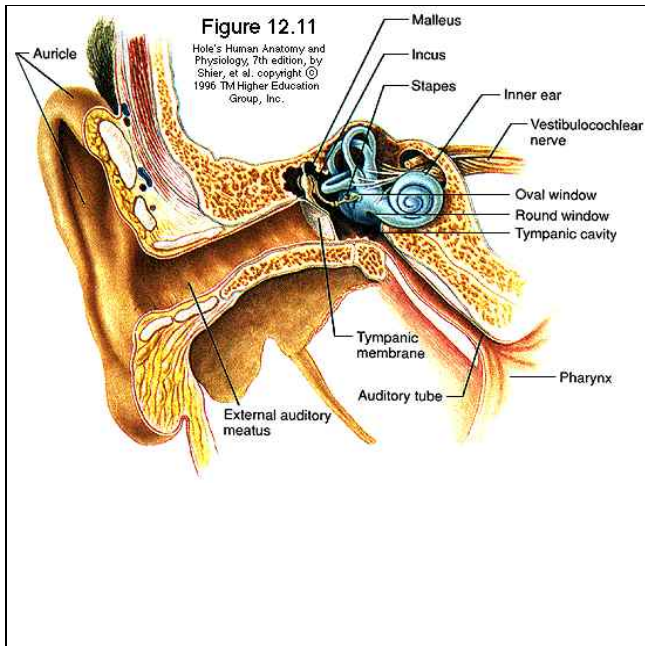
5. *Color Vision* –

- a. *Hue* – psychological property of light referred to as color, determined by the wavelengths of refracted light
- b. *Brightness* – the lightness or darkness of reflected light
- c. *Color Blindness*
  1. *Trichromats* – individuals who perceive all three primary colors
  2. *Monochromats* - individuals who perceive only one color (black cones)
  3. *Dichromats* - individuals who perceive only two of the three primary colors
- d. *Theories of color vision*
  1. Trichromatic Theory (Young-Helmholtz) –
    - a. There are three types of cones in the retina – red-sensitive, green-sensitive, and blue-sensitive. These roughly correspond to short, medium, and long waves of light, and the cells primarily respond to these types of light waves. Any other wavelength will trigger a combination reaction (so purple triggers a mixture of red and blue cones.
    - b. Problems with the explanation - does not account for afterimage and green-red color blindness.
  2. Opponent-Process Theory (Ewald Hering)-
    - a. A theory of color vision that holds that the experience of color results from opposing processes involving two sets of color receptors, red-green and blue-yellow receptors, and that another set of opposing receptors, black-white, is responsible for detecting differences in brightness.
    - b. The opponent process theory proposes that cones work in pairs and these pairs work in opposition to each other. Seeing blue light generates a response from the blue members of the pairs but none from the yellow members. Other colors stimulate combinations across pairs (purple stimulates the red in the red-green pairs and the blue in the blue-yellow pairs.
    - c. Afterimage effect –
      - i. when a person stares at a green square for a while and then looks at a white piece of paper, a person will see red which is green's opponent color. Stare at a yellow square and you will later see its opponent color blue on the white piece of paper.
      - ii. Hering surmised that there were two additional color processes, one responsible for red v. green perception and one for yellow v. blue
      - iii. Hering was very interested in this because a color blind person (green/red) could still see yellow which is a combination of green and red
  3. Integrated Theory –
    - a. A theory that states both the trichromatic and opponent process theories work together at different stages of visual processing. The trichromatic approach is thought to apply to additional processing that occurs in the ganglion cells, using information from the red, blue, and green cones. Opponent processing may occur not in the retina itself but in the thalamus and occipital lobes.

C. *Auditory System* –

1. *Sound* – the psychological experience that occurs when changes in air pressure (waves) stimulate the receptive organ for hearing (measured in decibels)
2. *Amplitude* – is the height of the wave and determines the loudness of the sound
3. *Frequency* – the number of complete waves and determines pitch
  - a. *Pitch* – the highness or lowness of a sound that corresponds to the frequency of the sound wave

4. Structure of the ear –



Structure	Purpose
Outer ear	Gathers sound
Auditory canal	Focuses sound
Tympanic membrane	Also known as the ear drum, separates the outer ear from the inner ear and vibrates to auditory stimuli to transmit vibrations to the inner ear
Ossicles (little bones)	Three tiny bones in the ear which vibrates and transmits sound from the ear drum
Oval Window	Thin membrane like the tympanic membrane which connects the stirrup to the semicircular canals
Semicircular canals	Connect the oval window to the cochlea
Cochlea	Fluid filled structure that contains the basilar membrane in which hairs act as auditory receptors
Auditory nerve	Nerve that carries electrical impulses from the ear to the brain
Estuaction tube	Connection to the nose and throat

5. How do we hear?

- a. Sound waves are collected by your outer ear and sound waves travel down the auditory canal until they reach the eardrum or tympanic membrane
- b. Sound waves make the tympanic membrane vibrate and moves sound from the outer ear into the middle ear
- c. The ossicles (hammer, anvil, and stirrup) which are attached to the tympanic membrane transmit the sound waves to the oval window
- d. Once the oval window begins to vibrate and thus making the cochlea vibrate, the fluid in the cochlea activates neurons in the basilar membrane which begins the process of transduction
- e. The auditory nerve transmits the neural message to the thalamus which sends messages to the auditory cortex located in the temporal lobe

6. Theories of hearing –

- a. Place theory – that analysis of sound occurs in the basilar membrane (in the cochlea), with different frequencies and intensities affecting different parts or places of the membrane
- b. Frequency theory – analysis of the pitch and intensity occurs at higher centers (levels) of processing, perhaps in the auditory area of the cortex and that the basilar membrane only transfers the information
  1. *volley theory* relates the experience of pitch to the alternating firing of groups of neurons along the basilar membrane

7. Sound localization –

- a. *Interaural time difference* – a sound heard on a person’s left will reach their left ear faster so a person can easily direct themselves to the sound
- b. *Interaural intensity difference* – a sound heard on a person’s left will be perceived as slightly more intense by the left ear
- c. These two differences will be interpreted (with the help of visual cues) to determine where a sound is coming from

8. Hearing impairments –

- a. *Conduction deafness* – which is deafness resulting from interference with the transmission of sound to the neural mechanism of the inner ear.

- b. *Sensorineural deafness, (or nerve deafness)* – which is deafness resulting from damage to the cochlea, auditory nerve, or higher auditory processing (such as the cortex).

D. *Taste* –

1. A chemical sense where when food is placed in the mouth it is broken down by saliva that releases chemicals that stimulate the taste buds. When a substance comes into contact, a person experiences taste.
2. Taste buds: sweet, sour, salty, and bitter
3. How do things taste so different with only four taste buds?
  - a. Sight
  - b. Smell
  - c. Past experiences
  - d. Genetics
  - e. Number of taste buds a person has (6,000 – 14,000)
  - f. “*supertasters*” –
    1. Supertasters may experience an overall higher level of tasting ability than others, according to some evidence.
    2. supertasters appear to be more responsive to many bitter compounds, including those in coffee, grapefruit juice and green tea.
    3. Supertasters perceive saccharin and sucrose as sweeter than other people do. They also seem to be more sensitive to oral pain.
    4. The burning heat set off by the chili pepper ingredient, capsaicin, is more intense in supertasters than in others.

E. *Smell* –

1. A chemical sense in which chemicals in air molecules must move toward the receptor cells located on the walls of the nasal passage (through nostrils or back of the throat from food) then sent by the olfactory nerve to the olfactory bulb (not the thalamus) to the limbic system and then to the cerebral cortex
2. The nerve fibers from the olfactory bulb are connected to the limbic system (amygdala and hippocampus) thus making smell very powerful of the sense because it directly connects to memory and emotion (triggers powerful memories)
3. a human has over five million odor receptors

F. *Skin Senses* – (touch, pressure, temperature, pain)

1. One-half million receptors for touch and pressure are distributed throughout the body.
2. These receptors (some respond to one type of stimulation, others respond to multiple sources) transmit sensory information to the spinal cord that processes information to the somatosensory cortex (part of the cerebral cortex)
3. *Gate-Control Theory of Pain* –
  - a. the belief that a neural gate in the spinal cord opens to allow pain messages to reach the brain and closes to shut them out
  - b. ex. if a person rubs an area of pain, then the signals of pain and pressure can close the gate because of a “bottle neck” of messages at the gate

G. *Kinesthesia and vestibular senses* –

1. *Kinesthesia sense* – the sense that keeps us informed about movement of the parts of the body and their position in relation to each other
2. *Vestibular sense* – or sense of balance. It informs the brain of the position of the head relative to the ground, and the speed at which the head and body are moving.

## II. Perception

A. *Perception* is the process by which an organism selects and interprets sensory input so that it acquires meaning

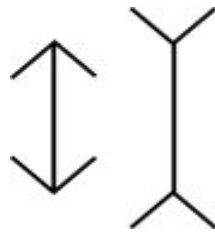
B. *Major Concepts of Perception*

1. *Selective Attention* – because people can only pay attention to one or two things at once, psychologists study the *allocation* of a person’s attention

- a. Cocktail party phenomenon – a person cannot make out a conversation which is taking place across a crowded room, however they can hear when their name is said
  - b. Filter theory – humans possess a limited ability to process information so they filter or screen out information with one or the other ear
  - c. Attenuation theory – all information is taken in and analyzed but only selected information is sent to the highest centers for processing (ex. selective-listening)
  - d. Inattention blindness(or change blindness) – failing to see visible objects when our attention is directed elsewhere [ex – Simmons & Chabris asked a group of participants during a study to pay attention to a basketball game after which they would be asked some questions regarding the game. For 5-9 seconds during the game, a man dressed as a gorilla ran out onto the court pounded his chest and ran off. Only half of the participants saw the gorilla.]
2. Perceptual Set –
- a. our expectations or preconceptions may influence our perceptions by creating a system (perceptual set) for interpreting stimuli in ways that conform to those expectations or preconceptions. Also known as “frame of mind.” (expecting that the footsteps heard behind you would not bother you if you had just seen “Meet the Fockers” than if you had just seen “Saw”)
  - b. Pas de lieu Rhone que nous [paddle your own canoe] – past experiences can inhibit your perception
  - c. Perceptual inference – occurs when the brain fills in the gaps of what our senses are telling us and it is largely automatic and unconscious due to just a few cues.
    1. we need only a few cues to inform us that a noise is a dog barking or that a road continues on the other side of a hill [we have encountered such stimuli and objects in the past and know what to expect from them in the present]
3. Modes of Perceptual Processing –
- a. Bottom-Up (feature analysis)– the process by which the brain forms perceptions by piecing together bits and pieces of sensory data (like angles, lines, or shapes that a person has seen before) to form meaningful patterns (recognize letters, numbers)
  - b. Top-Down – the process by which the brain forms perceptions by recognizing whole patterns without first piecing together their component parts
    1. handwriting differs, mistaken recognition
    2. I hop\_ you g\_t a 5 on t\_\_ A\_ e\_ am.
4. Perceptual Constancies – the tendency to perceive the size, shape, color, and brightness of an object as remaining the same even when the image it changes on the retina changes
- a. Shape Constancy – the tendency to perceive an object as being the same shape even when it is viewed from different distances or perspectives
  - b. Size Constancy – the tendency to perceive an object as being the same size despite changes in the size of the retina image it casts
  - c. Color Constancy – the tendency to perceive an object as retaining the same color even when lighting conditions change
  - d. Brightness Constancy – the tendency to perceive an object’s brightness as constant even as the level of illumination fades (chalk vs. hockey puck)
5. Gestalt Principles of Perceptual Organization
- a. Gestalt theorists suggest that the mind organizes the elements of experience to form unique perceptions and that each individual views the world in terms of these perceptual frameworks
    1. According to research at Cambridge University, it doesn’t matter in what order the letters in a word are, the only important thing is that the first and last letters be at the right place. The rest can be a total mess and you can still read it without problem. This is because the human mind does not read every letter by itself, but the word as a whole. Amznig huh??

- b. Figure-ground – the tendency to perceive the visual environment in terms of figures (objects) that stand out from the surrounding background, or ground
  - c. Principles of Grouping – the tendency to perceive sensory stimuli in terms of their contexts, grouping bits and pieces of sensory information into unitary forms or wholes
    - 1. Law of Proximity – the tendency to perceive objects as belonging together when they are close to one another
    - 2. Law of Similarity – the tendency to group objects that have similar characteristics or appearance
    - 3. Law of Continuity – the tendency to perceive a series of stimuli as a unified form when they appear represent a continuous patters
    - 4. Law of Closure – the tendency to group disconnected pieces of information into a meaningful whole (parts that are not represented will be filled in)
    - 5. Law of Fate Principle – items that move or change together will be perceived as together or as a whole
6. Depth Cues
- a. Without depth perception we would perceive the world as two dimensional
    - 1. E. J Gibson and the *Visual Cliff Experiment*
    - 2. determine if children had developed depth perception
    - 3. table with glass that expands over an edge with a checkerboard patter on the table and the floor
    - 4. Children who do not venture past the end of the table have depth perception (6-9 months)
  - b. Binocular Cues – we depend on both eyes
    - 1. Retinal disparity – the disparity in the images of objects projected onto the retina, which the brain uses as a cue to the distance. Nearby objects produce a greater retinal disparity.
    - 2. Convergence – turning the eyes inward to focus on a nearby object, this creates muscular tension that the brain uses as a cue for depth perception. The closer the object, the more the eyes must converge to maintain the single image
  - c. Monocular Cues – depend on one eye
    - 1. Relative Size – an object that appears larger than another object believed to be of the same size is judged to be closer
    - 2. Interposition – objects that are obscured by other objects are perceived as being farther away
    - 3. Relative clarity – nearby objects are clearer than more distant objects
    - 4. Texture Gradient – the details of nearby objects appear to have a coarse texture than those of distant objects
    - 5. Relative Height – object higher in the field of sight are perceived as farther away
    - 6. Relative Motion (motion paradox) – as we move, objects that are actually stable may appear to move
    - 7. Liner Perspective – objects and the spaces between them look smaller as they become more distant. Thus, parallel lines appear to converge as the recede into the distance
    - 8. Shadowing – shadows can create the appearance of curving surfaces or three dimensions, giving the impression of depth.
7. Motion Perception –
- a. the path of the image as it crosses the retina
  - b. the changing size of the object
8. Perceptual Expectancy (expectations) – how we perceive the world based on out past experiences, motivations, culture, or anticipation of outcomes (drivers cutting in)
- a. When an American looks down a highway they expect to see cars, truck, etc. not airplanes, where as a person from an indigenous tribe in Africa might be shocked to actually see a car

9. Agnosia – an inability to recognize a sensory stimulus that should be recognizable because perceptual systems for detecting color, shape, and motion are normal and intact and there are no verbal, memory, or intellectual impairments [usually due to brain injury because of injury or stroke]
- a. an agnostic, when presented with an object, is not able to name that object
  - b. Prosopagnosia - or face-blindness, is a neurological condition that renders a person incapable of recognizing faces. It is unrelated to the person's ability to see faces. Someone with perfect vision can suffer from prosopagnosia. In the normal brain there is a center that is dedicated to face recognition. Prosopagnosia arises when that special center becomes damaged or is otherwise unable to perform its function. (Ruth M., Cecilia and rocks)
10. Illusions – misconceptions of visual stimuli
- a. Müller-Lyon Illusion – illusion leads people to believe that inward wings create creates the impression of an outward corner of a room which appears closer (a ruler would tell you differently!)

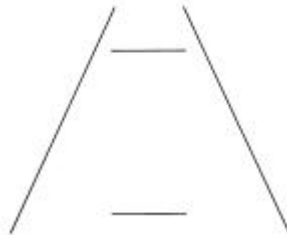


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- b. Ponzo Illusion (railroad illusion) – the illusion leads people to believe that the upper lines are farther away and longer



[www.vf.bio.uu.nl/lab/NE/people/borghuis2/scriptie.html](http://www.vf.bio.uu.nl/lab/NE/people/borghuis2/scriptie.html)

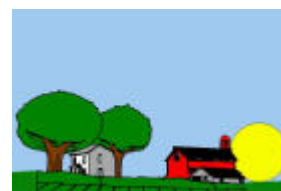


[www.richardgregory.org/papers/brainmodels/illusions](http://www.richardgregory.org/papers/brainmodels/illusions)

- c. Moon Illusion – when the moon appears near the horizon, it may appear to be enormous compared to its “normal” size or apparent size when it is high in the evening sky

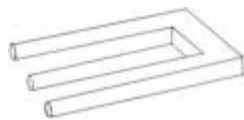


[www.uwsp.edu/psych/sh/moon.htm](http://www.uwsp.edu/psych/sh/moon.htm)



[www.uwsp.edu/psych/sh/moon.htm](http://www.uwsp.edu/psych/sh/moon.htm)

- d. Impossible Figure – impossible figures fool the brain into creating the impression of a whole figure when the figure is viewed from different perspectives



[www.sdsc.edu/~ICE/IceTalk/talk/slides/mt0005.htm](http://www.sdsc.edu/~ICE/IceTalk/talk/slides/mt0005.htm)



[www.angelfire.com/la3/aries1b/](http://www.angelfire.com/la3/aries1b/)

- e. Stroboscopic Movement –
    - 1. a type of apparent movement based on the rapid succession of still images, as in motion pictures
  - f. Phi Phenomenon –
    - 1. a perceptual illusion first described by Max Wertheimer a Gestalt researcher in 1912
    - 2. a type of apparent movement created by the rapid switching on and off of columns of lights
  - g. Purkinje Phenomenon (dark adaptation)
    - 1. When there is low light, the human eye perceived images towards the blue end of the color spectrum
    - 2. Example - at twilight, a stop sign looks black/blue not red
    - 3. Example - runners at night wear yellow or white not red/blue/black
11. Controversies in Perception
- a. Subliminal Perception – perception of stimuli presented below the threshold of conscious awareness
    - 1. some believe that subliminal messages affect behavior but psychological research does not support that claim
    - 2. research does indicate that subliminal messages can affect behavior in subtle ways such as choosing a word in a list after it was presented subliminally
    - 3.
  - b. Extrasensory Perception – perception occurring without the benefit of the known senses
    - 1. telepathy – communication of thoughts from one mind to another that occurs without using the known senses
    - 2. clairvoyance – the ability to perceive objects and events without using the known senses
    - 3. precognition – the ability to foretell the future
12. Perception and Culture
- a. Research indicates that some perceptual rules that were innate are actually learned such as the way optical illusions are perceived
  - b. Example – some people who come from non-carpentered cultures that do not use right angles and corners in their building and architecture are not usually fooled by the Muller-Lyer illusion
  - c. Cross-culturally research demonstrates that some basic perceptual sets are learned from culture

### C. Why Study Perception?

#### 1. Dr. Conard Kraft and the late 1960 Air Crashes

- a. In the late 1960's there were a number (more than 12) of commercial airline crashes which Dr. Kraft, a cognitive research psychologist, decided to look into
- b. Dr. Kraft noted from the crashes:
  - 1. all took place at night
  - 2. all involved landing short of the runway

- c. Kraft reasoned that, beyond the runway, city lights would project a larger retinal image if on a rising terrain and this would make the ground seem farther away than it was
- d. By recreating these conditions in flight simulators, Kraft discovered that pilots were deceived into thinking they were thinking they were flying and landing safely
- e. Today, Boeing (large aircraft maker) is making planes and airlines are training pilots with these perceptual, human factors in mind

Notes based on information from the following sources:

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