

# Glossary

## A

**Absolute Refractory Period:** the period, right after an action potential has begun during which it is impossible for the neuron to generate a new action potential. It last about 1 msec.

**Absolute Threshold:** the lowest sensory level that can be detected reliably.

**Accommodation:** Adjusting the lens of the eye so that you can see both near and far objects clearly.

**Action Potential:** the signal that travels down the axon of a neuron. The voltage goes from the -70 mV of the **resting potential** to +30 mV to actually more negative than the resting potential before returning back to the resting potential.

**Acuity:** the ability to resolve fine details.

**Adaptation:** the change in sensitivity as a result of prolonged exposure to an unchanging stimulus.

**Additive Color Mixing:** creating a new color by a process that adds one set of wavelengths to another set of wavelengths.

**Aftereffect:** an alteration in our perceptions that occurs after prolonged exposure to a stimulus.

**All-or-None Law:** the characteristic of action potentials that they are always the same size (-70 mV to +30 mV) and stay the same size as they travel down the axon.

**Anomalous Trichromat:** a color deficiency where the person has three cones, but one of the cone pigments are different from the others. Usually it is closer to one of the other pigments rendering color discrimination slightly poorer.

**Apparent Motion:** the appearance of real motion from a sequence of still images.

**Ascending Staircase:** used in the Method of Limits psychophysical method. The experimenter presents the least intense stimulus first and then proceeds to present stimuli of ever increasing intensity.

**Astigmatism:** the lens is misshapen so that it focuses more strongly along one axis than the axis at a right angle.

**Atmospheric Perspective:** a pictorial depth cue that arises from the fact that objects in the distance appear blurred and tinged with blue.

**Axon:** the part of the **neuron** that has **action potentials**.

## B

**Backward Masking:** the reduction of sensitivity to a stimulus caused by stimuli that are presented after the target stimulus.

**Beta or Optimal Motion:** Apparent motion where an object seems to move through space just like a real object though it is only a sequence of still images.

**Binaural Cues:** from Bi meaning two and aural for hearing. These cues help determine the direction of a sound by comparing the stimulus hitting each ear.

**Binocular Depth Cues or Binocular Cues:** depth cues that require the use of both eyes.

**Binocular Disparity:** the binocular depth cue that arises from the fact that the images of most objects that are in the visual scene do not fall on the same location of the retinas of the two eyes. Disparity is actually the measure of this difference in the position of the images on the two retinas.

**Binocular Suppression:** when, in the case of diplopia, the image from one eye is suppressed so that only one image is seen.

**Blindsight:** Vision abilities in the absence of the visual cortex. The patient claims to be blind but can point at objects.

**Brightness Assimilation:** a visual phenomenon where the brightness of a set of stripes looks more similar to the background than it actually is.

**Brightness Constancy:** the perception of an object not changing its brightness despite wide changes in the amount of light coming from the object to the observer (change in luminance).

## C

**Calibration:** the process of adjusting equipment so that it works in a known way, for example, setting the volume on a computer so that a sound will be at a known ability to be heard or a known intensity.

**Color Constancy:** the finding that color appearance of an object does not change with the change in wavelengths being reflected off of an object as happens with changing illumination.

**Comparison:** stimulus in experiment that is varied within a condition and compared to the unchanging standard.

**Computational Approach:** an approach to understanding how perception occurs by trying to specify the necessary computations that the brain would need to carry out to perceive the world.

**Confound Variable:** a variable that changes with the independent variable.

**Constructivist Theory:** associated with Helmholtz. The idea is that our perceptions are constructed using information from our senses and our own cognitive processes, including memory.

**Contour:** basically, this is an edge. There is an abrupt change in the visual stimulus across the scene. The contour is usually a change in luminance or color.

**Contralateral:** coming from the opposite side of the brain or body.

**Contrast:** the difference between two adjacent regions of a stimulus. Usually this is a difference in luminance, but it can also be a difference in color.

**Contrast Sensitivity Function:** A person's contrast sensitivity as a function of the spatial frequency of the sine wave grating.

**Convergence:** the vergence eye movement where the eyes rotate together.

**Cornea:** the clear front surface of the eye that allows light in. It also is a major focusing element of the eye.

**Criterion:** the level of activity in signal detection theory used to make the judgment whether a stimulus has occurred or not.

**Critical Band:** the region of frequencies centered around the frequency of a tone where noises can be added that will be able to mask the tone. This critical band is a region of spatial summation on the basilar membrane.

**Critical Fusion Frequency (CFF):** the threshold frequency at which a flickering stimulus is seen continuous.

**Crossed Disparity:** the name given to the direction of disparity for objects in front of the horopter (the image in the left eye is to the right of the image of the object in the right eye). This disparity is often given a positive sign.

## D

**d'**: This is a measure of a subject's sensitivity in terms of the number of standard deviations the mean of the signal plus noise curve is greater than the mean of the noise curve.

**Dark Adaptation:** the process in the visual system where it increases its sensitivity to low light levels.

**Decussation:** the crossing of axons from one side of the central nervous system to the other.

**Dendrite:** the part of a neuron that receives input from other neurons.

**Dependent Variable:** this is the variable that is measured and is determined by the participant's response to the independent variable in the experiment. See Independent Variable.

**Depth Cue:** a source of information that helps the visual system determine depth.

**Dermatome:** an organized region of skin where all the somatosensory information travels in the same spinal nerve.

**Dermis:** The living layer of the skin beneath the epidermis.

**Descending Staircase:** used in the Method of Limits psychophysical method. The experimenter starts with the most intense stimulus and proceeds to less intense stimuli.

**Detection:** the determination on the part of the observer that a stimulus is present.

**Dichromat:** A color deficiency where the person is missing one of the normal classes of cones.

**Diplopia:** double images. Seeing two copies of the same image. This outcome usually results from the images from the object having too much disparity to lead to fusion.

**Discrimination:** the ability to tell that two stimuli are different from each other.

**Discrimination Threshold:** the smallest difference that can be detected reliably.

**Direct Perception:** the position of J. J. Gibson. The senses work by extracting information directly from the full pattern of stimulation. No extra cognitive operation is needed.

**Disparity:** see Binocular Disparity.

**Divergence:** the vergence eye movement where the eyes rotate away from each other.

**Doctrine of Specific Nerve Energies:** see **Specific Nerve Energies, Doctrine of**

**Dorsal Columns:** nerve pathways at the back of the spinal chord that carry touch and body position and movement information to the brain.

**Duplex Theory of Vision:** The doctrine that there are functionally two distinct ways that our eyes work, one, the photopic, associated with the cones, and the other, the scotopic, associated with our rods.

## E

**Emmetropic:** The eye can adequately focus on both near and far objects so that the image of these objects are clear on the retina.

**Epidermis:** The outer layers of the skin that is above the **dermis**.

**Excitatory Postsynaptic Potential (EPSP):** A reduction in the negative voltage on the postsynaptic neuron that makes the postsynaptic neuron more likely to have an action potential.

## F

**Far Point:** The farthest distance that can be focused clearly.

**Figure:** the organized object of regard.

**Flicker Photometry:** A method to equalize the luminance between two colors by alternating the colors very quickly. The participant is to adjust the luminance of one of the colors to minimize the perceived flicker.

**Focus:** The process of gathering light that starts in a point back into a point on an image.

**Forced-choice Method:** a psychophysical method where the participant is required to report when or where a stimulus is instead of if the stimulus was perceived.

**Fourier Analysis:** a mathematical procedure for taking any complex wave form and determining the simpler waveforms that make up that complex pattern. The simpler waves used are sine waves.

**Frame of Reference:** this concept refers to the idea that all motion is relative. To perceive an object as moving, it must be judged against other objects or the background. These other objects or background form the frame of reference.

**Frequency:** in a sound stimulus, refers to the number of cycles that occur in a second.

**Frequency Coding:** the firing rate of the neuron determines the experience.

**Frequency Theory:** the theory of frequency encoding where the brain is able to determine the frequency of a sound by the firing rate of the neurons.

## G

**Gestalt Psychology:** the idea that we perceive objects as wholes and that these perceptions cannot be reduced to more fundamental elements of perception such as color and form.

**Glabrous Skin:** skin found on the palms of hand and soles of feet. It does not have hair.

**Global Motion:** seeing on overall direction and extent of motion of a random dot field when the possibility exists to see motion in many directions and to many extents.

**Grating:** a visual stimulus that is an alternating series of light and dark bars. The bars can be sharp with discrete changes in luminance or they can change gradually and appear fuzzy.

**Ground:** the background against which a figure is viewed.

## H

**Hairy Skin:** skin with hair that covers most of the body.

**Hemianopia:** loss of vision in half of the visual world, either the right or the left half.

**Hertz:** A unit of measure indicating how many times something repeats or vibrates in a second. Often abbreviated Hz.

**Horopter:** the region in space where the two images from an object falls on corresponding locations on the two retinas.

**Hue:** The quality of color most closely associated with the color names we apply. Often what is meant by color in common usage.

**Hyperacuity:** acuities that seem to exceed the fineness of our cones to detect small changes. See Vernier Acuity.

**Hypermetropia:** The person can focus clearly of distant objects but not close objects. Also called “far sighted”.

**Hyperpolarization:** a change in the voltage of a neuron where the inside of the cell becomes more negative than it is at its resting state.

## I

**Illusion:** an incorrect perception.

**Independent Variable:** the variable that is controlled by the researcher. By control, what is meant is that the experimenter will set the levels for this variable in the experiment. There can be more than one in an experiment.

**Inhibitory Postsynaptic Potential (IPSP):** An increase in the negative voltage on the postsynaptic neuron that makes the postsynaptic neuron less likely to have an action potential.

**Intensity:** when referring to waves, refers to the height of the wave.

**Interaural Loudness Difference:** a binaural cue to the direction of sound that arises because the head reflect a small part of the sound away so that sounds reaching the far ear are less intense than sounds reaching the near ear.

**Interaural Phase Difference:** a binaural cue to the direction of a sound source. It arises from the fact if a sound is not directly in front of a person it takes longer to arrive in one ear than the other which causes the sounds to be in different phases when arriving at the two ears.

**Interaural Time of Arrival:** a binaural cue to the direction of a sound. If a sound is not directly in front of a person, it arrives sooner at the closer ear. This difference can be used by the brain to detect the direction of the sound. It works best for sounds of very short durations (clicks).

**Interposition:** sometimes called overlap. A depth cue where an object that is overlapped by another object is perceived to be farther away.

**Interstimulus Interval (ISI):** the period of time between the end of one stimulus and the beginning of a second stimulus.

**Ion:** a particle with an electrical charge, e.g. the sodium ion, Na<sup>+</sup>.

**Ion Channel:** a whole formed in the membrane of a cell by proteins that allow for ions to cross the membrane.

**Ipsilateral:** coming from the same side of the brain or body.

## J

**Just Noticeable Difference or JND:** see **discrimination threshold**.

## K

**Kinetic Energy:** Energy doing work.

## L

**Lateral Inhibition:** the reduction of a response of the eye to light stimulating one receptor by stimulation to nearby receptors.

**Law of Good Continuation:** edges that are smooth are more likely seen as continuous than edges that have abrupt or sharp angles.

**Law of Proximity:** the gestalt grouping law that elements that are close together tend to be perceived as a unified group.

**Law of Similarity:** the gestalt grouping law that elements that are similar to each other tend to be perceived as a unified group.

**Law of Specific Nerve Energies:** the idea that what we experience depends upon which neuron is firing. Thus, neurons in the visual cortex generate visual experiences while those in the auditory cortex generate hearing. Attributed to Johannes Müller.

**Lens also called the Crystalline Lens:** the adjustable focusing element of the eye. Located right behind the iris of the eye.

**Light Adaptation:** the process where the visual system reduces its sensitivity so that it can operate in higher light levels.

**Limulus:** the horseshoe crab. It has a compound eye and was studied by Hartline to discover lateral inhibition.

**Linear Interpolation:** a method of using the line equation  $mX+b$  to estimate the threshold.  
**Linear Perspective:** the pictorial depth cue that arise from the fact that parallel lines appear to converge as they recede into the distance.  
**Local Motion:** seeing the motion of a random dot field composed of many motions in many directions and many extents.  
**Loudness:** the perceptual experience of intensity of a sound stimulus.

## M

**Magnitude Estimation:** The psychophysical method, developed by S. S. Stevens where subjects assign numbers to the perceived strength of an event.

**Measurement:** the assigning of numbers based on a commonly agreed upon scale to an observation.

**Mechanoreceptors:** the class of somatosensory receptors that respond to a deformation of the skin surface.

**Metamer:** a color match between two patches of light that have different sets of wavelengths.

**Method of Adjustment:** a classical psychophysical method. The stimulus is adjusted by the participant or the experimenter.

**Method of Constant Stimuli:** a classical psychophysical method for determining the threshold. Several levels of stimulus intensity are presented in a random order. The threshold is traditionally the intensity level detected 50% of the time.

**Method of Limits:** a classical psychophysical method for determining the threshold. Levels of the stimulus are presented in either a descending and ascending series of intensities in alternations.

**Modulus:** the modulus is a stimulus in a **Magnitude Estimation** experiment that is given a standard value. The judgments of the experimental stimuli are made relative to this stimulus.

**Monaural Cues:** from Mon- for one and aural for hearing. These auditory cues help in localizing sounds, mostly distance and relative movement, and only require the stimulus to reach one ear.

**Monocular Depth Cues or Monocular Cues:** depth cues that require only one eye.

**Motion Parallax:** a monocular depth cue arises from the relative velocity of objects moving across the retina of a moving person.

**Motion Recruitment:** a coherent motion, like a grating, that when overlaid with random patterns of dots that change with each motion of the grating will influence the perception of that motion of the grating to be perceived in the direction of the coherent motion.

**Myopia:** the person can focus clearly on near objects but not far objects. Also called "near sighted".

**Mucocutaneous Skin:** skin at body entrances such as the mouth and nose that join mucous membranes.

## N

**Natural Selection:** the driving force behind evolution. This is the concept that those characteristics that help an organism survive will get passed on and come to be prominent in the entire population.

**Near Point:** The closest distance that an eye can focus.

**Neuron:** The cells that is part of the nervous system that sends signals from one part of the nervous system to another.

**Neurotransmitter:** the molecules that are stored in the presynaptic neuron and released into the synaptic cleft to bind to receptor molecules on the postsynaptic neuron and serve to communicate between neurons.

**Noiceptor:** the somatosensory receptor that responds to pain.

**Noise:** in signal detection theory, noise refers to the background rate of stimulation that occurs in the absence of stimulation.

**Nonpictorial Depth Cues:** those monocular depth cues that cannot be represented in a static image such as a photograph or a painting.

**Nucleus:** 1. in the central nervous system it is a collection of cell bodies. It generally represents an area where processing takes place. The Lateral Geniculate Nucleus is an example. 2. in a cell, it is the organelle that contains our genetic material.

**Nystagmus:** any repetitive pattern of eye movements.

## O

**Ocular Dominance:** Which eye a cell in the visual system prefers to respond to.

**Opsin:** the protein portion of a photopigment that captures the photon of light and begins the process of transduction. It is the variation in this opsin that gives determines the type of visual receptor.

**Optic Axis:** The imaginary line that connects from the fovea through the center of the lens that represents a person's direction of gaze.

**Optic Flow:** The patterns of motion that arises from our motion through space.

**Optimal Motion:** see **Beta or Optimal Motion**.

## P

**Panum's Fusional Area:** the region of small disparity around the horopter where the two images can be fused into a single perception.

**Perception:** the processes involved in identifying and interpreting the stimulus that is detected in sensation. See **Sensation**.

**Phase:** the position in one cycle of a wave. There are 360 degrees in a single cycle of the wave.

**Phi Phenomena or Phi Motion:** a type of apparent motion where motion is perceived without the perception that the objects creating the motion move. This is referred to as objectless motion.

**Photopic Vision:** the vision associated with the cones. It is used in the day, has good acuity in the fovea and has color vision.

**Physiological Zero:** the complete adaptation to a thermal stimulus so that neither warm nor cold is experienced. It is a very narrow range of temperatures.

**Pictorial Depth Cues:** monocular depth cues that can be represented in a static image such as a painting or photograph.

**Pitch:** the subjective experience of sound that is most closely associated with the frequency of a sound stimulus. Related to the experience of whether the sound is high or low such as two ends of the keyboard of a piano.

**Place Theory:** the theory of pitch perception where different frequencies stimulate different parts of the basilar membrane and it is this difference that leads to frequency discrimination.

**Point of Subjective Equality:** the value of a stimulus where it is perceived to be identical to another stimulus.

**Postsynaptic Neuron:** the neuron that receives information in a synapse.

**Potential Energy:** energy that is available to do work.

**Presbyopia:** "old eyes". The stiffening of the lens with aging that results in the eyes being focused only to see far objects.

**Presynaptic Neuron:** the neuron that has the terminal in a synapse. The information is sent from the presynaptic neuron to the **postsynaptic neuron**.

**Principle of Equal Action:** every quanta of light absorbed by a receptor has the same effect on the receptor causing all information about its wavelength to be lost.

**Psychophysics:** the study of the relationship between physical stimuli and the mental events that arise as a result of these stimuli. The methods developed are fundamental to sensation and perception.

**Purkinje Effect:** the observation short wavelengths tend to be relatively brighter than long wavelengths in scotopic vision than for photopic vision.

## Q

## R

**Receiver Operating Characteristic or ROC curve:** in signal detection theory, a plot of the false alarms versus the hits for any given sensitivity. Indicates all possible outcomes for a given sensitivity.

**Receptive Field:** a region of adjacent receptors that will alter the firing rate of cell that is higher up in the sensory system.

**Receptor:** a specialized nerve cell that picks up energy or information from the environment and converts it into signals that can be processed by the nervous system.

**Referred Pain:** The experience of pain that has its source inside the body as coming from some different location on the skin. The pain is usually referred to the dermatome of somatosensory information that enters at the same location in the spinal chord.

**Refractory Period:** The period of time after the generation of one action potential when it is either impossible or more difficult to generate another action potential. See also **Absolute Refractory Period, Relative Refractory Period.**

**Relative Height:** a monocular depth cue. As objects are farther away in distance they get closer to the horizon. For objects on the ground, that means that they are higher in the scene as they are farther away. For objects in the sky, that means that they are lower in the scene as they are farther away.

**Relative Refractory Period:** the period of time, after the **absolute refractory period**, during which it is harder for a neuron to generate a new action potential.

**Relative Size:** a monocular depth cue. As an object is farther away, it has a smaller image at the eye.

**Resonance:** the property of all matter to vibrate most easily at certain frequencies.

**Resting Potential:** the -70 mV state of the axon when it is ready for an **action potential** to occur.

**Retina:** the paper thin layer of cells at the back of the eye where transduction takes place.

**Retinal:** a derivative of vitamin A that is part of a photopigment.

**Retinotopic Map:** The point-by-point correspondence between a brain region and the retina.

**Reuptake:** the process of removing neurotransmitters from the synaptic cleft by their being reabsorbed into the presynaptic neuron.

## S

**Saccades:** the most common and rapid of eye movements. They are version eye movements and are used to look from one object to another.

**Saccadic Suppression:** the inability to perceive the degree of blurring of the images caused by saccades.

**Scotopic Vision:** the operation of the visual system associated with the rods. It has relatively poor acuity, no color ability, but is very sensitive to light.

**Sensation:** the basic processes of detecting that a stimulus is in the world. see **Perception.**

**Sensitivity: (1)** in signal detection theory, this value refers to the ability of a subject to determine if a given level of sensory activity is due to the signal or not. See **d'**. **(2)** in most other areas refers to a value that is the inverse of the threshold.

**Shadow:** among other ways shadow facilitates vision it can provide a depth cue because the object is in front of the shadow and the angle of the shadow can provide some information about how far the object is in front of the background.

**Shape Constancy:** the perception of the shape of an object staying the same even through rotations that change the retinal image shape.

**Shearing Force:** A situation where there are two forces moving in opposite directions adjacent to each other like in scissors (shears). This force is the basis for transduction in the auditory system.

**Signal Detection Theory:** the theory that in every sensory detection or discrimination, there is both the sensitivity to the stimulus that is sensory and the criterion used to make the cognitive decision.

**Simultaneous Contrast:** the influence of the luminance on adjacent region on the brightness of the area you are examining. Usually it is a negative reaction where a dark surround makes the region you are examining look brighter and bright surround make the region you are examining look darker.

**Size Constancy:** the perception of an object as having a fixed size, despite the change in the size of the visual angle that accompanies changes in distance.

**Smooth Pursuit Eye Movements:** these are the voluntary tracking eye movements.

**Sodium/Potassium Pump:** A protein in the cell membrane of the neuron that shifts sodium out of the cell and brings in potassium.

**Somatosensory Homunculus:** the shape that the organisms body would have if the body parts of the organism matched the relative sizes of the same body parts as seen in the **somatotopic map**. See **somatotopic map**.

**Soma:** the cell body of a neuron. Contains the nucleus.

**Somatosensory System:** the complex of sensations that arise from the skin and body. These sensations include the sense of pressure (light and deep), temperature, pain, body position and movement.

**Somatopic Map:** the organized layout of the skin surface on the somatosensory cortex.

**Spatial Forced-Choice:** a forced-choice method where the two stimuli are presented in different locations but at the same time. In this forced-choice method the decision is where is the stimulus. See **Forced-choice Method**.

**Spatial Frequency:** the number of cycles of a stimulus, say a sine wave grating, in a degree of visual angle.

**Spatial Summation:** There are two senses of this term. It is important to know that the sense of the term in definition (1) depends on the operation of the sense of the term in definition (2). (1) The combining of light over a small region of the retina to determine a stimulus' brightness. (2) The combining of postsynaptic potentials from different presynaptic neurons at the axon hillock.

**Specific Nerve Energies, Doctrine of:** the idea, developed by Johannes Mueller that the type of sensation experienced depends on which neurons are stimulated and not what originally caused the stimulation.

**Spectral Sensitivity:** The differential sensitivity of the visual system to different wavelengths.

**Standard:** the unchanging stimulus in on condition that other stimuli in an experiment are compared to.

**Stereopsis:** the ability to see depth using the depth cue of binocular disparity.

**Stimulus:** the physical event or source of information that is to be picked up by the receptors.

**Subtractive Color Mixing:** color mixing where a new color is made by the removal of wavelengths from a light with a broad spectrum of wavelengths.

**Summation:** the arrival of two or more **postsynaptic potentials** at the axon hillock. The change in the voltage is the combination of all of the postsynaptic potentials present at the time.

**Synapse:** literally to join. The place were two neurons connect for one neuron to send information to another neuron.

**Synaptic Cleft:** the extremely small gap between the two neurons connecting at a synapse.

**Synaptic Vesicle:** a membrane sack in the presynaptic neuron that holds **neurotransmitters**.

## T

**Teleology:** determining the use or purpose for something in nature.

**Temporal forced-choice:** a forced-choice method that presents the two stimuli at different times. The decision is thus when the target stimulus occurred. See **Forced-choice Method**.

**Temporal Summation:** There are two senses of this term. It is important to know that the sense of the term in definition (1) depends on the operation of the sense of the term in definition (2). (1) the brief period of time during which light is gathered so that we can see. (2) the arrival of two **postsynaptic potentials** from the same presynaptic neuron at the axon hillock close enough together in time to add together.

**Terminal:** the end of the axon that sends information to another neuron, or a muscle, or a gland.

**Texture gradient:** a monocular depth cue that occurs because textures become finer as they recede in distance.

**Thalamus:** a structure of the forebrain found in both hemispheres near the center. It has major connection both to and from most areas of the cortex. All sensory systems will connect to the thalamus before connecting to the cortex.

**Thermoreceptors:** somatosensory receptors that respond to temperature changes across the skin.

**Threshold:** a sensory limit. A stimulus below threshold cannot be perceived. A stimulus above threshold can be perceived.

**Transduction:** the process of converting one form of energy to another, say converting light to action potentials.

**Traveling Wave:** the sympathetic motion of the basilar membrane to the incoming sound stimulus. It moves from the base toward the apex.

**Two-point Threshold:** the smallest distance between two points, simultaneously applied, that can reliably be felt as two distinct points. If the points are within the two-point threshold, they will be felt as one stimulus.

## U

**Unconscious Inference:** the idea, developed by Helmholtz, that unconscious processing of our sensory processes play a role in inferring what is being perceived. The perception is not adequately determined by the sensory information so an inference or educated guess is part of the process.

**Uncrossed Disparity:** the name given to the direction of disparity for objects that are behind the horopter (the image of the object in the left eye is to the left of the position of the image of the object in the right eye). This type of disparity is often given as a negative value.

## V

**Vection:** the illusory perception of self-motion when you are not moving.

**Vergence Eye Movements:** eye movements where the eyes move in opposite directions, either towards or away from each other. These eye movements also serve as a binocular depth cue.

**Vernier Acuity:** the measure of the smallest amount of displacement in the middle of line that can be detected.

**Version Eye Movements:** eye movements where the eye move in the same direction and to the same extent.

**Visual Angle:** the size of an image on the retina in terms of the angle formed by the object at the surface of the eye.

**Visual Field:** the range of the world that can be seen by one eye without moving.

**Visual Illusion:** a figure that causes the observer to systematically misperceive some feature of the figure.

**Volley Principle:** the feature of frequency theory where a sound is encoded by several neurons. No one neuron may fire at the exact frequency of the sound stimulus, but the total firing across of all of the neurons involved does firing at the exact frequency of the sound stimulus.

## W

**Wavelength:** the distance between two adjacent peaks in a repeating wave.

## X

## Y

## Z