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## Chapter 5

### Sensory, Attentional and Perceptual Processes

#### ❖ Sense Organs

- The knowledge of the world is obtained from the senses through sensation, attention and perception.
- There are five external senses and two internal senses.
- They receive stimuli and send them in the form of neural impulses to specialised areas of brain for interpretation.
- The sense organs are known as sense modality as they are highly specialised.

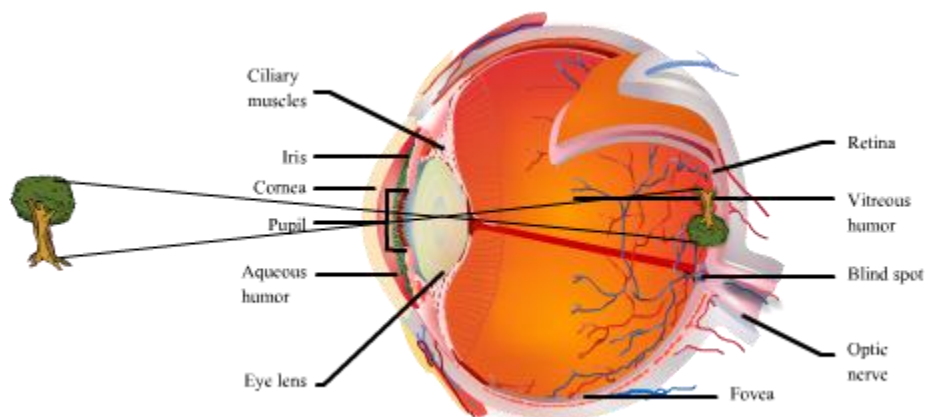
#### ❖ Limitations of the sense organs

- Humans function within a limited range of stimulation as human sense organs have some functional limitations. Ears cannot hear very faint or loud sounds. Similarly the eyes cannot see things which are in very dim or very bright light. In order to be noticed, a stimulus has to be of an optimal intensity and magnitude.

#### ❖ The Structure of Human Eye

- Visual sensation occurs between the light wavelengths of 380nm to 780nm. The human eye is made up of three layers which comprises:
  - i. Cornea and sclera in the outer layer
  - ii. Choroid in the middle layer
  - iii. Retina in the inner layer
- Rods are the receptors for scotopic vision while cones are the receptors for photopic vision.
- The light enters the lens which focuses on retina.
- Retina is divided into two parts—the nasal half and the temporal half.
- The inverted image formed on the retina is transmitted to the visual cortex through the optic nerve where the image is re-inverted and processed.





### ❖ Adaptation

- The process of adjusting to different intensities of light through photochemical processes is called 'visual adaptation'.
- The process of adjusting to bright light after exposure to dim light is called light adaptation, which takes a minute approximately.
- The process of adjusting to a dim surrounding after exposure to bright light is called dark adaptation, which may take few hours.
- Light adaptation takes place when the rhodopsin or visual purple in the rods gets bleached or broken down, as a result of the actions of light molecules on it. Dark adaptation takes place when the light is removed allowing for restorative processes that regenerate the pigment in the rods with the help of vitamin A.

### ❖ Colour Vision

- Colour vision refers to the colours that are visible to the eyes.
- The Colours are a psychological property of our sensory experience.
- The dimensions of colour are:
  - i. **Hue:** It is a property of chromatic colours. Hue varies with wavelength and each colour carries a specific wavelength.



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ii. **Saturation:** It is a psychological attribute that refers to the relative amount of hue of a surface or object. The light of a single wavelength is highly saturated while the mixtures of different wavelengths have low saturation.

iii. **Brightness:** It refers to the perceived intensity of light and varies from both chromatic and achromatic colours. While white is the brightest colour, black is the least bright colour.

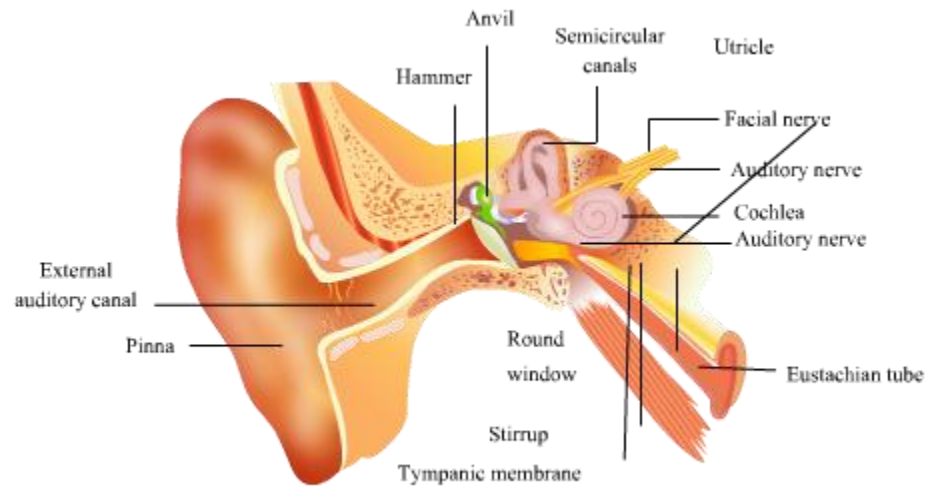
❖ **After Images**

- The effect of a visual stimulus persisting for some time after the removal of stimulus from the visual field is called after image.

❖ Positive after images resemble original stimulus while negative after images are produced in complementary colours.

**The Structure of Human Ear**

- Auditory sensation takes place when sound enters the ear and stimulates the chief organs of hearing.
- The human ear is divided into:
  - **External ear:** It contains pinna and auditory meatus that collect and carry sound waves respectively.
  - **Middle ear:** It mainly comprises tympanum and tympanic cavity. The ossicles increase the intensity of sound by 10 times.
  - **Inner ear:** It has a membranous labyrinth that is encapsulated in a shell called bony labyrinth. A fluid called perilymph is also found here. The organ of corti is the main organ for hearing.



### ❖ Sound

- Sound is a stimulus for auditory sensation.
- Loudness, pitch and timbre are the properties of sound.

### ❖ Attentional Process

- Attention refers to the process through which certain stimuli are selected from a group of others.
- It has three properties:
  - i. Alertness:** It is the individual's readiness to deal with stimulus that they experience.
  - ii. Concentration:** It is the focus of awareness on specific objects while excluding the others in that period of time.
  - iii. Search:** It takes place when an observer looks for some specific objects among a set of objects.
- Attention can be divided into two types:
  - i. Selective attention:** It is related to the selection of a limited number of stimuli from a large group of stimuli. Factors influencing selective attention are external factors and internal factors.
  - Sustained attention:** It is primarily concerned with concentration and the ability to maintain attention on an object

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or event for long duration. The factors influencing sustained attention are sensory modality, clarity of stimuli, temporal uncertainty and spatial uncertainty.

### ❖ Perception

- It is the process of informed construction and interpretation of the information received from sensory organs.
- Human beings perceive the world through motivation, expectation, cognitive style and cultural background.
- The main proposition of Gestalt psychologists with respect to perception of the visual field is that different stimuli are perceived as an organised “whole”, in a definite form which is different from the sum of their parts.
- Space is perceived in three dimensions that include spatial attributes as well as the distance between the objects. It is possible to perceive the two dimensional image of objects projected on the retina in three dimensions by transferring the two dimensional retinal vision into a three dimensional perception.
- Monocular cues of depth perception are used by artists to induce depth in two dimensional paintings. They are effective when the objects are viewed with only one eye, and are also known as pictorial cues.
- The binocular cues of depth perception are viewed by both eyes in three-dimensional spaces.

### ❖ Illusions

- Illusions occur as a result of mismatch between the physical stimuli and its perception. They are caused by external stimulus situation that generates the same kind of experience in all the individuals.



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### ❖ Socio-Cultural Influence on Perception

- Socio-cultural factors our perceptions by generate differential familiarity and salience of stimuli as well as certain habits of perceptual inference among people. Thus, they influence perceptions.

### ❖ Important Terms and Definitions

- **Absolute threshold:** It refers to the minimum value of stimulus that is required to activate a sensory system.
- **Bottom-up processing:** The initiation of recognition process from the parts to a whole entity.
- **Cochlea:** The fluid filled, coiled tunnel in the bony labyrinth of inner ear containing the receptors to hear.
- **Depth perception:** It refers to a process of viewing everything in three dimensions.
- **Difference threshold:** The minimum difference between a pair of stimuli that is important to be perceived.
- **Eustachian tube:** The passage that contains air pressure and connects the middle ear to the throat, allowing the release of pressure.
- **Loudness:** One of the three psychological dimensions of sound, whose amplitude is responsible for high or low loudness.
- **Organ of corti:** It is the main organ that helps in hearing, which is a structure on the surface of basilar membrane with fine hair cells that function as receptors for hearing.
- **Perceptual constancies:** Perceiving the objects as stable even after frequent changes in the stimulation of sensory receptors.
- **Phi phenomenon:** The illusion of movement created by motionless picture by projecting them one after another at specific time intervals.



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- **Pitch:** One of the properties of sound, reflecting its highness or lowness. **Timbre:** It is the nature and quality of sound that reflects the quality of sound waves.
  - **Top-down processing:** The processing in which recognition process begins from the whole entity that later identifies its various components.
  - **Wavelength:** It is the spatial period of a wave which is measured in accordance with the distance from the peak of one light or sound wave to the peak of the next.