

Sensory, Attentional And Perceptual Processes

NCERT TEXTBOOK QUESTIONS SOLVED

Question 1. Explain the functional limitations of sense organs.

Answer: Sense organs function with certain limitations. For example our eyes cannot see things which are very dim or very bright. Similarly our ears cannot hear very faint or very loud sounds. The same is true for other organs also. As human beings, we function within a limited range of stimulation. For being noticed by a sensory receptor a stimulus has to be of an optimal intensity or magnitude.

Question 2. What is meant by light and dark adaptation? How do they take place?

Answer: Bright adaptation refers to the process of adjusting to bright light after exposure to dim light. This process takes nearly a minute or two.

Dark adaptation refers to the process of adjusting to a dimly illuminated environment after exposure to bright light. This may take half an hour or even longer depending on the previous level of exposure of the eye to light. The dark-adapted eye is about 100,000 times more sensitive to light than the light-adapted eye.

Question 3. What is colour vision and what are the dimensions of colour?

Answer:

- A person's ability to distinguish different shades of colour is termed colour vision.
- Person with normal colour vision can distinguish more than seven million different shades of colour.
- There are three basic dimensions of colour-hue, saturation, and brightness.
- Hue is property of chromatic colours. It refers to the name of the colour, e.g., red, blue, and green. Hue varies with wavelength, and each colour is identified with a specific wavelength. For example, blue has a wavelength of about 465 nm. and green of about 500 nm. achromatic colours like black, white or grey are not characterised by hues. .

- Saturation is a psychological attribute that refers to the relative amount of hue of a surface or object.
- The light of single wavelength (monochromatic) appears to be highly saturated.
- As we mix different wavelengths, the saturation decrease. The colour grey is completely unsaturated.
- Brightness is the perceived intensity of light. It varies across both chromatic and achromatic colours.
- White and black represent the top and bottom of the brightness dimension.
- White has the highest degree of brightness, whereas black has the lowest degree.

Question 4. How does auditory sensation take place?

Answer: Sound serves as stimulus for auditory sensation. Loudness, pitch, and timbre are the – properties of sound. Organ of Corti located in the basilar membrane is the chief organ of hearing.

Auditory sensation begins when sound enters our ear and stimulates the chief organs of hearing.

Pinna collects the sound vibration and serve them to the tympanum through the auditory meatus.

From the tympani cavity the vibrations are transferred to the three ossicles, which increase their strength and transmit them to the inner ear. In the inner ear the cochlea receives the sound waves.

Through vibrations the endolymph is set in motion, which also vibrates the organ of Corti. Finally the impulses are sent to the auditory nerve, which emerges at the base of cochlea and reaches the auditory cortex where the impulse is interpreted.

Question 5. Define attention. Explain its properties.

Answer: The process through which certain stimuli are selected from a group of others is generally referred to as attention.

The properties of attention are selection, alertness, concentration and search.

1. **Selection**— A large number of stimuli impinge upon our sense organs simultaneously, but we do not notice all of them at the same time. **Only a selected few of them are noticed**, e.g. when you enter your classroom you encounter several things like doors, walls, windows etc but you selectively focus only on one or two of them at one time.
2. **Alertness**— Alertness refers to an **individual's readiness** to deal with stimuli that appear before him/her. e.g. while participating in a race in your school you must have seen the participants on the starting line in an alert state waiting for the whistle to blow in order to run.
3. **Concentration**— Concentration refers to **focusing of awareness** on certain specific objects while excluding others for the moment, e.g. in the classroom a student concentrates on the teacher's lecture and ignores all sorts of noises coming from different corners of the school.
4. **Search**— In search an observer looks for some **specified subset of objects** among a set of objects, e.g. when we go to school to fetch our younger sister and brother from the school we just look for them among innumerable boys and girls.

Question 6. State the determinants of selective attention. How does selective attention differ from sustained attention?

Answer: Selective attention refers to the focusing of conscious awareness on a particular stimulus. It is concerned mainly with the selection of a limited number of stimuli or objects from a larger number of stimuli. Factors affecting selective attention :

External factors:

These are related to the features of the stimuli. Other factors held constant.

- The size, intensity and movement of stimuli are important determinants.
- Large, bright and moving objects easily catch our attention.
- Auditory narrations are readily attended than visual narrations.
- Stimuli that are novel and slightly complex catch our attention.
- Human figures are more likely to be attended than the inanimate objects.

Internal factors can be of two types :

(1) Cognitive factors (2) Motivational factors

1. Cognitive factors include factors like interests, attitudes and preparatory set.
 - Stimuli that appear interesting are readily attended.
 - Stimuli that are favorably disposed by us also catch our attention.
 - Preparatory set a state of mind to act in a certain way and to respond to some stimuli and not to others at that moment.
2. Motivational factors
 - These are related to our biological and social needs e.g. hungry person will attain food first. During examination days students focus more on teacher's instructions.
 - Selective attention is concerned mainly with the selection of a limited number of stimuli from a large number of stimuli whereas sustained attention refers to focusing of awareness on specific objects while excluding others for the moment.
 - It is ability to maintain attention on an object or event for longer duration.

Question 7. What is the main proposition of Gestalt psychologists with respect to perception of the visual field?

Answer: Gestalt psychologists (Wertheimer, Koffka and Kohler) outlines several principles that describe the way in which basic sensory input are organized into whole patterns.

- According to Gestalt psychologists, human beings perceive different stimuli not as discrete elements, but as an organized, "whole" that carries a definite form.
- They believe that the form of an object lies in its whole, which is different from the sum of their parts.
- For example, a flower-pot with a bunch of flowers is a whole. If the flowers are removed, the flower-pot still remains a whole. It is the configuration of the flower-pot that has changed. Flower pot with flower is one configuration, without flowers it is another configuration.
- Gestalt psychologists also indicate that cerebral processes of human beings are always oriented towards the perception of a good figure. That is the reason why human beings perceive everything in an organized form.

Some of these principles are discussed below:

1. **Figure ground relationship**—We tend to divide the world around us into two parts: figure, which has a definite shape and a location in spaces; and ground, which has no shape, seems to continue behind the figure, and has no definite location. The figure-ground relationship helps clarify the distinction between sensation and perception.
2. **Contours**—Contours are formed whenever a marked difference occurs in the brightness or colour of the background. Contours give shape to the objects in our visual world because they mark one object off from another or they mark an object off from the

general ground. Contours determine shape, but by themselves they are shapeless.

3. **Grouping**—Haws of grouping describe basic ways in which we group items together perceptually. These are simple principles through which we perceive the world around us. The principles of grouping include **similarity, proximity, closure, and continuity**.
 - The principle of **similarity** says that objects of similar shape, size, or colour tend to be grouped together. In the auditory sense, sounds of similar tone and intensity are grouped together.
 - The law of **proximity** says that items which are close together in space or time tend to be perceived as belonging together or forming an organized group
 - Principle of **continuation** describes the tendency to perceive a line that starts in one way as continuing in the same way.
 - Law of **closure** refers to perceptual processes that organize the perceived world by filling in gaps in stimulation.
 - In case of principle of continuity if interruptions are too pronounced or too long, continuity disappears and a unified whole is not perceived.
4. **Camouflage**: When contours are disrupted visually, objects are difficult to distinguish from the background. This is camouflage. It works because it breaks up contours, e.g. uniform of soldiers in the forest.

Question 8. How does perception of space take place?

Answer: Space is perceived in three dimensions. This is because of our ability to transfer a two-dimensional retinal vision into a three dimensional perception. Spatial attributes of objects like, size, shape and distance between objects also contribute towards the perception of space.

Question 9.What are the monocular cues of depth perception? Explain the role of binocular cues in the perception of depth.

Answer: Monocular cues are psychological cues.

- These cues are often used by artists to induce depth in two dimensional paintings.
 - Hence they are also known as pictorial cues.
 - They help us in judging the distance and depth in two dimensional surfaces.
 - Some important monocular cues that in judging the distance and depth in two dimensional surfaces are as follows:
1. **Relative Size**: The size of retinal images allows to judge distance based on past and present experience with similar objects. As the objects gets away, the retinal image becomes smaller and smaller. One tends to perceive an object farther away when it appears small, and closer when it appear bigger.
 2. **Interposition or Overlapping**: These cues occur when some portion of the object is covered by another object. The overlapped object is considered farther away, whereas the object that covers it appears nearer.
 3. **Linear Perspective**: This reflects a phenomenon by which distant objects appear to be closer together than the nearer object. For example, Parallel lines, such as rail track appear to converge with increasing distance.
 4. **Aerial Perspective**: The air contains particles of dust and moisture that make distant objects look hazy or blurry. This effect is called aerial perspective.
 5. **Light and Shade**: In the light some parts of the object get highlighted, whereas some parts become darker. Highlights and shadow provide us with information about an object's distance.
 6. **Relative Height**: Larger objects are perceived being closer to the viewer and smaller

object a being farther away.

7. **Texture Gradient:** It represents a phenomenon by which the visual field having more density of elements is seen farther away.
8. **Motion Parallax:** It is kinetic monocular cue, and hence not considered as a pictorial cue. It occurs when objects at different distances move at a different relative speed. The distant objects appear to move slowly than the objects that are close. The rate of an objects movement provides a cue to its distance. For example, when we travel in a bus, closer objects move “against” the direction of the bus, whereas the farther objects move “with” the direction of the bus.

Binocular cues are depth information based on the coordinated efforts of both eyes. Three of them are:

1. **Retinal or Binocular Disparity:**
 - Retinal disparity occurs because the two eyes are separated from each other horizontally by some distance.
 - Because of this distance, the image formed on the retina of each eye of the same object is slightly different.
 - This difference between the two image is called retinal disparity.
 - The brain interprets large retinal disparity to mean a close object and a small retinal disparity to mean a distant object.
2. **Convergence:**
 - When we see a nearly object our eyes converge inward in order to bring the image on the fovea of each eye.
 - A group of muscles send message to the brain regarding the degree to which eyes are turning inward and these messages are interpreted as cues to depth perception.
 - The degree of convergence decreases as the object moves further away from the observer.
3. **Accommodation:** Accommodation refers to a process by which we focus the image on the retina with the help of ciliary muscles.
 - These muscles change the thickness of the lens of the eye. If the object gets away (more than 2m) the muscle is relaxed.
 - When it moves nearer the muscles get tensed and the thickness of the lens increases.
 - The signal about the degree of contraction of the muscle is sent to the brain which provides the cue for distance.

Question 10. Why do illusions occur?

Answer:

- Illusions occur because of a result of a mismatch between the physical stimuli and its perception by the individual.
- The mismatch is caused by incorrect interpretation of information received by sense organs.
- Illusions are called primitive organizations as they are generated by an external stimulus situation that generates the same kind of experience in all the individuals.
- Some illusions are universal in nature as they are found in all individuals.
- These are also called permanent illusions because they do not change with experience and practice.

- Illusions that vary from individual to individual are called personal illusions.

Question 11. How do socio-cultural factors influence our perceptions?

Answer:

- Several psychologists have studied the processes of perception in different socio-cultural setting. For example, they have used Muller-Lyer and vertical-Horizontal illusion figures with several groups of people living in Europe, Africa, and many others place, by comparing samples from remote. African villages and western settings.
- It was found that African subjects showed greater susceptibility to horizontal vertical illusions, whereas Western subjects showed greater susceptibility to Muller-Lyer illusion.
- Similar findings have been reported in other studies also. Living in dense forests the African subjects regularly experienced vertically (e.g., long trees) and developed a tendency to overestimate it.
- The Westerners, who lived in an environment characterised by right angles, developed a tendency to underestimate the length of line characterised enclosure (e.g., arrowhead).
- This research suggests that the habits of perception are learnt differently in different cultural settings.
- Hudson did a study in Africa, and found that people, who had never seen pictures, had great difficulty in recognizing objects depicted in them and in interpreting depth cues.
- Sinha and Mishra have carried out several studies on pictorial perception using a variety of pictures with people from diverse cultural settings, such as hunters and gatherers living in forests, agriculturists in cities.
- Their studies indicate that interpretation of pictures is strongly related to cultural experiences of people.