Sensory, Attentional And Perceptual Processes

We know our environment in particular and the world at large through our sense organs. The information collected by our sense organs is the basis of our cognition. The whole phenomena of cognitive functioning is determined by sensation, attention and perception. Sensation refers to the stimulation of a receptor (e.g., eyes) rather than the experience (e.g., seeing i.e. perception). Attention refers to the tendency of an organism to focus on selected features of the environment. Perception is a process by which information in the environment is transformed into an experience.

I. External stimuli are received through specialized sensory receptor cells.

(A) Sense organs receive stimuli, convert sensory energy into neural impulses, and send neural messages to the brain for interpretation.

(B) Psychophysics is the field of psychology that studies the relationships between physical stimuli and psychological sensations and perceptions.

II. The sense organs of sight transduce light energy.

(A) The intensity of light waves largely determines brightness, while the wavelength (frequency) largely determines colour.

(B) The eye, working much like a camera, is the primary sense organ for seeing.

1. Light enters the eye through the cornea (with the iris regulating the size of the pupil) and the lens into the retina.

2. Rods and cones convert light waves into neural impulses for transportation to the brain.

3. The 125 million rods, located throughout the retina except for the fovea, are active in peripheral vision and vision in dim light, but they do not play a role in colour vision.

4. The 6 million cones clustered mostly near the fovea code information for colour.

5. Both trichromatic theory and opponent-process theory are helpful in understanding colour vision.

III. The sense of hearing detects sound waves.

(A) The frequency of sound waves determines pitch, while the intensity determines loudness.

(B) The ear is the primary sense organ for hearing.

(C) Sound waves vibrate the eardrum, which is connected to a series of three movable bones (hammer, anvil, stirrup) in the midDiffemtial thresholde ear.

(D) The inner ear, containing the cochlea and the organ of Corti, transduces the sound wave energy into neural impulses for transportation to the brain.

IV. Chemical senses respond to chemicals rather than to energy in the environment.

(A) In the sense of taste, chemicals produce the perception of qualities of sweet, sour, bitter, and salty.

(B) In the sense of smell, chemicals produce the perception of odours.

V. Internal stimuli are also received by the sensory system.

(A) The vestibular organ provides information about body orientation, while the kinesthetic sense reports bodily position and movement.

(B) The various skin senses can detect pressure, temperature, and pain.

1. Two sensations of pain reach the brain at slightly different times because they travel on different neural pathways.

(a) The first sensation reaches the somatosensory area quickly on myelinated neurons.

(b) The more emotional type of pain reaches the limbic system more slowly on unmyelinated neurons.

2. Many factors can block the “pain gates” for the emotional aspect of pain.

VI. Sensory neural impulses, when transmitted to the brain, are interpreted in a process called perception; examining visual perception demonstrates the general nature of the process.

(A) Perception is an active mental process. Gestalt principles explain many of the ways in which humans tend to organize sensory information.

(B) Individual factors, such as emotion, motivation, and previous learning, also affect our perceptions.

Several factors influence perception. Attention divides our field of perception into a focus and a margin. Attention is shifted by such factors as intensity, size, contrast, and repetition. Preparatory set gives us a readiness to respond to one kind of stimuli and not to other kinds. Motivation gives us a tendency to see what we want to see. Previous learning strongly influences perception. Changes in perception can also be induced by depriving people of normal sensory experience. Most psychologists doubt the existence of extrasensory perception.

• The concentration of consciousness or certain objects and events or stimuli while ignoring others in the environment is referred to as attention.

• Attention is a cognitive process through which we select certain information by filtering out many others. Activation, concentration and search are important properties of attention. Attention can be classified as either focused or divided. According to process oriented view attention can be classified as Selective attention, Sustained attention and Divided attention. Selective attention is mainly selection of a limited number of objects from a large number of stimuli. Sustained attention is related to concentration which is focussing of awareness on certain specific objects while excluding others for the moment. It is also called Vigilance.

• Early filter theories of selective auditory attention proposed that only one input was selected for processing, with non selected inputs awaiting their turn in a sensory buffer. Later theories like Filter attenuation theory suggested that all inputs are processed in an attenuated (weakened) form. Multimode theories suggest that attention is a flexible system that allows selection of stimulus over others at three stages, i.e.,

sensory representation, semantic representation and late selection 3rd stage deep land processing.

• Selective attention is significantly influenced by certain external and internal factors. External factors like size, intensity, novelty, rhythm and motion influence attention whereas motivational factors e.g., biological and social needs and cognitive factors like interest, attitude and mental set of the individual influence individual's process of attention.

• Sustained attention i.e., concentration is influenced by sensory modality, clarity of stimuli, temporal uncertainty and spatial uncertainty.

• Basically attention is a pre perceptive process which depends upon individuals interest, motivation and the nature of stimuli.

• Perception is a process by which the sensory input or information is organised and integrated into a meaningful experience. Perception is a cognitive process by which we recognise, interpret or give meaning to the information provided by sense organs. The processing may be bottom up or top down. Many a times it is combined.

• Perceptual process is very much influenced by an individual's motivation, perceptual sets, cognitive styles, i.e.' Field dependent or Field independent, cultural background and experiences.

• There are two types of Perception: Forms perception and Depth perception.

• The process of organising visual field into meaningful wholes is known as Form perception.

• Gestalt Psychologists like Wertheimer, Kohler and Koffka have tried to explain the principles involved in the organisation of perceptions. Gestalt means whole or 'configuration'. The main principles involved in organisation of perception are figure and ground, perception, contour and grouping.

• The process of viewing the world in three dimensions is called depth or distance perception. In perceiving depth we depend on two main sources of information called Cues. Different type of cues facilitate depth perception which can be classified as : Monocular cues (Depth perception with one eye) and Binocular cues where space are provided by both eyes. The monocular cues is also known as pictorial cues or Psychological cues. In understanding the distance and depth in two dimensional surface many monocular cues are used like: Relative size, interposition, linear perspective, aerial perspective, light and shade, relative height, texture gradient and motion paralax (not pictorial cue).

• Binocular cues to depth perception in three dimensional space are retinal or binocular disparity, convergence and accommodation.

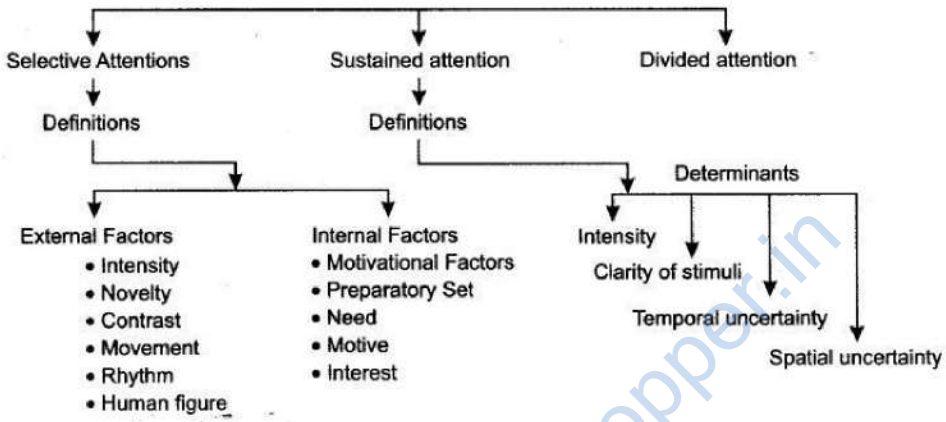
• Despite changing environmental conditions, an individual's awareness of the world around him remains stable and unchanging. Stability of perception helps one to adopt to his environment.

• This kind of stability of the environment experienced by human beings is termed as Perceptual Constancy. It may be size, shape or colour constancy.

• On certain occasions objects are perceived as different from their real shape or size. Such incorrect perceptions are called Illusions. These are false perceptions of reality. Some illusions are universal, whereas some are personal and cultural specific.

FEW MINDS MAP

Attention : It is effort location
: It is the process through which certain stimuli are selected from a group of others
: It is cognitive process

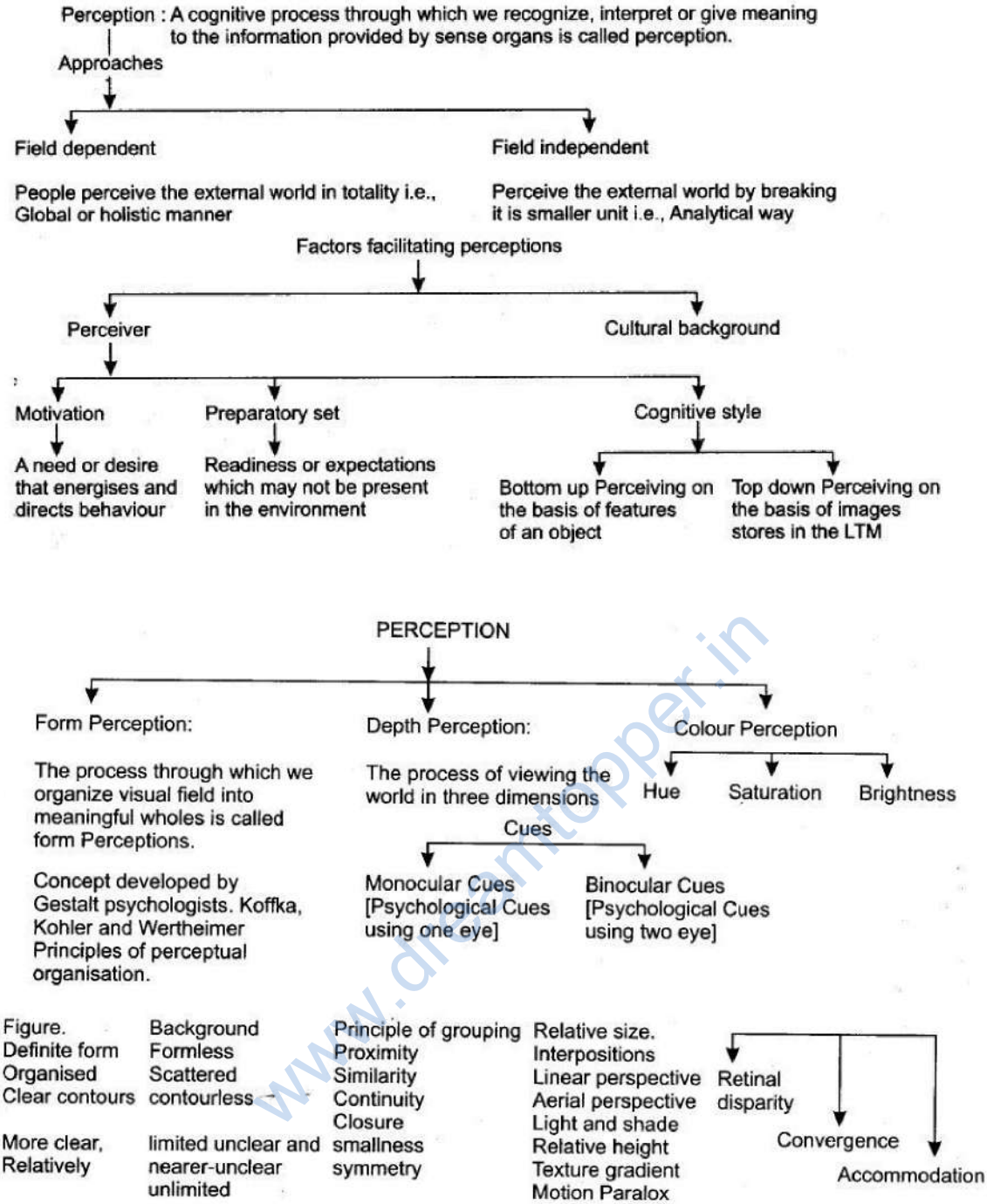


THEORIES OF ATTENTION

Filter Theory
By Broadbent
Many Stimuli simultaneously enter our receptors creating bottleneck situations.

Filter Attenuation Theory
By Triesman
The stimuli not getting access to the selective filter.
• At a given moment of time are not completely blocked.
• Some stimuli manage to escape through the selective filter to reach the higher level of processing.

Multimode Theory
By Lokhart and Heinz
Attention/Selection is a flexible system.
• Three levels
• Visual image
• Semantic representation
• Processing of information



Word That Matter

1. Absolute threshold : The minimum intensity necessary for a stimulus to be detected.

2. After images : A visual image that persists after a stimulus is removed.

3. Binocular cues : Depth cues, such as retinal disparity and convergence, that depend on the use of two eyes.

4. Bottom-up processing : In form perception, progression from individual elements to

the whole.

5. Cochlea : The fluid-filled, coiled tunnel in the inner ear that contains the receptors for hearing.

6. Cones : Specialised visual receptors that play a key role in daylight vision and colour vision.

7. Dark adaptation : The process in which the eyes become more sensitive to light in low illumination.

8. Depth perception : The perception of the distance of an object from the observer or the distance from front to back of a solid object.

9. Difference threshold : The minimum difference between a pair of stimuli that can be perceived.

10. Divided attention : The process by which attention is split between two or more sets of stimuli.

11. Eustachian tube : Passage that connects the middle ear to the throat and allows release of pressure.

12. Gestalt: An organized whole, Gestalt psychologists emphasized our tendency to integrate pieces of information into meaningful wholes.

13. Light Adaptation : The adjustment of the rods and cones in the eye to changes in illumination.

14. Loudness : The perception of a sound wave's amplitude.

15. Monocular cues : Visual cues from one eye only.

16. Organ of corti : Structure on the surface of the basilar membrane that contains the receptor cells for hearing.

17. Perceptual constancy : The ability, in perception, to draw similar inferences about the world from different patterns of sensory activity (e.g., a person seen from many different angles is still perceived as the same person).

18. Phi phenomenon : The illusion of movement created by presenting visual stimuli in rapid succession.

19. Pitch : The perceptual interpretation of a sound's frequency.

20. Primary colours: A set of three colours, i.e. red, green, and blue, when mixed in unequal amounts can produce any colour.

21. Retina: Layer of cells at the back of the eye containing photoreceptors.

22. Rods : Specialised visual receptors that play a key role in night vision and peripheral vision.

23. Selective attention : The focusing of conscious awareness on a particular stimulus.

24. Timbre : The characteristic quality of a tone produced by the combination of overtones heard along with the pure tone.

25. Top-down processing : In form perception, a progression from the whole to the elements.

26. Visual illusions: Physical stimuli that consistently produce errors in perception.

27. Wavelength: The distance from the peak of one light or sound wave to the peak of the next.