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Q. Discuss the monocular & Binocular cues of depth perception.
 or: Discuss the psychological & physiological factors governing perception of space or distance.

Ans. Depth perception refers to the perception of third dimension of the object. It is the process by which we have the immediate know. of the distance, space or depth of the present stimulus.

The retinal image of the object is the base of any cognition or perception. The difficulty with space perception is that the retinal image of the third dimension of the object is never formed. So it is a complex phenomenon to understand the way the perception of third dimension occurs. The researches relating to it have indicated the foll. cues or factors governing the perception of space.

a) Monocular Cues :- By monocular cues we mean the cues or factors which operate involving one eye only. Therefore they are called monocular cues. Here the determination of the distance is made on the basis of some psychological processes so the

also called physical cues or factors.

The foll. monocular cues are imp.

- 1) Size of the Stimulus:- The greater bigger the appearance of the size of the object, the lesser the distance & vice versa. The reason is that the image of the nearer object is made bigger & the image of the farther object is made smaller ^{on} at the retina. The nearer aeroplane appears bigger & with the increasing distance its size goes on becoming smaller & smaller. (This cue is useful for the determination of both - the absolute & relative distance.) However it has some dangers as well. (Gibson (1950) reported that due to the size constancy this monocular cue fails to be accurate Estimation of the object. Moreover this cue fails to give the estimation of the distance of the object which is unfamiliar. In spite of this difficulty this cue is very common & simple to estimate the distance of both moving & non moving objects.

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Movement of the Stimulus:-

Here two measures are taken into account for the estimation

of the distance of the object. One measure is the intensity of the movement. ^{the} Two objects, suppose have the same intensity of the movement. If one object appears moving with greater speed & another object appears moving with slow speed it means that the first object is nearer & the second object is farther. Farther objects appear moving slow & nearer objects appear moving fast. (The second measure is the direction of movement). If the two objects have the same intensity of movement & one appears moving in the opposite direction & the other appears moving in the same direction, it means that the first object is nearer & the second object is farther.) (Farther objects appear moving in the same direction while nearer objects in the opposite direction.) The passengers of a running train may find the nearer plants running behind & the farther plants running ahead ^{of} with the train. (This monocular cue is beneficial for determining both the absolute & relative distance; (But the difficulty is that it cannot determine the distance of a non moving object.) More or

Farther - slow
Nearer - fast

Farther - same dir.
Nearer - opp. direction

4)

it cannot determine the distance of the moving object whose intensity of speed is not known. So Woodworth (1954) has rightly remarked that its utility is much limited.

3) Interposition of the Stimuli:-

✓ If two objects are placed in the same direction, one object will mask another object. So the object ~~for~~ which masks will be nearer & the object which is masked is farther. Suppose A & B are ~~two~~ two objects placed in the same row & A is masked by B. Naturally the distance of A will be greater than that of B. {Acc. to Woodworth & Schloßberg (1954) this is the most reliable monocular cue for determining the perception of distance.}

② However ^{its utility is limited} the utility of this cue is limited. (It is useful only for relative distance & not for absolute distance.) Moreover it cannot determine the perception of relative distance of the objects which are not placed in the same direction or row. (Naturally, this cue is limited to only relative distance of the objects placed in the same row.)

⑤ (So the remark of Woodworth & Schloßberg is justified to this extent only).

4) The Contours of the Stimulus

This is a physical monocular cue in which the contours or the gradients or aerial perspective of the object serve as the index of the percep. of distance. (The more the clarity of the gradients of the stimulus, the shorter the distance + vice-versa.) (If the distance of an aeroplane is shorter ^{the} gradients of the aeroplane are ^{will be} more visible.) (With the increasing distance the gradients go on becoming less visible + ultimately with the greater distance it looks just a big spot.) So Harlow (1966) has remarked that on the basis of the visibility of the aerial perspective of the object its distance can be determined very easily. (It should be noted that this cue is helpful for the determination of both relative + absolute distance.) However the difficulty is that this cue cannot determine the distance of the object which is unfamiliar + unknown. (Moreover, as Gibson (1950) has pointed out, this cue becomes less effective due to shape constancy.)

5) Linearity of the Stimuli :- Here the linear perspectives of the

with the increasing distance the gradients go on becoming less visible. It looks just a big spot. So acc. to Harlow (1966) the distance of the object can be determined on the basis of its visibility. (Gibson (1950) has pointed out that this cue is less effective due to shape constancy.)

object serve as the index of depth perception. If two objects are parallel & so long as they appear parallel the distance will be shorter. On the other hand if they appear ~~converging~~ converging or meeting together the distance shall be greater. The observation of ~~a railway~~ tracks from diff. distances will bear witness to this fact. This monocular cue has limited utility. (It cannot determine relative distance. Again it cannot determine the relative distance of unparallel objects.)

- b) Binocular Cues: — There are some factors which cooperate with the involvement of both the eyes. so they are called binocular cues. Here the physiological processes taking place in both the eyes serve as the index of space perception. So they are also called physiological cues. The foll. three physio. cues are worth mentioning:
- 1) Accommodation Process: — Whether it is a binocular cue or a monocular cue, it is still a matter of controversy. However a majority of psy. sts consider it a mono. cue. But this is an agreed opinion that it is a physiological cue.

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While seeing a stimulus the lense becomes flat, big or short small manipulated by the ciliary muscles in accordance with the distance of the object so that its image may properly be formed ^{on} ~~at~~ both the retinas. So this process of adjustment relating to lense of the eyes is called accomodation process. This is purely a physio. cal process which may be treated as a criterion for the determination of the space of the object. If the lense accomodates to become small, the distance is longer & if it accomodates to become flat or bigger the distance must be shorter. This is highly a reliable index although very complex. Accr. to Morgan & King (1971) this physio. cal cue becomes unreliable after a distance of 70 ft.

2/ Convergence Process :- This is a binocular cue which has been an agreed opinion among psyists. Right from Wundt, the early experimentalist, to this time, Convergence is treated as binocular physio. cal cues. While seeing an object the eye balls move inward or outward. This movement of the eye balls is called Convergence process. Here the

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direction of this process serves as the index of space perception. The inward move. is the index of shorter distance & the outward move. is the index of longer move. Although a complex process, it is a reliable index of space perception. (Morgan & King have stated that this cue fails to give accurate estimation of distance beyond 70 ft.

Retinal Disparity :- This is the most reliable monocular physical cue. There is an agreed opinion that it is a bino. cue. (Numerous studies have been done to understand the complex nature of this process. (Wundt, Tolt etc.). * While seeing a stimulus ~~one~~ ^{on} double images ^{is} each at ^{on} the left retina & one ^{on} the right retina so double images are made of a single stimulus. These two images are never identical. There must be some disparity between the two. Now the amt. of disparity serves as the index of the distance of the object. The gr. the disparity the lesser the distance & vice-versa. It should be noted that the disparity becomes ^{zero} at infinitive.

* It is the diff. in the images falling on the retinas of the two eyes.

(Among all the psy. cal & physio. cal cues Retinal disparity is supposed to be the most reliable. (Hind. & Woodworth & Scholberg)