THE MAGNITUDE OF THE PULFRICH STEREOPHE-NOMENON AS A FUNCTION OF BINOCULAR DIFFERENCES OF INTENSITY AT VARIOUS LEVELS OF ILLUMINATION

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SUMMARY

(1) The present investigation is concerned with a stereophenomenon first described and analyzed by Pulfrich: with unequal illuminations in the two eyes, the bob of an oscillating plane-pendulum appears to rotate out of its plane of oscillation. The apparent displacement has been accounted for in terms of differences in visual latent-periods for the two eyes. Appropriate theory allows for calculation of latency-differences when the apparent displacement of the oscillating object in the vertical median plane is determined.

(2) Determinations are made of the relationships existing between (a) the magnitude of the near and far displacements (or the corresponding calculated latency-differences) and (b) the difference in retinal illumination existing between the two eyes for (c) many basic levels of illumination.

(3) The apparatus and procedure used in the experiment are described.

(4) Curves are drawn separately for each subject showing the near and far displacements (C_N and C_F) and the corresponding latency-differences (Δt_N and Δt_F), obtained at each of the levels of illumination, as functions of conditions of retinal illumination. The curves relating C_N, C_F, Δt_N, and Δt_F to conditions of retinal illumination show the following relationships: (a) displacement and latency-difference increase as the difference in retinal illumination increases; (b) displacement and latency-difference approach maximal values as the difference in retinal illumination increases; (c) the rate of increase depends on level of illumination; slopes of the curves increase as level-of-illumination decreases; (d) for a given difference in retinal illumination, displacement and latency-difference increase as level of illumination decreases; and (e) the difference in retinal illumination necessary to produce a constant displacement or latency-difference becomes smaller as level of illumination decreases.

(5) The results obtained may be accounted for on the assumption that the absolute visual latent-period and the logarithm of the stimulus-intensity are inversely related.

(6) The results are analyzed in terms of laws of space-perception, and additional experiments have been performed to test the relations.