Reversible Perspective as a Function of Stimulus-Intensity
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NOTES AND DISCUSSIONS

REVERSIBLE PERSPECTIVE AS A FUNCTION OF STIMULUS-INTENSITY

Some years ago, Fisichelli reported the results of a number of experiments on reversible perspective using the Lissajous figures, and advanced the theory that the rate of reversal is a function of the amount of stimulation of a given set of nerve fibers.[1] This conclusion seemed well supported by the evidence. Since this work appeared, little advance in the understanding of the factors responsible for reversible perspective has been made, but the question has developed additional interest as a result of Eysenck's finding that the reversal rate is reduced in psychotics,[2] and Speakman's that it is reduced in old people.[3] It is possible that further understanding of the processes taking place in psychosis and aging could be gained from a renewed consideration of the factors affecting rate of reversal. The implication of Fisichelli's theory, taken in conjunction with the findings on psychosis and aging, appears to be that among psychotics and old people there is reduced sensitivity to stimulation.

This argument needs strengthening at two points. In the first place, Fisichelli worked with the Lissajous figures while Eysenck used the Necker Cube and Speakman the Schroder staircase. It has been shown by Thurstone that a number of tests of the rate of reversible perspective are positively intercorrelated.[4] It seems likely, therefore, that the Lissajous figures and the two dimensional figures are comparable tests and that it is legitimate to argue from one to the other. Nevertheless, a demonstration that reversal rate on the two dimensional figures is a function of the amount of stimulation is clearly desirable. Secondly, Fisichelli did not experiment with the variable of stimulus-intensity, which might be regarded as one of the simplest and most direct estimates of the amount of stimulation of the nerve fibers. Accordingly, on the basis of Fisichelli's work two hypotheses have been set up. First, rate of reversal on the Necker Cube should be a function of amount of stimulation; and secondly, a further measure of the amount of stimulation can be derived from the stimulus-intensity,

[1] V. R. Fisichelli, Reversible perspective in Lassajous figures: Some theoretical considerations, this JOURNAL, 60, 1947, 240-249.
[2] H. J. Eysenck, *The Scientific Study of Personality,* 1952, 220.
[3] Quoted by A. T. Welford in *Ageing and Human Skill,* 1958, 170.
[4] L. L. Thurstone, *The Factorial Study of Perception,* 1944, 109.

and therefore stimulus-intensity should affect reversal rate on the Necker Cube.

The apparatus consisted of a wooden box about 30 cm. square, in one side of which was a glass window painted black. A Necker Cube measuring 4 cm. square was scratched in the paint, so that the cube, when a lighted bulb was placed in the box, was clearly observable. Two degrees of illumination were used: a 25-w. and a 60-w. bulb. Twelve men, university students, were used as subjects (*Ss*). They sat about 2 m. from the box. After the nature of the reversal was explained to them, they were shown the cube until they reported reversals. When they had become familiar with their task, they were then asked to report, during a 30-sec. interval, the number of (1) spontaneous reversals and (2) of reversals that occurred when they were trying to prevent them. Half the *Ss* looked at the brighter cube first; half the dimmer.

The mean reversal rates reported for the two conditions under the different stimulus-intensities were as follows: Condition 1, 25-w. light, 7.51; 60-w., 12.66 ($t = 2.64$, $p > 0.05$); Condition 2, 25-w., 3.75; 60-w., 7.25 ($t = 5.00$, $p > 0.001$). It will be observed there is a significant tendency for the *Ss* to report more reversals at the higher stimulus-intensity.

The results confirm and extend Fisichelli's theory that rate of reversal is a function of the amount of stimulation by showing that reversal rate is a function of stimulus-intensity and that the relationship holds for the Necker Cube as well as for the Lissajous figures. The wider implications of this finding seem to be twofold. In the first place, the demonstration that reversal rate depends on the intensity of the stimulus relates reversible perspective to Hull's construct of stimulus-intensity dynamism (V) and thereby to a number of other phenomena. Secondly, the findings that psychotics and old people have a low reversal rate implies that psychotics and old people perceive stimuli less intensely or, in Hullian terms, have low values of V.

An alternative explanation could be found in the concept of attention. It is possible that reversals are a function of attention, and that the present findings were obtained because one determinant of attention is stimulus-intensity.[5] The implication of this explanation would be that there is a reduction in the capacity for attention among psychotics and old people. Such an explanation accords well with recent work suggesting that psychotics

[5] D. E. Broadbent, *Perception and Communication,* 1958, 298.

and old people have high inhibitory potentials and are impaired on tasks where sustained attention is required.[6]

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DEPTH-PERCEPTION AND ASTIGMATISM

Depth-phenomena described here were observed and investigated by the author whose eyes are astigmatic. These phenomena result from the fact that the astigmatism differs in kind and degree for each eye. When I look at a dot from a distance of 30 cm. with my right eye, I see it as two dots—one slightly above and to the left of the other. The lower dot is 0.58 mm. (6′43″ of angular value) to the left and about 1 mm. (12′10″) below the upper one. With my left eye, I see it similarly doubled; the lower dot is seen almost vertically beneath the upper one, 0.29 mm. (3′21″) to the left and 0.89 (10′11″) below the upper one. With the right eye, the lower dot looks larger and sharper than the upper; with the left eye, the upper looks larger and sharper than the lower. When I look at the dot binocularly from the same distance (30 cm.) I see again two dots; both approximately of the same sharpness and about the same size (effect of the summation of both images), but the upper one is farther away from me and the lower, which is nearer, is a bit to the left.

When the observation is repeated with a vertical hair, or thin line drawn on a sheet of paper, similar results are obtained. With the right eye, I see two lines slightly displaced vertically and horizontally, the right line being sharp, the left thinner and blurred. With the left eye, I also see two lines, the right thin and blurred and the left sharp and clear, the lateral distance between the two lines being larger for the right eye than for the left; for both eyes the interspace between the two lines is filled up with a brownish blur. When viewing with both eyes, I see two lines displaced in space; the left one in front of and slightly lower than the right one and between them a brownish blur. Besides, I see the portion of the sheet of paper in the neighborhood of the left image nearer than that adjoining the right image, as if the sheet were broken by the two images of that line.

These results are the same as those obtained from two dots or two lines similarly arranged on the two halves of a stereogram and combined in free stereoscopy or by the use of a stereoscope.

[6] P. H. Venables and J. Tizard, Paradoxical effects in the reaction-times of schizophrenics, *J. abnorm. soc. Psychol.*, 53, 1956, 220-224; Stephen Griew and Richard Lynn, The construct "reactive inhibition" in the interpretation of age changes in performance, *Nature*, 1960, 182.