STEREOKINETIC PHENOMENA: DEMONSTRATIONS AND A POSSIBLE EXPLANATION

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Stereokinetic phenomena first investigated by Musatti (1924, 1955) are threedimensional objects produced by 2-D figures in slow rotatory motion, that appear solid and real. A circle with an eccentric dot inside appears as a cone with well defined dimensions. An ellipse of uniform colour appears as a rigid disc or as an ellipsoid with its major axe slanted in depth. A uniform rectangle with semi-circular minor sides appears as a cylinder. A bar of constant length appears slanted in depth and 1.5 longer than when it is stationary on the frontal plain. Three aspects of these objects are theoretically interesting: 1) they do not appear to rotate but describe a circular translation, 2) they appear as 3-D and solid, 3) they appear of a well defined length in depth. These three aspects were explained by Musatti and others as due to different perceptual mechanisms. The first as due to a tendency to a constant orientation in space or to the limited aperture of peripheral movement receptor (misperception). The second as due to a constancy of form (Musatti) similar to the rigidity hypothesis (Ullman, 1979,1983). The third aspect, the apparent length in depth, cannot be explained by either of these hypotheses.

The hypothesis posited here will consider these three aspects of stereokinetic phenomena as strictly connected and due to the same visual process. This process minimizes the relative velocity differences between all the points of the moving configuration. It is based on the fact that the different velocities of two points on the frontal plane can be equalized by adding to the velocity of one point a depth component such that this will appear to move in depth describing, in the same period of time, a distance equal to that of the point moving on the frontal plane.

The hypothesis can be mathematically formulated and can predict the apparent length in depth of the stereokinetic objects. The predictions are in good agreement with experimental results. Moreover, the hypothesis can be applied to translatory movement on the frontal plain.

References

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