Notes and Comment

Zanuttini's "surface shrinkage" explanation of the Poggendorff misalignment effect

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Zanuttini (1976) has recently argued in this journal that the apparent misalignment of two oblique, collinear lines separated by a pair of parallels, the Poggendorff illusion, is attributable to apparent shrinkage or narrowing of the surface defined by the parallels. This explanation, which is supported by experimental data, derives from general principles proposed by Koffka (1935) and Metzger (1930) and recent observations reported by Kanizsa (Note 1).

In agreeing with the general argument that the Poggendorff effect is due to perceptual distortion of the space between the oblique lines, I wish also to point out that our data show that the distortion in the conventional parallel-line figure studied by Zanuttini is an outcome of three components. Each can by itself give rise to spatial distortion with consequent apparent misalignment of collinear elements. This explanation has recently been set out in detail (Day & Dickinson, in press).

Briefly, we argue that apparent extent between the aligned elements is relatively elongated in one direction and contracted in that at right angles to it. Three independent components, the horizontal-vertical (HV), the longitudinal-transverse (LT), and the obtuse angle (OA) effects, have been shown to contribute either singly or jointly to this perceptual distortion.

The HV component is the well-known greater apparent extent in the direction corresponding with the vertical meridian of the eye compared with that corresponding with the horizontal meridian (Avery & Day, 1969; Begelman & Steinfield, 1967; Künnapas, 1955). The LT component refers to the apparently greater extent longitudinally in a rectangular figure than the same physical extent transversely (Piaget & Denis-Prinzhorn, 1953; Sanford, 1898; Wundt, 1893). The OA component is the apparently greater extent along a line forming an obtuse angle with another than the same distance along a line standing alone (Day, 1974; Jastrow, 1892; Judd, 1899).

In consequence of these effects, acting singly or jointly, apparent oblique direction across the open space between the aligned elements is modified so that the elements appear to be misaligned. Perceived misalignment is therefore secondary to spatial distortion. We have shown also that the contributions of the HV, LT, and OA components in the conventional parallel-line figure are approximately 34%, 26%, and 40%, respectively.

The separate contributions of the three compo-

nents can be demonstrated with appropriate figures. For example, if the conventional figure is oriented with the parallels horizontal, apparent misalignment is reduced by about 23% compared with the vertical orientation. This reduction is due to opposition between the HV effect, on the one hand, and the LT and OA effects, on the other. The involvement of the HV component can also be shown with two oblique lines alone. With this figure, a small, but nevertheless reliable, apparent misalignment occurs (Day, 1973). A general notion of surface shrinkage cannot easily account for either the reduction with horizontal orientation of the parallels or the effect with two obliques alone.

Thus, while agreeing generally with Zanuttini that the Poggendorff illusion is due to distortion of space between the collinear obliques, we wish to make two further points. First, apparent distortion is not merely a shrinkage transversely between the parallels (when both are present), but an elongation longitudinally. Second, there are three separate and independently demonstrable components which can contribute either alone or together to the spatial distortion between the two obliques.

REFERENCE NOTE

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