Fig. 2. The slight apparent bending of the horizontal line in the figure obeys the rule of the acute angles (see text). As in all such cases it is the single line which is distorted, not the repetitive stripes. This figure also contains the key configuration in Gregory's Necker cube and shows that the cube itself is unnecessary

example, as the top of a cone. To do this, however, is to make a quite arbitrary designation of the perspective sense, and the distance explanation then loses any predictive value.

A general rule which applies to all cases of figural distortion on a background field is that acute angles are perceptually enlarged (Fig. 2). This has been discussed by previous authors[4]. This rule has the merit of applying in the two cases in Fig. 1 and, in addition, since distortion is related to the acuteness of the angle of intersection, it predicts the curved distortion in these figures and the linear distortions in illusions such as the Zöllner. Unfortunately, in the majority of cases, the constancy scaling hypothesis and this angle rule for distortion predict exactly the same effects, so that it is difficult to distinguish the two experimentally. Indeed, this angular distortion is basic to Tausch's explanation of many illusions[5]. He postulates that lines forming an acute angle represent a right angle in perspective view and this cue for perspective produces the distortion, or in Gregory's terms, sets the scaling. At this extreme, Tausch's hypothesis is not useful since it is, in fact, not disprovable. Any angle can be regarded as the perspective view of a right angle, and, consequently, any pattern containing line intersections can be held to possess depth cues. The fact that the distortions observed in the illusion figures operate in the appropriate direction does not in any sense prove that they are due to the interpretation of an acute angle as a right angle. The same criticism applies to the interpretation of the bending of the line in Gregory's Necker cube figure. The bending of the line is, of course, not dependent on the presence of a Necker cube, it occurs in other configurations also (Fig. 2). All such configurations are subject to the previously mentioned ambiguities of interpretation. In further support of his depth hypothesis, Gregory reports that, in the case of the illusions where figures are distorted by a background, the illusion disappears when the affected lines are displaced in depth from the background in a stereoscope. One can produce this displacement more simply by etching the main long lines on a 'Perspex' sheet and viewing the background pattern through this at a distance (for example, at 50 cm). The Zöllner and Hering illusions are still strikingly present in such conditions. A final interesting point is that the Zöllner illusion is still present if the whole display is in three dimensions, with the pattern on the floor of a normal daylit room and the main lines extending away from the observer over a distance of 4 m. The distortion produced by the configuration thus persists even in the presence of real perceived depth. The only concrete evidence for the constancy scaling hypothesis in the context of the illusions is Gregory's experiment relating measurements of apparent distance to the size of the illusion. The correlation of 0·9 which he quotes for the Müller–Lyer is extremely convincing. In view of this, but acknowledging some of the points already mentioned, it is possible to suggest that illusions like the Müller–Lyer and Ponzo's illusion are different types of illusion from the distortion of figures on patterned fields. Such distortions remind one forcibly of some of the phenomena described by McKay[6], in particular his finding that such repetitive fields impose an orderly movement on a random noise pattern, such that the dots appear to move at right angles to the lines of the pattern. His interpretation of this and applied phenomena in terms of the satiation of certain direction analysers and of sampling of the visual field may be the correct interpretation of the distortion illusions. Certainly none of the known facts concerning these illusions appear to controvert this.

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I would disagree with Mr. Wallace that Figs. 1*a* and 1*b* have the same perspective sense. On my view there are gradients of expansion along each of the converging lines of 1*a*. This expansion is due to the converging perspective of these lines, so that any feature near the middle of this figure should be, and is, expanded. This gives the outward bowing of the vertical line, since the expansion is greater where these lines are near the centre of the figure. Fig. 1*b* is less obvious. If the arrangement of equally spaced circles is viewed as a luminous figure, with a single eye, to prevent the competing information that it is in fact flat, it appears flat. If, however, the spacing of the circles is non-uniform, then it will be seen as a tunnel or a cone, depending on whether the spacing increases or decreases outward from the centre. In other words, the depth of the background figure depends on the spacing of the circles, not the circles themselves.

What we must consider is why primary scaling should be set by the arcs of the circles touching, or nearly touching, the straight lines. Their distortion is compatible with the form of the Müller–Lyer illusion having curved ends. An ingoing curve produces shrinking, as does the more familiar ingoing corner. It seems that, in this Orbisson figure, the ingoing arcs produce local shrinking in the same way, giving the observed inward bowing of the superimposed lines. My hypothesis does not lose predictive power through arbitrariness, for the local depth effect can be directly measured in this, as in other, cases.

In pointing out that a line straight across a Necker cube appears bent, I realized that the whole of the Necker figure is not necessary to produce the bending. The point of using a complete Necker cube, rather than just a corner, was to show, using the reversal properties of the figure as a whole, that the bending is in the same direction whether this corner is seen in inward or outward depth. It is a crucial observation to distinguish between primary and secondary constancy. Wallace evidently fails to see the significance of this point, and his Fig. 2 does not add anything to the discussion.

With regard to illusions in binocular perception: this is very complicated, and exactly why they sometimes disappear and sometimes do not remains to be worked out. I would not agree that reference to direction analysers is helpful in explaining these illusions, for we know too little of their properties. In any event, 'satiation' can scarcely be involved, for this implies a time course; but these illusions are seen instantaneously and do not increase with prolonged viewing. The particular strength of the misplaced constancy theory is that it clearly relates well-established perceptual phenomena and does not require special or untestable assumptions.

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