

Last but not least

The Poggendorff illusion: premeditated or unpremeditated misbehaviour?

Abstract. Poggendorff illusions have sometimes been explained as arising in a two-stage process, with misalignment consequent upon prior, independently observable misjudgments of angle, extent, or proportion. However, several misalignments combined in one figure can be arranged so that if such prior illusions were the cause, they would have to transform simultaneously in opposed directions to save appearances. When Poggendorff misalignments are deliberately embedded in other illusions, results are intriguingly various, but the comparison of Poggendorff figures with and without associated illusions suggests that the underlying misalignments arise from pre-attentive cues, local to each traverse across a gap.

Meet Miss Alignment (figure 1), a witness in the mysterious case of the Poggendorff illusion. It is sometimes presented as a two-stage affair, with misalignment appearing only as a consequence of a primary misjudgment of angle, ratio, or position in the plane or in depth. The primary misjudgment is then at least in principle accessible to conscious scrutiny, independent of the Poggendorff context.

Miss Alignment doesn't buy the two-stage idea. Suppose that errors of angular size or line orientation are the agency. Either the test lines *A*, or the parallels *B*, would have to rotate simultaneously clockwise and anticlockwise, or to bulge, to match what we see (more saliently as regards lines *A* and *B* with Miss A turned on her side). In another proposal, Ninio (2001) suggests that a tendency to exaggerate ratios, which he shows has predictive value in a wide range of illusions, contributes to Poggendorff illusions. The ratio concerned would then be of distances across the gap, and its perceptual enhancement in classic Poggendorff figures would reduce the distance normal to the inducing parallels, whilst increasing the oblique transit between the target points.

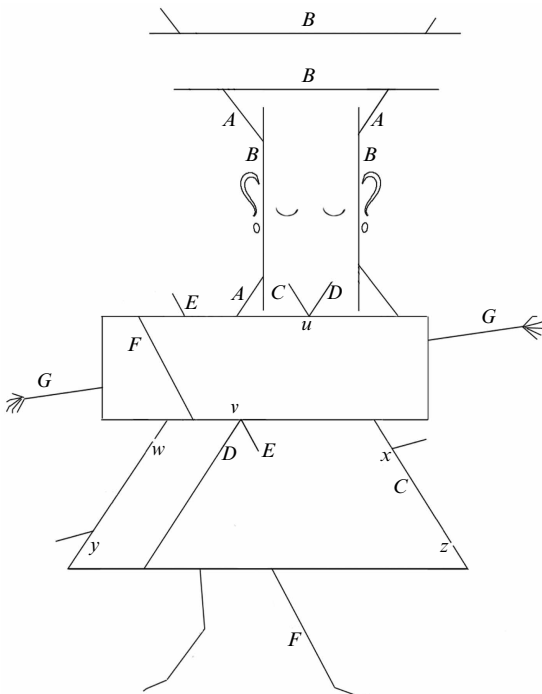


Figure 1. Miss Alignment. Poggendorff misalignments are sometimes attributed to prior misjudgments of angle, relative proportion, or extent in the plane or in depth. But these agencies would have to present illusion simultaneously in opposed directions to save appearances in this figure.

However, Miss Alignment presents what seems to be a robust Poggendorff type misalignment between points x and y , where the inducing lines are not parallels, but the upwardly converging edges of her skirt. But that leads to another opposition if ratio exaggeration were at work here, since the ratio wx/xy would now be opposed by yz/xy . Alternatively, Gillam (1971) proposes that misjudged target position arises because obliques are seen as receding, whilst the gaps are understood as planes normal to the line of sight. But here the plane that would be normal to line of sight interrupting alignment D has simultaneously to recede with F , and vice versa.

Or imagine, (as suggested mainly in older accounts), that narrowing of the gaps between parallels is at work, from attraction of parallels or via a Müller-Lyer related effect. Bringing the horizontal parallels closer would certainly account for the otherwise paradoxical effect at target point u , which appears shifted to the right in respect of test lines D , and simultaneously to the left with test lines C . However, any reduction of the gap between the horizontal parallels must surely also proportionately compress the height of the vertical edges of the rectangle comprising Miss Alignment's chest. Such a compression would at the same time shift the junctions of test lines G with the vertical edges, in a direction counter to the misalignment we observe (assuming that the orientation of G remains unaffected, as might be expected). This is diagrammed in figure 2, which shows that reduction of the gaps between parallels, were it at work, would seem likely to result in contradictory effects, whenever Poggendorff misalignments across horizontal and vertical parallels are combined in a single figure.

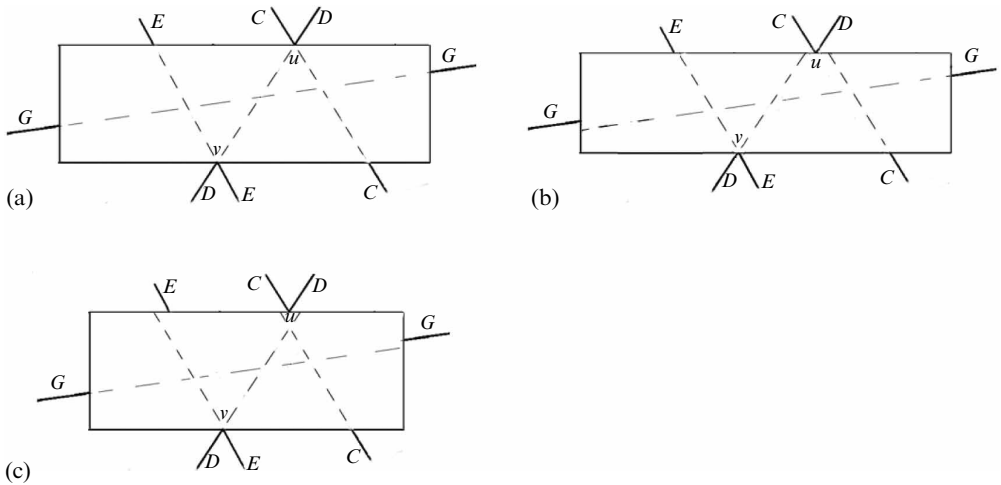


Figure 2. A diagrammatic demonstration of contradictory alignment transformations, if attraction of parallels were at work in figure 1. (a) Dotted lines show objective alignments. (b) Narrowing the gap between horizontal parallels saves appearances in figure 1 at u , and with line E , but proportionately compressing the vertical edges opposes what we see with G . (c) Reducing the gap between vertical parallels matches what we see with G , but opposes appearances with C , D , and E .

Yet, in defiance of all these various contradictions, the misalignments in figure 1 seem quite stable. As the eye runs over them, they don't flip from one state to another, and we can be simultaneously aware of more than one of them at a time. Don't the contradictions then exclude the possibility that any primary misjudgments involved are accessible to independent scrutiny?

When Poggendorff misalignments are deliberately associated with independently assertive illusions, they are in some cases inhibited or enhanced, but in others resist any effect. Attaching Zöllner inducers to Poggendorff test lines, as might be anticipated either enhances or inhibits the Poggendorff illusion (figure 3a). (Twisted cord type inducers can have similar effects.)

On the other hand, in figure 3b an opposed-angle misalignment between x and y is not obviously affected at all by association with a Müller-Lyer array, where one might have expected apparent gap expansion by assimilation of the test points in the two illusions to reduce misalignment. Absence of an effect seems consistent with the independence of judgments of extent and alignment established in the Morinaga paradox (Morinaga and Ikeda 1965).

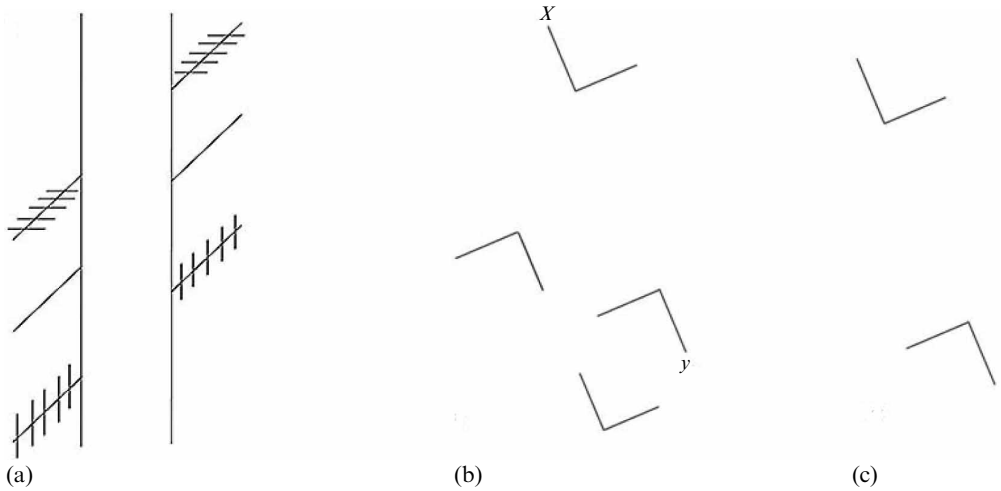


Figure 3. When Poggendorff-type misalignments are deliberately associated with other illusions, they may be inhibited or enhanced, as by Zöllner effects at (a), or left unaffected, as by a Müller-Lyer illusion, if misalignment between x and y in (b) is compared with (c).

Similarly, various results follow when the associated illusions are explicitly of depth. Since the late nineteenth century, researchers, including most recently and ingeniously Howe et al (2005), have sought Poggendorff arrays in perspective contexts, in search of configurations that might account for the perceived misalignments. Extreme geometric perspective can certainly affect the illusion. Gillam (1971) demonstrated that misalignment halves when test lines cooperate with other obliques to target a dominant vanishing point. Within a Ponzo context (figure 4), the objectively parallel test lines accommodate to the horizontal size-constancy expansion with apparent divergence, even though their upper segments are on surfaces that do not recede. Misalignment also remains

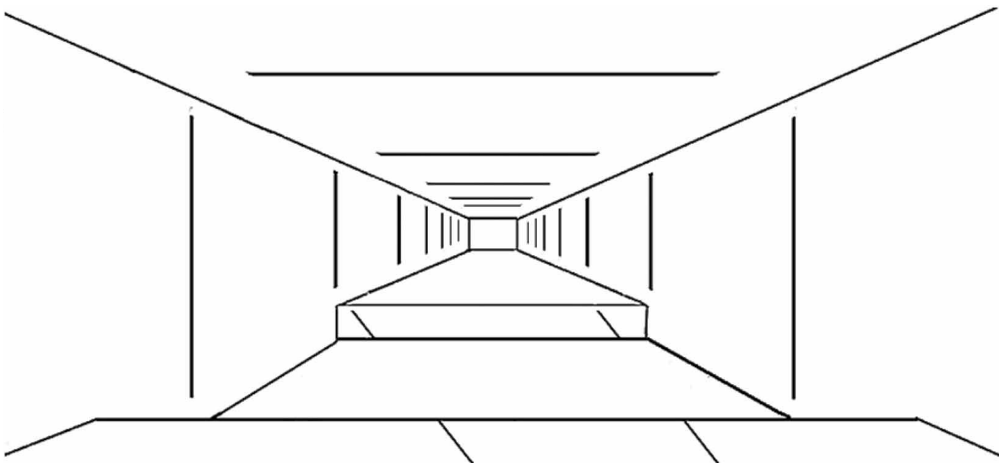


Figure 4. Poggendorff-in-Ponzo. The objectively parallel test-lines adapt to size-constancy expansion with divergence, cue signalled by the obliques, even though their upper segments do not recede.

robust, whereas I anticipated its increase to the left, and reduction to the right, in line with inference from the expected shift in apparent test-point positions. The divergence we observe instead seems consistent with Gregory's (1998) characterisation of obliques as depth signal cues, acting as it were by default independently of top-down spatial knowledge. (To my eye, the apparent divergence of the parallels in this figure can reduce with inspection, but becomes stronger as the angle of vision occupied by the context increases, when the image is enlarged or brought closer, and can also be refreshed by turning the figure upside down.)

More generally the distinction that these figures may clarify, when they are all taken together, would be between agencies accessible to conscious scrutiny, as in figures 3 and 4, and whatever is at work in figure 1. The former seem to co-exist with Poggendorff illusions, sometimes interacting with them, but only to adjust the underlying Poggendorff effect. Must not the misalignments in figure 1, by contrast, be cued pre-attentively, and separately, by characteristics local to each gap crossing? For me, the cues most probably act on the orientation of the gap trajectory—the culprit lurking out of sight in every figure—but Miss Alignment's evidence does not rule any of the usual suspects out of the line-up. It does, maybe, reduce the charge they face from premeditated to unpremeditated misbehaviour.

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