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Depth and motion in object completion

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Models of illusory and occluded contour and surface completion have focused on static spatial relations in planar surfaces. We consider several findings indicating that depth and motion play important roles in object completion. In one set of studies, effects of depth separation were studied in a speeded classification paradigm in which surface pieces were oriented in parallel or convergent (intersecting) planes. Subjects' task was to respond "parallel" or "convergent" on each trial. It was hypothesised that object completion would facilitate performance, and that depth separation of the two visible areas would disrupt completion. Speed and accuracy were reliably reduced when object parts were separated in depth via stereoscopic information. In a second series of studies a speeded classification paradigm was used to test perception of illusory figures from edges specified solely by motion (accretion-deletion of texture). The aim of a third study was to test occluded object completion where the visible parts of the object were not simultaneously present, but revealed over time. Results showed reliable object completion effects when certain spatial and temporal relationships held among object parts.

We discuss three elements of a revised theoretical model suggested by these results: (1) edge inputs to boundary completion processes need not be luminance edges---they may also be motion-specified edges; (2) the criterion of relatability governing edge interpolation processes must include depth relations as well as planar ones; (3) the criterion of relatability must be reformulated in terms of spatiotemporal, rather than merely spatial, relationships. Particulars of a new model that meets these conditions are briefly described.