

Vision after early blindness

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We report on the initial visual experiences of MM, who recently received his first successful corneal transplant after becoming completely blind (except for light sensitivity) at age 3. He had no visual imagery or memories of life as a sighted person.

MM's post-operative vision presently remains neurally limited in resolution to 20/450 for static gratings, but is about twice as good for drifting gratings. His perception of depth and 3D spatial arrangement is somewhat rudimentary but shows interesting differences between the effectiveness of different cues: he can exploit occlusion and motion parallax (a wire frame cube appears flat, but pops into relief when rotated), but he can not derive solid shape from shading (a simulated ball lit from above looks flat). He was able to recognize a simple Johansson figures as depicting a moving person. He does not perceive subjective contours in static displays, but does if the display elements are set in motion.

MM experiences brightness illusions associated with T junctions (e.g. White's illusion). He is impressively free from geometrical illusions that are associated with a suggestion of depth (e.g. he matches the images of the Shepard tables veridically, and shows little or no phenomenal regression to the real object in his assessment of the aspect ratio of the images slanted surfaces); yet he shows roughly normal susceptibility to many geometrical illusions, including Muller-Lyer and Sander.

The cues that MM exploits for depth perception are those that (unlike shading) have counterparts in the tactile world. His results with the Muller-Lyer illusion (unlike those of Gregory and Wallace's SB) suggest that this illusion does not depend on processes associated with depth perception. The particular efficacy of motion in MM's visual world suggests that motion mechanisms may be more robust to deprivation, or perhaps are sustained in the blind by tactile experience.

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