

Sometimes change blindness is just a visual amnesia

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Abstract

People often fail to report large changes in visual displays (“change blindness”). One influential interpretation is that perceptual representations are not as rich as people think. However, change detection could fail at any of three stages: perception, memory or comparison. We tested the same stimuli at each stage in three experiments.

All experiments tested both simple (diamonds, circles) and complex (2s, 5s) stimuli. Objects were presented on an imaginary circle around fixation. In Experiment 1 (perception), participants reported which of two forms predominated (e.g., more diamonds or circles?) in displays of 3, 6, or 9 items. For simple forms, reaction times (RTs) were nearly independent of set size (slope = 5.9 ms/item). For complex forms, RT increased with set size (55.1 ms/item). In Experiment 2 (memory), we presented displays of 6 or 9 items for 500 ms. After a 300–1200 ms blank interval, a single location was probed, and participants had to report which item was initially presented there (e.g., diamond or circle?). For simple forms capacity was near ceiling, while for complex forms, capacity was 2–3 items, independent of set size. Experiment 3 (comparison), was similar to Experiment 2 except that instead of a memory probe, a second display appeared 1000 ms after the initial display. Participants indicated whether this display had changed from the first display. For both complex and simple forms participants could access no more than 2–3 items.

For complex stimuli, capacity limits were seen in perceptual processing (steep slopes in Experiment 1). For simple stimuli, perceptual and immediate memory processing were virtually unlimited. The limit in change detection occurred in the comparison stage. Either the second display disrupted memory, or the comparison process itself was capacity-limited. We argue that the interpretation of change blindness depends critically on the complexity of the stimuli.