Computing an average when part of the population is not perceived.

By elsc_admin
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By elsc_admin September 15, 2016


Abstract:

The syndrome of unilateral spatial neglect (USN) after right-hemisphere damage is characterized by failure of salient left-sided stimuli to activate an orienting response, attract attention, and gain access to conscious awareness. The explicit failure processing left-sided visual information is not uniform, however, and patients seem to be more successful performing certain visual tasks than others. The source of this difference is still not clear. We focus on processing of visual scene statistical properties, asking whether, in computing the average size of an array of objects, USN patients give appropriate weight to objects on the left; disregard left-side objects entirely; or assign them an intermediate, lower weight, in accord with their tendency to neglect these objects. The interest in testing this question stems from a series of studies in healthy individuals that led Chong and Treisman [Chong, S. C., & Treisman, A. Statistical processing: Computing the average size in perceptual groups. Vision Research, 45, 891-900, 2005a; Chong, S. C., & Treisman, A. Attentional spread in the statistical processing of visual displays. Perception & Psychophysics, 67, 1-13, 2005b] to propose that processing of statistical properties (like the average size of visual scene elements) is carried out in parallel, with no need for serial allocation of focal attention to the different scene elements. Our results corroborate this suggestion, showing that objects in the left ("neglected") hemispace contribute to average size computation, despite a marked imbalance in spatial distribution of attention, which leads to a reduced weight of left-side elements in the averaging computation. This finding sheds light on the nature of the impairment in USN and on basic mechanisms underlying statistical processing in vision. We confirm that statistical processing depends mainly on spread-attention mechanisms, which are largely spared in USN.

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