FREE

Vision Sciences Society Annual Meeting Abstract | August 2014

Electrophysiological correlates of size constancy

Irene Sperandio; Juan Chen; Melvyn Goodale

+ Author Affiliations

Journal of Vision August 2014, Vol.14, 146. doi:https://doi.org/10.1167/14.10.146

Abstract

Size constancy is the ability of the visual system to achieve a stable experience of perceived size despite the fact that the image projected onto the retina varies continuously with viewing distance. To compute the perceived size of an object, our visual system needs to combine together retinal image size with distance information. To date, there has been little investigation on the neural mechanisms that underlie size constancy in the human brain in a situation in which the real, rather than the apparent, distance of the stimulus is manipulated. In the present study, event-related potentials (ERPs) were measured to investigate the temporal dynamics of size-distance scaling. The viewing distance and the retinal image size of a series of filled black circles were varied to create four experimental conditions: 'small-near', 'big-near', 'small-far', and 'big-far'. The critical conditions were those in which the stimuli were perceived as different in size but subtended the same retinal angle as a result of their different distance from the observer (i.e. 'small-near' vs. 'big-far') as well as those in which the stimuli were perceived as constant but their retinal image size decreased with distance (i.e. small-near vs. small-far, big-near vs. big-far). Participants were asked to maintain their gaze steadily on a fixation point throughout the experiment while EEG was recorded from 28 scalp electrodes. We focused on the first visual evoked ERP component peaking at approximately 100 ms after stimulus onset. We found earlier latencies in response to larger than smaller stimuli, regardless of their distance. Moreover, we observed that the amplitude was greater in the far than in the near condition, regardless of stimulus size. These findings provide novel evidence that size constancy involves operations that take place at the earliest cortical stages in conditions in which the real, rather than the apparent, distance changes.

Meeting abstract presented at VSS 2014