Rapid formation of spatiotopic representations as revealed by inhibition of return

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Created 7/4/2011
By zroth July 4, 2011

Pertzov, Y, Zohary E, Avidan G. 2010.

Abstract:

Inhibition of return (IOR), a performance decrement for stimuli appearing at recently cued locations, occurs when the target and cue share the same screen position. This is in contrast to cue-based attention facilitation effects that were recently suggested to be mapped in a retinotopic reference frame, the prevailing representation throughout early visual processing stages. Here, we investigate the dynamics of IOR in both reference frames, using a modified cued-location saccadic reaction time task with an intervening saccade between cue and target presentation. Thus, on different trials, the target was present either at the same retinotopic location as the cue, or at the same screen position (e.g., spatiotopic location). IOR was primarily found for targets appearing at the same spatiotopic position as the initial cue, when the cue and target were presented at the same hemifield. This suggests that there is restricted information transfer of cue position across the two hemispheres. Moreover, the effect was maximal when the target was presented 10 ms after the intervening saccade ended and was attenuated in longer delays. In our case, therefore, the representation of previously attended locations (as revealed by IOR) is not remapped slowly after the execution of a saccade. Rather, either a retinotopic representation is remapped rapidly, adjacent to the end of the saccade (using a prospective motor command), or the positions of the cue and target are encoded in a spatiotopic reference frame, regardless of eye position. Spatial attention can therefore be allocated to target positions defined in extraretinal coordinates.

Journal:
The Journal of Neuroscience: The Official Journal of the Society for Neuroscience

Volume:
30

Pagination:
8882?8887

Date Published:
jun

Notes:
{PMID:} 20592210
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