Beyond retinotopic mapping: the spatial representation of objects in the human lateral occipital complex

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Created 7/4/2011
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Abstract:

The spatial representation in the human ventral object-related areas (i.e., the lateral occipital complex ([LOC])) is currently unknown. It seems plausible, however, that it would diverge from the strict retinotopic mapping (characteristic of V1) to a more invariant coordinate frame, thereby allowing for reliable object recognition in the face of eye, head, or body movement. To study this, we compared the {fMRI} activation in {LOC} when object displacement was limited to either the retina or the screen by manipulating eye position and object locations. We found clear adaptation in {LOC} when the object's screen position was fixed, regardless of the object's retinal position. Furthermore, we found significantly greater activation in {LOC} in the hemisphere contralateral to the object's screen position, although the visual task was constructed in a way that the objects were present equally often on each of the 2 retinal hemifields. Together, these results indicate that a sizeable fraction of the neurons in {LOC} may have head-based receptive fields. Such an extraretinal representation may be useful for maintenance of object coherence across saccadic eye movements, which are an integral part of natural vision.

Journal:
Cerebral Cortex {(New} York, {N.Y.:} 1991)

Volume:
17

Pagination:
1164?1172

Notes:
{PMID:} 16818474

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