Spatial representations and visual memory

Perceiving the environment, generating a reliable mental spatial representation, and being able to further explore specific features of interest within it, are an essential requirement for normal function and orientation in everyday life. The clinical syndrome of unilateral spatial neglect (USN), in which patients ignore objects presented on the left visual field, or the left part of a specific object, is typically encountered after damage to the right hemisphere, and suggests the brain lateralization of processes of spatial attention. Left side neglect is also common for internal representations stored in long term memory (i.e. the “Piazza effect described by Bisiach and Luzzati). This raised the long-standing debate regarding the mechanisms underlying the various phenomena encountered in the clinical syndrome of unilateral neglect: is it essentially a disorder of attention, or a disorder of space representation. Edoardo Bisiach argued that neglect is a representational disorder, i.e. neglect patients are impaired in generating a stable representation of the left side of an image, for images perceived in the present as well as for internal representations created long ago (even before the injury). We are critically testing Bisiach's theory under a novel series of experiments, evaluating the influence of the spatial position of a visual object on various aspects of memory (immediate verbal recall, delayed object recognition and delayed position recollection), in USN patients and normal control subjects. The prediction stemming from Bisiach's theory is that beyond a left-lateralized bias in immediate recall, USN patients will also fail to later recognize objects previously presented in the left side, and when recognized the object would be mislocalized to the dominant right field. Nevertheless, we found that delayed recognition of objects previously recalled verbally by USN patients was not laterally biased [see publication]. Now we conduct a new recognition memory experiment among USN patients, comparing the influence of spatial position on recognition performance of two types of stimuli- objects and non-namable abstract figures- in order to assess if semantic encoding is the mechanism diminishing the lateralized bias in memory of objects, or that the lateralized bias described in the "Piazza effect" is inherent to recall but not to recognition memory. This will help us to better understand the mechanisms underlying the successful generation and conscious access to a spatial representation, and contribute to the understanding whether neglect is essentially a representational disorder, as proposed by Bisiach.
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