

Reaction time to foveal stimuli as a function of eye position and attentional set in neglect patients

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A unilateral lesion of the parietal-temporal cortex of the right hemisphere in humans often results in hemineglect, a neuropsychological syndrome characterised by a profound unawareness of contralesional hemispace. This impairment is present even in patients without hemianopia or other sensory defects of central origin and includes a reluctance to perform motor actions in the contralesional space. It has been long debated whether neglect is caused by an impairment in orienting toward the contralesional space or by a distorted or amputated mental representation of space. Furthermore, it has been debated whether it is retinocentric or it affects other frames of references as well, such as those centred on eye and head. Here we provide evidence that neglect patients respond to a foveal stimulus with a similar speed independently from whether the eyes are deviated contra- or ipsilesionally while the same subjects show a marked slowing down of RT in the contralesional hemifield with lateralized presentations and central fixation. The contralesional slowing down increased sharply as one goes from more central to the leftmost portion of the hemifield. This result shows that neglect, as assessed by RT, is mapped in retinocentric rather than oculocentric coordinates.

In a second experiment designed to study the representational aspects of neglect, we found that RT to the same foveal stimulus is slower when patients are expecting a stimulus in one of various positions in the ipsilesional than in the contralesional field. We interpret this unexpected result as related to a covert attentional focusing towards the most ipsilesional part of the hemifield of stimulus presentation. When expecting an ipsilesional stimulus the fovea lies in the most contralesional portion of the represented hemispace and RT is slow. In contrast, when expecting a contralesional stimulus the fovea lies in the most ipsilesional portion and RT is fast.

In conclusion, the present results tend to emphasise the retinocentric and representational nature of neglect.