Divided attention and hemisphere interaction: Perceptual processes across and within visual hemifields

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Responses to stimuli distributed across the two visual hemifields tend to be faster and more precise than responses to stimuli that fall within one hemifield. This phenomenon has been referred to as different-hemifield advantage. In a recent study we investigated whether this effect is the result of hemisphere-specific pools of resources working in parallel during visual spatial processing across the hemifields. Our results confirmed the existence of largely independent processing pools which, however, are not entirely separated.

In the present study we aimed to further characterise the nature of the different-hemifield advantage. Taken together, findings from earlier experiments imply that participants can divide the focus of attention more easily across than within hemifields. This should be reflected in neural responses and behavioural performance. We presented six LEDs that were aligned on a semi-circle in the lower visual field, each flickering at a different frequency. Participants were asked to attend to two LEDs that were spatially separated by an intermediate LED, and to respond to synchronous events at the attended LEDs. To perform the task they had to split their spotlight of attention within one of the two or between both hemifields. We recorded the electroencephalogram (EEG) and investigated amplitudes of the steady-state visual evoked potentials (SSVEPs) to the frequency tagged LEDs. SSVEPs are brain responses that oscillate at the same fundamental frequency as the flickering stimulus and are enhanced by attention. Therefore, they allow the analysis of attentional allocation to individual components of multi-element displays.

We found significantly reduced processing of LEDs at intermittent to-be-ignored positions only when the spotlight of attention had to be split *across* hemifields. This finding was further supported by corresponding behavioural data. Thus, our results suggest that dividing one's attention between locations that are distributed across hemifields is easier than between locations that fall within one hemifield.