

Neural Measures of Interhemispheric Information Transfer During Attentive Tracking

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Abstract

People are generally able to track 4-5 objects as they move amongst visually identical distractors. However, Alvarez & Cavanagh (2005) found that if tracked objects are lateralized to one visual hemifield, tracking capacity is drastically reduced relative to bilateral tracking trials. These data suggest that tracking for each hemifield is carried out independently by the contralateral hemisphere. If so, what happens when an object moves from one hemifield to another? If the right hemisphere is tracking an object that moves to the right visual field, does the left hemisphere pick up the object representation the moment that it crosses the midline, does it preemptively start tracking the object before it crosses the midline, or does it wait until some point after the midline has been crossed? When does the right hemisphere stop tracking the object? We studied these questions using a sustained contralateral negativity that indexes tracking activity during lateralized versions of the attentive tracking task (Drew & Vogel, 2009). We measured contralateral and ipsilateral activity while a tracked object moved horizontally across the midline. As predicted, activity with respect to the hemifield where the object originated initially exhibited a strong contralateral negativity that then flipped to an ipsilateral negativity as the object moved to the opposite hemifield. We found that ipsilateral activity prospectively increased prior to the moment when the object crossed the midline whereas contralateral activity did not decrease until several hundred milliseconds after the object crossed the midline. This suggests that the two hemispheres were both tracking the object for several hundred milliseconds. Furthermore, we were able to influence the timing of this interaction by manipulating the predictability of object motion. When the object movement was less predictable, the duration of interhemispheric information sharing decreased.