

## **Neural correlates of tracking changing positions of objects**

### **ABSTRACT:**

Although the mechanisms with which we track moving objects have been well studied, the underlying neurophysiological mechanisms remain poorly understood. Individual differences in resting peak alpha frequency (PAF) have been linked to several cognitive tasks: the phase of alpha oscillations appears to predict accurate perception of stimuli (e.g. Busch et al., 2009) and therefore it has been suggested to underlie periodic updating of perception. Whether or not these neural oscillations contribute to updating representations of moving targets has not, to our knowledge, been investigated. In two experiments, we asked observers to track the position of either one, two or four discs. After a period of semi-random motion, discs disappeared and observers indicated the final position of a queried target. We calculated spatial errors: the distance between the final position and the reported final positions of queried objects. We found poorer spatial precision for monitoring two targets than a single target, and poorer precision for four targets than two targets - consistent with a resource model of position perception. On average, people tended to report slightly out of date positions, that is to say that reports exhibited perceptual lags (e.g. Howard & Holcombe, 2008; Howard, Masom & Holcombe, 2011). In a separate recording block we recorded observers' resting alpha activity over occipital sites. We assessed individuals' PAF as the greatest mode of the occipital EEG power spectrum between 8-12 Hz. We did not observe a strong relationship between PAF and perceptual lags as may be predicted from oscillation-based explanations of lags. However, in several instances, individuals' PAF was correlated with position report precision such that slower peak alpha frequency at rest was associated with more precise reporting of targets' positions. We suggest a possible role for the period of alpha oscillations in determining the accumulation of spatially precise position information.

### **Keywords**

Attention, Vision, Contralateral delay activity, Alpha oscillations

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