NEUROSCIENCE 2021
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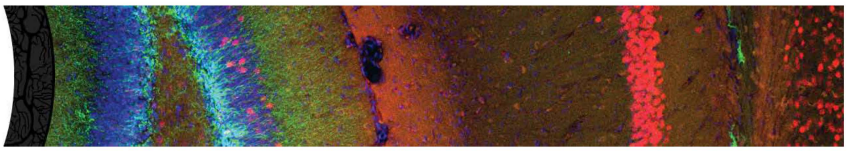

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Session P774 - Mechanisms of Attention: Primate

P774.08 - Neural mechanisms of attentive object processing in primates structured by microsaccades

November 9, 2021, 9:45 AM - 10:45 AM | Virtual Only

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Abstract
Covert spatial attention is usually attributed to be directed without any eye movements. However, we had previously shown that even during visual fixation periods in a sustained attention task, the neural firing rates and stimulus representations in primate visual cortical areas V4 and the inferotemporal cortex (IT) are enhanced only following microsaccades (MS) towards the attended target locations (Lowet et.al., Neuron, 2018). Here we present evidence that the first MS towards the intended (cued) target location kickstarts the attentional modulation of neural firing rates typically observed in area V4. That is, at the neural level, the timing of the first MS structures the process of attention which continues for the remainder of the trial. Subsequent MS during the trial modulate the underlying attentional enhancement. Furthermore, the neural modulations triggered after the MS onsets have significant effects in shaping the object representation, tuning, and selectivity at the target locations. Decoding analyses of V4 firing rates for objects present in the target location confirms that the performance of the decoder is significantly increased for the MS towards intervals towards the attended stimulus compared to intervals following MS directed away from the attended stimulus. The type of MS, towards or away from the target, gives rise to distinct temporal regimes of representation, selectivity, and decoding performance. Such mechanisms are usually obscured when analyzing the neural activity during the full trial periods without taking MS into account. These results thus reveal a major link between spatial attention and its coordination with eye movements. We thus suggest that selective visual attention is not merely a covert cognitive process, but has visuomotor components that shape our ability to dynamically attend, recognize, and act on the objects in the world.