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The role of neural oscillations during trans-saccadic integration

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The question how we perceive the world as continuous has been largely debated in neuroscience. Indeed, in every-day life, we constantly interact with the external environment by scanning it through eye movements. Saccadic eye movements are the major example of an abrupt change in visual perception caused by self-movements. While it is clear that self-movements challenge perceptual stability by introducing spatiotemporal distortions, the underlying neural correlates of how the brain integrates these changes have not yet been thoroughly investigated. Specifically, how the brain integrates pre- and post-saccadic signals is still unknown. In the present project, we aim to investigate neural oscillations at the time of saccades whilst administering a location and orientation judgment task where a brief 17-ms Gabor patch of six possible orientations (±35°, ±45°, ±55°) is presented at the center of the screen at random delays from saccadic target appearance. EEG, eye-tracking and behavioural data has been recorded. Preliminary results showed a pre-saccadic neural oscillation at around 10 Hz that is locked to the onset of the saccade. Moreover, single trial analysis revealed that serial dependence may play a role in integration across saccades. Indeed, alpha power locked to saccadic onset in parieto-occipital electrodes significantly differentiated trials in which the reproduced orientation in the current trial was attracted towards the previous trial's stimulus orientation (versus repulsive trials). These results show that (1) visual perception is coupled to cortical alpha rhythm and (2) that this oscillatory activity carries visual information about the recent past during saccadic eye movements.

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