Patterns of brain activity reorganize visual perception during eye movements

May 25 2015

Scientists measuring brain activity have found that in many regions, such as the sensory or motor cortex, activity sometimes oscillates at different frequencies, forming wave-like patterns. Despite the fact that such oscillations are frequently observed, and present in many brain regions, their functional role remains unclear. Research done by Dr. Christopher Pack, from McGill University, who looked at such waves occurring in a region of the visual cortex of the brain, suggests these oscillations could have a role in resetting the sensitivity of neurons after eye movements. Further results suggest these waves could also have a role in supporting the brain's representation of space. These results were presented at the 9th Annual Canadian Neuroscience Meeting, on May 25th 2015 in Vancouver, British Columbia.

Vision is an extremely dynamic process - Even when we look at a fixed image, our eyes are making rapid movements, called "saccades" to explore the image that is sent to our brain. By recording neuronal activity in monkeys as they performed tasks that caused saccades, Dr. Christopher Pack has shown that there are waves of activity that cross specific vision processing areas of the brain in defined patterns, and that these patterns are reorganized by saccadic eye movements. After a saccade, this wave of activity reorganizes to travel from the fovea, at the center of the visual field, and which is the area of the eye with the best visual acuity, to the periphery. As the wave passes, it is suggested to reset the sensitivity of the area, and its pattern allows visual processing to occur earlier in the fovea relative to the periphery resulting in an early focus on the object that attracted the eyes. This work was recently

published in the journal Neuron (Zanos et al., 2015).

More recent work has shown that patterns of oscillations can facilitate the representation of visual space during eye movements. "This is important because each saccade shifts the position of visible objects on the retina, and hence the brain needs to know the stable positions of objects in external space", says Dr. Pack. "By permitting rapid neural communication across neurons encoding different spatial positions, oscillations could contribute to this important perceptual process."

Provided by Canadian Association for Neuroscience