
CHRIS PACK, McGill University

Patterns of oscillations in the visual cortex

Electrical signals recorded from the brain are often observed to be oscillatory. Indeed the strongest known neurophysiological signal is the alpha oscillation, a 10 Hz signal that correlates in amplitude with visual stimulation and attentiveness. The role of oscillations at higher frequencies is hotly debated: Different models assign them different functions, such as object recognition, attention, interval timing, etc. Other models hypothesize that high-frequency oscillations are incidental consequences of brain connectivity, and that they have no function at all.

In this presentation I will focus on the beta oscillation, which corresponds to frequencies near 20 Hz. I will show that beta oscillations are a prominent feature of the monkey visual cortex, but that, when measured on a small spatial scale (hundreds of microns), they carry little information about visual stimuli or visually-guided behaviors. However, patterns of oscillations, distributed across several millimeters of visual cortex, exhibit interesting properties. In particular, I will show that beta oscillations frequently reorganize their relative phases to form a traveling wave of activity that sweeps across the cortical representation of visual space. This wave is triggered by eye movements, and it controls the timing of responses from individual neurons. I will speculate that these waves are responsible for some previously unexplained aspects of visual perception during eye movements.