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From Macroscopic to Microscopic: Interpreting neural activity from surface EEG recordings

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ABSTRACT OF THE TALK

Among all non-invasive neuroimaging tools, electroencephalography (EEG) remains the most widely used in both research and clinical settings.

Despite its ubiquitous use, how EEG signals are linked to underlying neural activity remains poorly understood. It is therefore of great interest to investigate how activity from a population of neurons contribute to the shaping of the surface recorded EEG. In this talk, I will present data from simultaneously acquired multiple-cell and surface EEG recordings from the visual cortex of awake monkeys during presentation of natural scenes. We could reliably predict the underlying multi-unit activity (MUA) using the power in the gamma band (30-100 Hz) with the phase in the delta band (2-4 Hz) of the EEG signal. The strength of the prediction decreased significantly when other oscillatory bands (e.g. alpha (8-15 Hz)) were used to model MUA, indicating that such bands do not provide significant information about local neural firing. Overall, these findings show which components of the comprehensive surface EEG signal are related to changes in underlying MUA in behaving monkeys. Such information may be used to directly predict neural activity from non-invasive EEG recordings in human populations with different neurological disorders.