



BCL5

5th Workshop on Brain, Computation, and Learning



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Faculty Hall



Human semantic encoding and rapid inference during language processing

Abstract: Intracranial monitoring for epilepsy and other awake neurosurgical procedures provide opportunities to study the neurophysiology of various aspects of language processing. The mechanisms by which the brain generates semantic-level representation from linguistic input remain largely unknown. In the first part of the presentation the role of single prefrontal neurons, sampled during deep brain stimulation procedures, is discussed. Humans also use language to achieve rapid, on-the-fly inference when presented with novel linguistic stimulus. By leveraging current context and prior knowledge the meaning of a novel combination of words or an unfamiliar word can be estimated. While this is an everyday occurrence necessary for effective communication, the mechanisms of rapid inference during sentence processing are not well understood. In the second part of the presentation, an approach to studying the mechanisms of language-based inference is explored. We implemented a zero-shot learning task in which a novel word was presented in high context allowing for easy inference of its meaning. We recorded frontal and temporal local field potentials (LFPs) and hippocampal single neurons recordings in human subjects undergoing clinical epilepsy monitoring while they performed the task. We identified hippocampal-neocortical spike-field and cross-spectral field-field temporal lobe interactions during moments of rapid language inference.