

Research opportunities

Cognitive Neurophysiology Laboratory

Department of Neurology

New York University School of Medicine

Project 2:

Sensory and cognitive information-processing in humans: Intracranial EEG

This project is concerned with the recording of brain activity from intracranially implanted electrodes in humans to gain a better understanding of sensory and cognitive brain function. For purely clinical reasons, patients with epilepsy are sometimes implanted with such electrodes to localize their seizure onset prior to surgical therapy. This gives us the chance to study brain processes with unmatched temporal and spatial resolution, without any additional risk to the patient. All our studies adhere to the strict ethical guidelines of the NYU School of Medicine guidelines for research involving human subjects and have current Institutional Review Board approval.

A clear advantage of intracranial EEG (iEEG) over other neuroimaging methods is that it possess both high spatial (mm scale) and temporal (ms scales) resolution. The spatial resolution of iEEG varies depending on recording equipment. We are currently able to obtain both single and multi-unit recordings from extra-cellular microelectrodes (Ulbert et al., 2001) and local field potential recordings from surface strips and grids of electrodes, as well as depth electrodes (often placed in the hippocampus and amygdala). Human iEEG grid recordings measure local field potentials (LFP), which reflect the summated activity from coherent neuronal assemblies. As such, their origin is closely related to that of signals from neuronal spikes (Shadlen and Movshon, 1999), scalp EEG (Regan, 1989), MEG (Hämäläinen et al., 1993) and fMRI (Logothetis et al., 2001). In our laboratory we are taking a multimodal imaging approach, whereby the same subject is studied with different neuroimaging techniques to allow us to compare methodologies and to gain a more comprehensive understanding on how the brain processes information.

This project is conducted in collaboration with neurologists, neurosurgeons and neuroscientists at the Comprehensive Epilepsy Center at NYU and is an ideal opportunity to apply technical skills to a real-world medical problem whose solution may have a direct impact on patient's lives. The ideal candidate should have programming experience, ideally in Matlab, be familiar with Unix and have an interest in cognitive neuroscience. The candidate will have opportunity to present the work at lab meetings, scientific conferences and in publications. Formal thesis supervision can be arranged.

For more information, please contact:

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