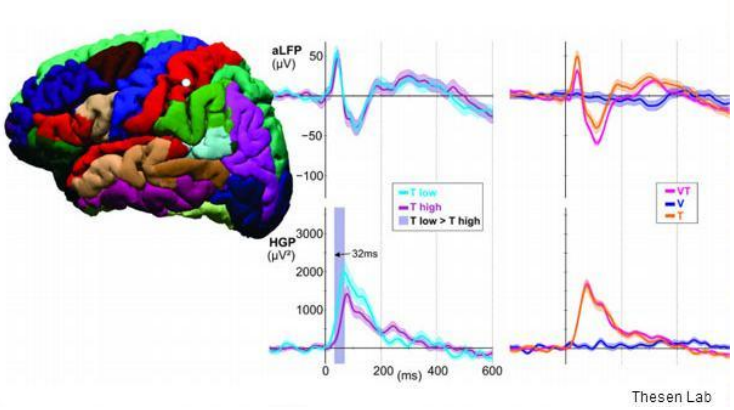
Research opportunities

Cognitive Neurophysiology Laboratory
Departments of Neurology & Radiology
New York University School of Medicine
http://www.med.nyu.edu/thesenlab/
http://ecog.med.nyu.edu/

Sensory and cognitive information-processing in humans: Invasive electro-corticography (ECoG)

This project is concerned with the recording of brain activity directly implanted in the human brain to gain a better understanding of sensory and cognitive brain function. For purely clinical reasons, patients with epilepsy are sometimes implanted with such electrodes in their brain to localize their seizure onset prior to surgical therapy. This gives us the change to study brain processes with unmatched temporal and spatial resolution, without any additional risk to the patient.

The world we live in is inherently *multisensory*. As we step through it we recognize and react to objects based on their auditory, visual, tactile and chemosensory properties. In our lab, we ask the question of how the brain integrates the information from these different sensory channels to create a unified and coherent percept that allows us to navigate our environment with ease and efficiency.



Being able to generate and understand complex *language* is a feature of our brain that sets us apart from other species. We are also interested in shedding light on the mechanisms that have evolved to support the transformation from scribbles on a page to neuronal representations of letter strings, to word recognition, phonological decoding, semantic processing and transformation of sensory representations to motor commands in order to understand language and produce an answer.

A critical problem in studying brain dynamics are the limitations imposed by individual *brain imaging technologies*. Each imaging modality has its advantages and disadvantages: fMRI possesses high spatial resolution, but poor temporal resolution; MEG possesses high temporal resolution but poor and ambiguous spatial resolution; ECoG possesses both high spatial and temporal resolution, but its

coverage is spatially limited. Our studies integrate fMRI, MEG and ECoG recordings, often in a single patient. By adopting a multimodal imaging approach, that involves recording brain signals during the same perceptual or cognitive task using all three imaging modalities, our laboratory leverages the distinct advantages of each of these techniques.

This research 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 signal processing and programming experience, ideally in Matlab 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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