

## Distinguished Lecture

### The Contributions of Statistics to Brain Research

Professor Hernando Ombao

Department of Statistics, UC Irvine



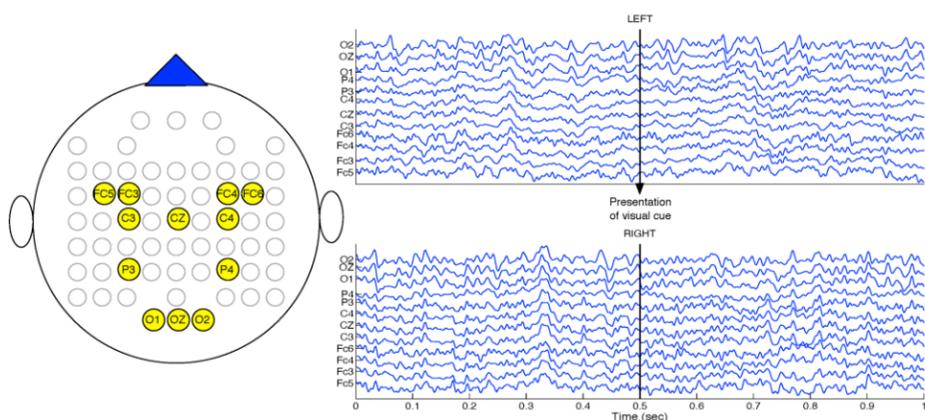
Hernando Ombao is Professor and Graduate Program Director of Statistics at the University of California, Irvine. He is Principal Investigator of the Space-Time Modeling group and actively collaborates with neuroscientists in modeling associations between neurophysiology, cognition and animal behavior on NSF-funded projects. He is Co-Editor of the Handbook of Statistical Methods for Neuroimaging (CRC press, to appear in 2016), serves as Associate Editor (AE) for the Journal of the American Statistical Association (ASA, since 2005), was AE for the Journal of the Royal Statistical Society, Series B (2012-2015), and serves in various other capacities at the national level for the NSF, NIH, and the ASA.

#### Abstract:

There has been substantive progress in brain science research over the last two decades. This success is attributed to the dramatic increase in the use of functional magnetic resonance imaging (fMRI) data as well as electroencephalograms (EEG) for studying animal sensory, motor and cognitive functions in many fields such as psychology, cognitive science, neurology and neuroscience.

The advancement in non-invasive technology is both a blessing and a curse. We now have unprecedented access to the inner workings of the brain as both fMRI and EEG data capture how the brain, in action, responds to external stimulus. However, analyzing brain data presents serious challenges because (1.) the underlying brain process is highly complex and (2.) brain data is massive. In this talk, I will highlight some of the contributions of statistics in advancing the frontiers of neuroscience. In particular, I will present a number of scientific hypotheses and how statistical models are being utilized to address these.

In one example, I will demonstrate how statistical modeling was used to identify differences in brain activity (including activation and connectivity patterns) between healthy subjects and stroke patients. In another example, I will present a novel statistical model that we developed to demonstrate that brain signals evolve over the course of an associative learning experiment. I will also include highlights of contributions of my fellow statisticians to the field of statistical neuroimaging.



**Friday**

**May 20, 2016**

**4:00 - 6:00 pm**

**Gregoire Family Lecture Hall,  
College of Business Administration  
Room 162-1001**

**Reception: 4:00-4:20 pm**

Refreshments compliments of the  
Department of Mathematics and Statistics