Advanced Methods for Cleaning up fMRI Time-Series

Organizers:
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As we continue to improve our understanding of brain function, we are designing ever more complicated neuroimaging paradigms to probe network behaviour and activation differences between cohorts of individuals, particularly involving resting state data. However, we are simultaneously becoming more aware of how difficult it is to distinguish between the neuronal signal of interest and variance due to confounds such as gross or subtle head motion, respiratory and cardiac variation, arousal levels, and other physiological sources. Papers demonstrating that unmodeled noise confounds can bias results have raised alarm across the entire neuroimaging community. Discussions of the influence of residual noise artifacts on study results are increasingly common in the literature. New methods for characterizing and removing noise signals from fMRI data have exploded in complexity and uptake over the last few years, reflected by a recent special issue of NeuroImage edited by the course organizers and featuring articles by the course presenters. Researchers are now keenly aware that noise can be a huge and tricky problem in their data analysis and interpretation, but still commonly ask: "which noise correction methods should I be using?" This course builds upon the previous pre-processing courses presented at OHBM by tackling advanced noise removal techniques, providing researchers with the practical tools and breadth of understanding to select the best approach for navigating noise in their own fMRI data.

Course Schedule:

8:00-8:45
Overview of noise in fMRI
Cesar Caballero Gaudes, Basque Center of Cognition, Brain and Language
San Sebastian, Spain

8:45-9:30
How to minimize noise at the acquisition stage
Daniel Handwerker, PhD, NIMH, Bethesda, MD, United States

9:30-10:00
How-to assess fMRI noise and data quality
Jonathan Power, New York Presbyterian Hospital, New York, NY, United States

10:00-10:15
Break

10:15-10:45
How-to perform nuisance regression
Molly Bright, D.Phil., University of Nottingham, Nottingham, United Kingdom

10:45-11:15
How-to use ICA for de-noising
Ludovica Griffanti, FMRIB, Oxford University, Oxford, United Kingdom

11:15-11:45
How-to use multi-echo data for de-noising
*Prantik Kundu, M*ount Sinai, New York, NY, United States

11:45-12:00
Question and Answer