Statistical Methods in Neuroscience Seminar

Friday January 15, 2010
11:00 – 12:00am
903 School of Social Work

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Better BOLD fMRI across the Lifespan from Children to the Elderly

Researchers using BOLD fMRI typically operate with an **implicit hypothesis** that: '*My BOLD fMRI results are robust to the exact techniques, algorithms, software packages and pipeline combinations I used and are not a significant function of these choices*'. In this talk I will present evidence for the **alternative hypothesis** that: '*BOLD fMRI results are a significant function of many pipeline choices, particularly early and late across the lifespan*'.

I will argue that we actually know little about what constitutes an optimal BOLD pipeline for many cognitive and clinically relevant tasks, particularly in children, middle-aged and older subjects who represent the age-matched controls relevant for many clinical populations. I will present evidence for the alternative hypothesis from three data sets: Fusiform face processing in children and young adults (Evans et al., Neuroimage, in press); neuropsychological testing using the Trails A/B task in young normal adults (Churchill et al., in preparation); a cognitive multitask activation study (Grady et al., Cerebral Cortex, in press). Results will be generated using both univariate GLM and multivariate analysis models, together with performance metrics for prediction and activation pattern reproducibility (NPAIRS, Strother et al., Neuroimage, 2004), and a new measure of mutual information extraction (Afshinpoor et al., Human Brain Mapp., in revision).

I will conclude that: 1) We do not adequately understand the impact of the pipeline choices that we make to produce BOLD fMRI results; 2) with better understanding of pipeline choices variability across published BOLD fMRI studies could be significantly reduced; 3) 1 and 2 are particularly true outside of the study of primary sensory systems in young normal controls, because BOLD fMRI results are a strong function of pipeline choices, particularly in the young, middle-aged and elderly.

This event is hosted jointly by the Departments of Statistics, Neurology and Psychiatry.