

**Stony Brook University  
The Graduate School**

Doctoral Defense Announcement

**Abstract**

Path Analysis of Multivariate Time Series Data with Subject-level Covariates

By

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The ultimate goal of brain functional connectivity studies is to propose, test, modify, and compare certain directional brain pathways. Functional magnetic resonance imaging (fMRI) studies are routinely conducted with a group of subjects to generate relevant data; while path analysis or structural equation modeling (SEM) is commonly regarded as the ideal statistical method for the analysis of such data.

Three approaches are conceivable for the path analysis of multi-subject, multivariate time series data from fMRI experiments. They are: (A) summarize (e.g. average the time series data across the subjects) and then analyze, (B) analyze and then summarize, and (C) Simultaneous analysis. Previously, we have developed the SEM methodology for approach (B) (Kim et al. 2006). In this thesis, we propose a new path analysis framework for approach (C), the simultaneous analysis of multi-subject, multivariate time series data with subject-level covariates. Resampling method is utilized to compare path coefficients across subjects (through resampling of the individual time series data) and to incorporate subject-level covariates (through resampling of the subjects). Comparisons are made between the three approaches and guidelines are provided.

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