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Seminar

Speaker: **Professor Donald Hoover**
Rutgers University

Title: **Regression With Repeated Measures: A Warning That Non-Independence Working Correlations May Give ILL-Defined Results**

Time: **3:20 – 4:20pm, *Wednesday*, September 25, 2013**

Place: **552 Hill Center**

Abstract

Donald R. Hoover, Qiuhu Shi, and Kathryn Anastos

We present an example where changing the working correlation structure from compound symmetry to independence in repeated measures generalized estimation equations (GEE) or mixed models (MM) of ($E[Y_{ij}] = \beta_0 + \beta_1 X_{1,ij} + \beta_2 X_{2,ij} + \ldots + \beta_K X_{K,ij}$ where i=independent persons (or clusters) and j=possibly correlated within person measures) qualitatively and statistically changed parameter estimates ($\hat{\beta}_k$ '*s*). This occurs if within person ($\beta_{k,WS}$) differs from cross sectional population ($\beta_{k,CRS}$) slope for example, a) a 10 pound weight change in the same person effects greater change in cholesterol than does b) a 10 pound weight difference between different persons as b) is tampered down by height/body frame (as opposed to only body fat) differences. Most current guidelines on working correlation choice ignore differences / goals in parameter estimates and for this setting might select Compound Symmetry based on having lower Quasi (and Akaike) information criteria. However, if $\beta_{k,WS} \neq \beta_{k,CRS}$ and predictor variables vary within the same person, GEE and MM without independence correlation structures estimate unknown, ill-defined quantities. But GEE with independence working correlation (GEE-IND) always estimates $\beta_{k,CRS}$. We illustrate how common longitudinal lag/reverse causality processes and covariate measurement errors cause $\beta_{k,WS} \neq \beta_{k,CRS}$, often with $|\beta_{k,WS}| < |\beta_{k,CRS}|$ for the strongest predictor. We suggest for fitting predictive linear models to repeated measures with predictors that vary within person to use GEE-IND that delivers $\beta_{k,CRS}$ unless $\beta_{k,CRS} \equiv \beta_{k,WS}$ is shown. For causal inference, more complicated approaches that separately consider $\beta_{k,WS}$ and between person association ($\beta_{k,BS}$) may be needed.

*** Refreshments will be served at @2:50pm in Room 502 Hill Center ****