Bayesian models for sequences of response time data

Peter Craigmile[1,2], Sungmin Kim[1], Mario Peruggia[1], Trisha Van Zandt[1]

[1] The Ohio State University

[2] The University of Glasgow

Response time (RT) measurements are the basis for theory construction and modeling in much of cognitive psychology and human performance research. In this talk I will present several modeling approaches that my colleagues and I have developed to account for features that appear, to a greater or lesser extent, in most RT data. At one end of the spectrum, we have models motivated by the empirical evidence that RT data exhibit trial-by-trial short-range dependencies, smoother systematic variation over longer time horizons, and include occasional responses that are unusually fast or exceedingly slow. At the other end of the spectrum we have models that are justified by general psychological theories of human cognition. These theories translate into specific stochastic processes (e.g., race models, Gaussian diffusions, etc.) that provide an underlying latent structure for the RT-generating mechanism. In the talk I will provide evidence supported by experimental data that a judicious synthesis of the various points of view can produce models that are both theoretically justified and predictively accurate.

Keywords:
Cognitive modeling; Gaussian diffusions; Race models; Time series analysis.