Joachim Vandekerckhove

Hierarchical diffusion models for choice response times

The diffusion process is a popular and parsimonious model for choice reaction time data. In this talk, we present a hierarchical extension of the model. In doing so, we explicitly consider the Wiener process as a measurement model in the psychometric sense and exploit the various modeling opportunities this provides. This approach -- an instance of "cognitive psychometrics" -- allows us to apply diffusion models in a variety of new paradigms. In particular, in the hierarchical framework we can disentangle different sources of parameter variability (e.g., item variance, population variance, trial variance), and attempt to explain parts of these variabilities through the inclusion of covariates (an explanatory diffusion model). Additionally, hierarchical diffusion models can be applied to data sets with many participants but relatively few observations per participant, something which is problematic with classical approaches. We will demonstrate the approach with applications in visual perception and semantic categorization.