Title: Adaptive Algorithms for Stimuli Sampling in Cognitive Studies

Abstract:

Sample size planning using a priori power analyses are often calculated with a focus on a predetermined effect size or hypothesis test. Often, cognitive research does not easily fit this experimental mold, especially if a selection of randomized stimuli is presented or the focus of the study is normed data collection. Accuracy in parameter estimation provides a framework in which researchers can preplan a specific confidence interval around a target parameter. For example, in a study with response latencies, a researcher may decide that all item response latencies must have a confidence interval width of 50 msec before stopping data collection. The focus on accurately measuring each stimulus accounts for known variability in presented items, while also maximizing efficiency in data collection. In this presentation, we will discuss two studies that implemented adaptive algorithms for stimuli presentation. In the first study, Bayesian t-tests are used to shift data collection toward conditions that show the largest differences between groups. In the second study, stimuli are probabilistically sampled until they have reached an appropriate confidence interval criterion allowing for optimal stopping when each item’s response latency has been accurately measured. Both studies are ongoing in partnership with the Psychological Science Accelerator, a distributed lab network that promotes open science principles in running diverse and inclusive studies.