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Integrating Methods to Improve Model-based Performance Prediction

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Abstract

The initial performance of individuals is often difficult for models of learning and retention to predict. One such model is the predictive performance equation (PPE) a mathematical model of learning and retention that uses regularities seen in human learning to predict future performance. To generate predictions, PPEs free parameters must be calibrated to a minimum amount of historical performance data, preventing valid predictions for initial learning events. Prior research (Collins, Gluck, Walsh, Krusmark & Gunzelmann, 2016; Collins, Gluck, & Walsh, 2017), has shown that the generalization of best fitting parameters from prior data can improve initial performance predictions. Here we build on that research, using Bayesian hierarchical modeling to estimate free parameters from various sources of prior data. Bayesian hierarchal modeling allows an opportunity to improve and add structure to the parameters used by PPE, improving its application to cognitive technology in education and training.