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Prediction During Statistical Learning, and Implications for the Implicit/Explicit Divide

Rick Dale¹, Nicholas D. Duran¹, and J. Ryan Morehead²

¹ Cognitive and Information Sciences, University of California, Merced

² Department of Psychology, University of California, Berkeley

Abstract

Accounts of statistical learning, both implicit and explicit, often invoke predictive processes as central to learning, yet practically all experiments employ non-predictive measures during training. We argue that the common theoretical assumption of anticipation and prediction needs clearer, more direct evidence for it during learning. We offer a novel experimental context to explore prediction, and report results from a simple sequential learning task designed to promote predictive behaviors in participants as they responded to a short sequence of simple stimulus events. Predictive tendencies in participants were measured using their computer mouse, the trajectories of which served as a means of tapping into predictive behavior while participants were exposed to very short and simple sequences of events. 143 participants were randomly assigned to stimulus sequences along a continuum of regularity. Analysis of computer-mouse trajectories revealed that (1) participants almost always anticipate events in some manner, (2) participants exhibited two stable patterns of behavior, either reacting to vs. predicting future events, (3) the extent to which participants predict relates to performance on a recall test, and (4) explicit reports of perceiving patterns in the brief sequence correlates with extent of prediction. We end with a discussion of implicit and explicit statistical learning and the role prediction may play in both kinds of learning.