Discovering Optimal Training Policies: A New Experimental Paradigm

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Typical psychological studies compare two or a small number of conditions. For example, in the domain of concept learning, a study might compare whether individuals learn better when trained on only difficult-to-classify exemplars versus when the training sequence gradually progresses from easy exemplars to the more difficult (fading). Instead of comparing a small set of training policies selected based on the experimenter's intuition, suppose we could define a parameterized space of policies and search this space to identify the

best policy. For example, in concept learning, policies might be described by a fading function that specifies exemplar difficulty over time. We propose an experimental technique for searching a low-dimensional policy space using Gaussian process surrogate-based optimization. Instead of running a large number of subjects in a small number of conditions, the technique runs a single subject in a large number of conditions. Even though individual subjects provide only a noisy estimate of the population mean, the optimization method allows us to determine the shape of the policy space and identify the global optimum, requiring not many more subjects than in a traditional study.