Prediction of Single-Trial Behavior using a Layered Dynamic Systems Model with Evolutionary Algorithm Updating

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Abstract: In this study we attempted to predict individual participants single trial behavior (response and reaction time) on a non-symbolic number comparison task. Experimental sessions included the completion of the number comparison task along with concurrent EEG measures. We then used a dynamic systems model with evolutionary algorithm updating to predict behavior for each participant independently. The computational model approximated neural coding of number by calculating tuning curves implemented through multilayered dynamic systems architecture. Typically dynamical systems models of cognition have fixed parameters tailored to the particular task being modeled and selected by the researcher. The models used were designed to adapt such that each participant's model is individually customized to their particular data. Average ERP amplitude across occipitoparietal areas were used as model input in addition to participant's prior responses and reaction time.