Recency Effects in Category Learning are Dynamic and Adaptive

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Recency Effects (REs) have been well established in both memory and probability learning paradigms. However, these effects have received relatively little attention, and virtually no empirical investigation, in research on multiple-cue category learning.

Some category learning models do make specific a priori predictions regarding REs. In particular, simple, static REs arise naturally in models incorporating the δ-rule, an error-driven learning mechanism (Gluck & Bower, 1988; Kruschke, 1992). Specifically, the δ-rule implies that responses are based on a weighted average of past cases, with recent cases receiving more weight. Weights drop at an exponential rate with temporal distance. Exemplar models make no a priori predictions regarding RE, but can mimic δ-rule predictions by explicitly incorporating exponential trace decay (Nosofsky, Kruschke, & McKinley, 1992). Both of these approaches predict RE to be unresponsive to characteristics of the task environment.

The present research contrasts this assumption with the alternative possibility that people explicitly test hypotheses concerning the predictive validity of recent outcomes. The latter idea implies that the magnitude of recency effects will adapt to the level of autocorrelation in the category sequence.

Method

Participants (n=100) engaged in a simulated medical diagnosis task in which they assigned each of a series of 150 hypothetical patients to one of two fictitious diseases based on the presence or absence of 3 symptoms, with outcome feedback given after each trial.

The experiment consisted of three conditions based on the manner of autocorrelation present in the sequence of disease outcomes. In the *positive* condition, each patient's disease matched that of the previous patient with 70% probability; in the *negative* condition that probability was 30%. Trials in the *control* condition were independently sampled (i.e., a 50% transition probability). For each subject, the diseases were first randomly generated according to the condition, and then the symptoms were randomly generated with probabilities dependent on disease outcomes.

Results

A logistic regression model was fitted to the data from each subject to determine the degree of influence of both present and past information on that subject's responses. The predictors in this model were the three symptoms, the disease of the previous patient ($Disease_{n-1}$), the similarity of the previous patient's symptom profile with that of the present patient (C^n_{n-1}, given as the number of matching minus the number of mismatching symptom dimensions), and the interaction $Disease_{n-1} \times C^n_{n-1}$.

The regression coefficient for $Disease_{n-1}$ was significantly higher for subjects in the Positive condition as compared to Control, indicating a heightened recency effect (Fig. 1). The reverse effect was not found for the Negative condition, despite its logical symmetry with the Positive condition.

In addition, the coefficient for $Disease_{n-1} \times C^n_{n-1}$ was significantly positive in all 3 conditions, showing that cue commonality moderates RE.

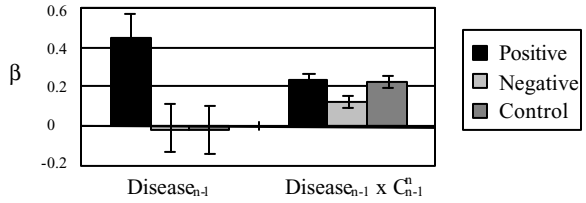

Figure 1: Subjects' use of past information, by condition

Discussion

Reliance on recent outcomes increased dramatically when those outcomes were positively related to the current case. No corresponding effect was found for negatively related recent outcomes. In fact, no overall RE was found in the negative and control conditions. These effects are not anticipated by the standard proposal that impact of outcomes simply decays exponentially with time. People appear to assess the predictive validity of recent events, but are nevertheless biased towards expecting a positive relationship.

References

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