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Rethinking the role of error in attentional learning

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Abstract

Learning how to allocate attention properly is essential for success at many tasks. Extant theories of categorization assume that learning to allocate attention is an error-driven process, where shifts in attention are made to reduce error. The present work introduces a new measure, error bias, which compares the amount of attentional change in response to incorrect responses versus correct responses during category learning. We first confirm that prominent categorization models predict high amounts of error bias. We then test this prediction against human eye-tracking data from 384

team B. You might reevaluate your estimates of team A's skill if they won ten games in a row, even though you would predict them to win every time. Your estimate of the teams' relative strengths was erroneous, even though your predictions were correct. Internal error is calculated in a similar way in the models; attention is adjusted based on mismatches between feedback and the model's internal estimates, not on the model's actual choices. Because of this fact, it is possible for error-driven models to predict some attentional shifting even without incorrect responses as long as the internal estimates do not completely match the feedback.

Despite the indirect connection between response errors and attentional shifts, error-driven models still make testable predictions about their relationship. The larger the model's

attentional change following correct trials over the total of the two. The error bias is +1 in cases where all the attentional change occurs following incorrect trials, 0 when there is no difference in the amount of attentional change following incorrect and correct trials, and -1 when all attentional change occurs following correct trials.

experiment) with a spatial resolution of 0.5°. Fixations were

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