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A model of timing in simple anticipatory decisions

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Abstract

While most models of response times have focused on reactive response times, many of the decisions we make involve planning ahead and making anticipatory responses. We present an accumulator model of these anticipatory timing choices, where a decision maker must make a response at a specific time depending on when they expect an event to occur. This model is applied to simple perceptual decisions where participants must determine the trajectory of a stimulus and anticipate its future location. We manipulate the stimulus speed, its travel distance, and the length of time it is occluded, requiring the decision maker to mentally represent its position and motion. Generally, we find that participants anticipatory tend to be much more likely to respond too late than too early. This pattern of results can be accounted for by a Wald accumulator model where the drift, threshold, and non-decision time change with the stimulus manipulations.