

**INTERCEPTING MOVING TARGETS:  
A LITTLE FORESIGHT HELPS A LOT**

by

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## ABSTRACT

Behavioral studies suggest that humans intercept moving targets by maintaining a constant bearing angle (CBA). The purely feedback-driven CBA strategy has been contrasted with the strategy of predicting the eventual time and location of the future interception point. This study considers an intermediate strategy involving prospective control based upon a prediction of the state of the bearing angle a short duration into the future. Subjects sat in front of a large projection screen and watched computer generated displays that simulated linear self-motion over a textured ground plane. Simulated speed was controlled by adjusting a foot pedal, the position of which was mapped onto speed according to a first-order lag. Subjects were instructed to intercept spherical targets as they moved across the ground plane. When targets changed speed midway through the trial in Experiment 1, subjects abandoned an unsuccessful CBA strategy in favor of a strategy involving the prediction of the most likely change in target speed. In Experiment 2, targets followed paths of varying curvature. Subject behavior was inconsistent with both the CBA and the purely predictive strategy. To investigate intermediate strategies, human performance was compared with a model of interceptive behavior that, at each time-step  $t$ , produced the velocity adjustment that would minimize the change in bearing angle at time  $t+\Delta t$ , taking into account the target's behavior during that interval. Values of  $\Delta t$  at which the model best fit the human data for practiced subjects varied between 0.25 s and 1.5 s, suggesting that subjects adjusted velocity to keep the bearing angle constant a short time into the future.