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Continuous decision-to-action information flow revealed by saccade dynamics

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Abstract

Drift-diffusion models (DDM) successfully explain choice and reaction times in perceptual decision tasks. However, standard DDMs leave unspecified how accumulated evidence is transformed into motor execution. Servant and colleagues (Servant et al., 2021; Dendauw et al., 2024) have proposed a DDM extension in which the decision variable is continuously transmitted to motor preparation areas (the gated-cascade model). This framework predicts that the neural drive generating the motor response scales with evidence quality. We tested this prediction in a random-dot motion task with saccadic responses (n=27). Because motor neural drive determines the force applied to the eye plant, and force determines acceleration (Newton's second law), we treated saccade acceleration as a proxy for neural drive. Linear mixed-effects models revealed that acceleration build-up rate and peak amplitude scale with evidence quality, consistent with a continuous transmission of decision information to motor preparation areas rather than discrete, serial decision and motor processes.