

Interactions between target and background properties on the latency of saccadic eye movements

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Abstract

We investigated the interaction between target and background properties on the latency of saccadic eye movements. The saccade target was a Gabor patch (Gaussian SD = 0.7deg^2) at one of 4 spatial frequencies (1, 2, 4 or 8 cpd), oscillating at one of 3 temporal frequencies (1, 8 or 16 Hz). It was presented on either a neutral gray background or a 1/f random noise background of the same average luminance (33cd/m^2), right or left of a central fixation point, at an eccentricity of 4 or 8 deg. We first measured detection thresholds for the individual targets on both backgrounds (eyes centrally fixated), and then presented the targets at a contrast of two times detection threshold in all subsequent eye movement experiments. We found that targets in the noise texture showed a significant advantage relative to a neutral gray background at several spatiotemporal frequencies (in particular, targets of low to medium spatial frequency (1 to 4 cpd) at low temporal (1Hz) frequency). In fact, with the exception of 1-2 cpd 8 Hz targets, saccade latency was either shorter or relatively unaffected by the random noise texture. Furthermore, this pattern was similar when compared to natural images. The results suggest that the oculomotor system is influenced by the interaction between the spatial frequency content of the background and the spatiotemporal properties of the embedded saccade target. This has implications for our understanding of saccade target selection in the natural world.