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Abstract:

It is well known that perisaccadic visual stimuli are less visible than those presented during fixation and that many visual areas change their response properties perisaccadically. The link between these phenomena remains tentative however. Our goal was to quantify the behavioral phenomenon to enable a more focused search for its neural mechanism. Several mechanisms may be responsible for reduced perisaccadic visibility: spatial uncertainty[1], internal multiplicative noise, and/or response inhibition[2] (or, equivalently, additive internal noise[3]). We tested these using equivalent noise analysis. Each mechanism predicts a unique pattern of detection thresholds when target stimuli are embedded in external noise[4]. Spatial uncertainty predicts no perisaccadic effect on sensitivity at low external noise, while sensitivity at high external noise should be reduced as the external noise swamps the signal. The multiplicative noise model predicts lower sensitivity at both high and low external noise. The response inhibition model predicts lower sensitivity at low external noise, with equal thresholds at high external noise. In our experiments, participants identified the location of a low spatial frequency grating above or below the fixation point. Stimuli were presented up to 50ms prior to saccade onset. The targets were embedded in Gaussian noise; stimulus and noise contrast were manipulated independently. Detection thresholds were calculated at each external noise level at fixation and perisaccadically. We found that response inhibition was sufficient to describe the perisaccadic detection thresholds relative to those found at fixation.

***1** Greenhouse and Cohn. 1991. J. Opt. Soc. Am. A, 8:587-595 ***2** Burr, and Ross. 1982. Vis. Res. 23, 3567-3569 ***3** Diamond, Ross and Morrone. 2000. J. Neurosci. 20, 3442-3448 ***4** Liu and Dosher. 1998. Vis. Res., 38, 1183-1198