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Title: Synchrony and firing rate modulation in area MT at the time of saccades
Conference: Vision Science Society 2012
Date: 5/15/2012

Abstract:
Humans perform about three eye movements per second. The detection of briefly flashed targets around such saccades is more difficult compared to fixation. This loss in sensitivity is typically referred to as saccadic suppression. Because a clear neurophysiologic correlate has not yet been identified, we continue the quest to identify possible neural mechanisms of saccadic suppression.

We recorded electrophysiological data in area MT of two macaques while they observed randomly positioned flickering bars and performed optokinetic nystagmus (OKN), a sequence of slow phases interspersed with fast backward eye movements. The OKN was induced by a random dot pattern that moved to the left or to the right and filled the entire screen.

We analyzed the firing rate, local field potential (LFP), the power of the LFP, as well as the correlations between the stimulus and the spikes and the correlations between the stimulus and the LFP, all around the time of saccades. The power of the LFP in a frequency band matched to the stimulus frequency showed a large drop around saccade onset, even when the firing rate of individual cells was increased or not modulated. This suggests that a lack of population synchrony may contribute to the reduced detectability of a visual stimulus around the time of a saccade.

We also used the polarity of the LFP modulation around saccade onset to putatively assign neurons and LFP recordings to specific layers (supra or infragranular; Murthy and Fetz, JNeurophys 1996). This assignment revealed a layer-specific modulation of firing rate immediately after the saccade. One group of neurons (e.g. in the putative infragranular layers) showed an increase of firing after the saccade, while the other group showed a decrease. We speculate that this may be a signature of feedback modulation enhancing the representation of afferent input.