A neural model of MSTd area for eye movement compensation

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Neurons in the dorsal part of monkey medial superior temporal area (MSTd) can respond to pursuit eye movement as well as visual motion patterns, such as dots expanding radially from one location and dots coherently moving to one direction (Komatsu and Wurtz, 1988). Not like the neurons in medial temporal area (MT), which are tuned to a specific retinotopic speed and direction of moving stimuli, some of these neurons in MSTd are tuned to the on-screen speed and direction of moving stimuli, even when there is eye movement (Bradley et al., 1996; Inaba et al., 2010). It seems that these MSTd neurons are able to compensate the corresponding visual effect caused by the eye movement, so that the actual visual motion can be revealed by the brain. However, how these neurons integrate the eye movement and the visual motion information to achieve this compensation is still controversial. In this study, we will show that in a shunting network (Grossberg, 1982; Pack et al., 2001) with a small set of parameters, the compensation of eye movement can be modeled. This result indicates one possible principle of neurons' computation in integrating the signals from different channels.

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