

Title: Eye Position Effects in Area MSTd

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Visual signals generated by self-motion are initially represented in retinal coordinates in the early parts of the visual system. Since this information can be used to navigate the observer through the environment, the signals must be transformed into body or world coordinates at later stations of the visual-motor pathway. MSTd neurons are involved in heading computation, however, it was not known in which coordinate frame the tuning curves were represented. We examined whether focus tuning curves in MSTd were represented in eye, head, body, or world coordinates. We recorded extracellular responses from 80 MSTd neurons in two rhesus monkeys (*Macaca mulatta*) and found that the vast majority of neurons had focus of expansion tuning curves which were aligned in an eye-centered coordinate frame as opposed to head, body, or world-centered coordinates. We also found that area MSTd demonstrates significant eye position gain modulation, much like its posterior parietal neighbors. Parietal areas including LIP, area 7, area 5, and PRR are gain modulated by eye, head, and limb positions. These gain fields are a possible mechanism for transforming eye-centered coordinates into the coordinate frames most relevant to downstream motor areas.

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