

# Neural Control of Sensory Acquisition: The Vestibulo-Ocular Reflex

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**Abstract:** We present a new hypothesis that the cerebellum plays a key role in actively controlling the acquisition of sensory information by the nervous system. In this paper we explore this idea by examining the function of a simple cerebellar-related behavior, the vestibulo-ocular reflex or VOR, in which eye movements are generated to minimize image slip on the retina during rapid head movements. Considering this system from the point of view of statistical estimation theory, our results suggest that the transfer function of the VOR, often regarded as a static or slowly modifiable feature of the system, should actually be continuously and rapidly changed during head movements. We further suggest that these changes are under the direct control of the cerebellar cortex and propose experiments to test this hypothesis.