Distributed Neural Information Processing in the Vestibulo-Ocular System

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Abstract:

A new distributed neural information-processing model is proposed to explain the response characteristics of the

vestibulo-ocular system and to reflect

more accurately the latest anatomical and neurophysiological data on the vestibular afferent fibers and vestibular nuclei.

In this model, head

motion is sensed topographically by hair cells in the semicircular canals. Hair cell signals are then processed by multiple

synapses

in the primary afferent neurons which exhibit a continuum of varying dynamics. The model is an application of the

concept

of "multilayered" neural networks to the description of findings in the bullfrog vestibular nerve, and allows us to formulate

mathematically

the behavior of an assembly of neurons whose physiological characteristics vary according to their anatomical

properties.