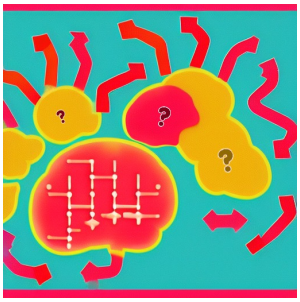
Journal of Vision Special Issue



Uncertainty in Sensory Processing and Action Control

Looking around and interacting with the world brings uncertainty, which our sensory and motor systems have to resolve. First, the processing of incoming sensory information is subject to internal noise, inherent ambiguity in sensory measurements, and processing delays, and is compounded by uncertainty induced by nuisance variability that is typical of natural perceptual tasks. Second, when we interact with our environment, each transition from motor plan inception to execution is associated with additional inherent uncertainty due to potential motor noise and error. In addition, the sensorimotor system has to handle challenging tasks in the real world that often require the simultaneous monitoring of multiple items, making it difficult to make decisions about how to distribute limited cognitive and perceptual resources. A crucial problem for the sensorimotor system is how to combine these different uncertainties, and how to act in a way that resolves uncertainty. Therefore, uncertainty, how to deal with it, and whether it is to some extent represented is an important theme for many areas of research. Topics can range from the control of simple actions and decision-making to behavior in real-world tasks, using psychophysical and neurophysiological approaches to computational models.

In this special issue, we aim to bring together different fields of research to explore current, common themes for how we deal with uncertainty across the sensorimotor hierarchy, as well as to guide integrative perspectives for future research. Topics include, but are not limited to:

- Perception under uncertainty
- Influence of experience and statistical learning
- Noise and uncertainty in motor control
- Complex real-world behavior
- Multitasking
- Representation of uncertainty

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Submissions Accepted through March 31, 2024. Accepted papers will be published as ready in the current monthly issue as well as presented together as a special issue on the JOV website.