

Division of Medical Sciences

Seminar Series

2024 – 2025

Probing the timescales of perception with white noise optogenetic stimulation



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Medical Sciences Location: MSB 150 & Zoom

Early visual information is processed both by the primary visual cortex (V1) and the superior colliculus (SC). These structures have traditionally been thought to perform distinct functions, with V1 supporting perception of visual features and the SC controlling orienting behaviors to visual inputs. Growing evidence challenges these divisions, as SC neurons encode many of the same visual features as their V1 counterparts. However, the degree to which SC visual representations contribute to perception is poorly understood. To resolve the relative contributions of V1 and SC to perception, we used randomized optogenetic perturbations of either SC or V1 in mice while they performed a challenging visual detection task. Performing a reverse correlation analysis on the optogenetic stimuli aligned to task events (stimulus onset, behavioral responses) revealed that both V1 and SC make simultaneous contributions to perception of some visual features, while perception of other features primarily depended on the SC. The data show both *when* and *where* visual neuronal responses are used by the brain to mediate visually guided behaviors.