

Invited | Other

📅 Sun. Oct 19, 2025 4:15 PM - 5:15 PM JST | Sun. Oct 19, 2025 7:15 AM - 8:15 AM UTC 🏢 Room 2(West B1)

[K3] Keynote : Masaki Tanaka

Chair:Hugo Merchant(Universidad Nacional Autónoma de México)

Periodic events evoke rhythm perception, which entails predicting stimulus timing, focusing attention on the moment, and preparing synchronized motor responses. Although both the cerebellum and basal ganglia are implicated in rhythm processing, their distinct roles remain poorly understood. In monkeys performing rhythmic tasks, we found periodic neuronal activity in the cerebellar dentate nucleus and striatal caudate nucleus. Cerebellar neurons encoded the spatial properties of sensory stimuli, while caudate neurons represented the direction and type of intended movements. These results suggest a functional dissociation: the cerebellum is involved in sensory prediction, whereas the striatum contributes to periodic motor preparation. Consistent with this view, optogenetic suppression of dentate activity impaired the detection of subtle changes in isochronous stimulus timing. Furthermore, Purkinje cells in the cerebellar crus lobules, which project to the dentate nucleus, showed periodic modulation in both simple and complex spikes, suggesting that synaptic plasticity in the cerebellar cortex may contribute to the formation of an internal model for rhythmic sensory input.

4:15 PM - 5:15 PM JST | 7:15 AM - 8:15 AM UTC

[K-01]

Decoding subcortical mechanisms of temporal prediction of periodic events

*Masaki Tanaka¹ (1. Hokkaido University (Japan))

Decoding subcortical mechanisms of temporal prediction of periodic events

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Periodic events evoke rhythm perception, which entails predicting stimulus timing, focusing attention on the moment, and preparing synchronized motor responses. Although both the cerebellum and basal ganglia are implicated in rhythm processing, their distinct roles remain poorly understood. In monkeys performing rhythmic tasks, we found periodic neuronal activity in the cerebellar dentate nucleus and striatal caudate nucleus. Cerebellar neurons encoded the spatial properties of sensory stimuli, while caudate neurons represented the direction and type of intended movements. These results suggest a functional dissociation: the cerebellum is involved in sensory prediction, whereas the striatum contributes to periodic motor preparation. Consistent with this view, optogenetic suppression of dentate activity impaired the detection of subtle changes in isochronous stimulus timing. Furthermore, Purkinje cells in the cerebellar crus lobules, which project to the dentate nucleus, showed periodic modulation in both simple and complex spikes, suggesting that synaptic plasticity in the cerebellar cortex may contribute to the formation of an internal model for rhythmic sensory input.

Keywords: temporal prediction, cerebellum