

DANDRITE Topical Seminar

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10.00 – 11.00

Building 1870, room 816



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Implementation of flexible decision-making algorithm by cortical neurons and circuits

Flexible decision-making in dynamic environments is a remarkable capability of the mammalian brain. Although extensive research has been conducted at behavioral and cognitive levels, the precise biological mechanisms that enable the computations underlying flexible decision-making remain largely elusive. To address this, we designed an inference-based flexible decision-making task for mice and employed in vivo two-photon imaging and circuit manipulations to explore the underlying neuronal mechanisms. By conducting a cross-brain region circuit analysis, we demonstrate that the orbitofrontal-sensory cortical circuits implement an inference-based algorithm, thereby providing a high degree of flexibility in rule-switching behavior. Furthermore, using subcellular two-photon imaging, we found that layer 5 cortical pyramidal neurons in the auditory cortex compartmentalize distinct types of task information within dendritic and somatic subcellular domains, facilitating a context-dependent sensory-to-choice transformation. Our findings unveil how neuronal circuits and individual neurons implement biological algorithms for flexible decision-making.

Host: Chao Sun