

This talk will be in English.

The 69th Frontier Brain Science Seminar

Sponsored by Research Center for Idling Brain Science (RCIBS)

Modeling the brain's representation of abstraction and probability

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日時: 2025. 9月26日 Fri. 16:30~17:45

場所: 富山大学 附属病院2階 臨床講義室1

Abstract

Adaptive behavior relies on activity-dependent synaptic plasticity to sculpt internal models of the world. I introduce two complementary frameworks for how the brain encodes abstraction and probability. Regarding abstract representations, we first propose a three-factor plasticity rule for nonlinear dimensionality reduction in a three-layer network inspired by the *Drosophila* olfactory circuit. This rule approximates the t-SNE algorithm and reproduces experimental findings from fly studies. Next, we describe a dual-pathway hippocampal model- featuring a dense, direct input path and a sparse, indirect input path- where modulation of inhibitory tone toggles recall between abstract categories and concrete exemplars. Regarding probabilistic representations, we exploit chaotic fluctuations in a recurrent network to perform Bayesian posterior sampling. Trained with biologically plausible learning on a cue-integration task, the network reliably approximates target distributions despite chaos-induced sensitivity to initial conditions. Together, these models illustrate how synaptic plasticity and neural dynamics could underlie abstract and probabilistic internal representations.

※ 本セミナーは、大学院博士課程授業「認知・情動脳科学特論」の一環です。履修者は、レポートの提出が必要です。また、本セミナーと同日 15:00 から開催の The 68th の両セミナーを受講することにより、大学院特別セミナー単位認定の対象となります。

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Organizer: Khaled Ghandour (RCIBS/Dept. of Biochemistry) (Ext, 7228)