CDB SEMINAR

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16:00~17:00 A7F Seminar Room

Dissecting computations in the dopamine reward circuit: beyond stamp collecting

Summary

We make decisions based not only on current sensory inputs but also on the consequences of previous decisions. How do animals learn from the consequences of previous decisions? Psychological studies of animal learning have shown that temporal contiguity between two events (e.g. a sensory cue and reward) is not sufficient for establishing associations between them. Instead, the efficiency of learning critically depends on the discrepancy between predicted and actual outcomes (i.e. prediction errors) (Kamin, 1969; Rescorla and Wagner, 1972).

Neurophysiological studies in non-human primates have shown that dopamine neurons in the midbrain signal discrepancies between expected and actual reward, i.e., they compute reward prediction error (Schultz et al., 1997). Because these firing patterns closely resemble a teaching signal used in machine learning theories (Sutton and Barto, 1998), this finding sparked great enthusiasm for understanding the function of dopamine neurons on a firm theoretical footing. Despite such interest, how dopamine neurons compute reward prediction error remains a mystery. To address how dopamine neurons compute reward prediction error, we have been taking a multidisciplinary approach using a mouse model amenable to emerging genetic and molecular techniques. In this talk, I will discuss our recent progress in dissecting neural circuits involved in reward prediction error calculations.

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