

Symposia

[4S03m]Beyond metacognition: parallel self-evaluative brain systems generate exploratory actions in novel environments

Organizer: Kentaro Miyamoto (Department of Experimental Psychology, University of Oxford), Rei Akaishi (Social Value Decision Making Unit, RIKEN CBS-Toyota Collaboration Center (BTCC))

Sat. Aug 1, 2020 9:00 AM - 11:00 AM Room 3

***Videos are available throughout the meeting period.**

[4S03m-04]Frontocortical mechanisms of confidence and metacognition in rat

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Studies in humans have revealed neural correlates of confidence in several regions, including in prefrontal cortex. However, it is still unclear which regions are causally involved in this process. I will present recent work where we trained rats to discriminate between ambiguous visual cues via spatial choices based on a learned stimulus-response rule. Following action selection using a touchscreen, rats expressed their confidence by time-wagering: they could wait for a variable amount of time before they could receive a possible reward or initiate a new trial. This design allowed us to measure confidence trial-by-trial. We found that waiting times increased with discrimination accuracy and were negatively correlated with response times, demonstrating that this measure could be used as a proxy for confidence. Following chemogenetic silencing of anterior cingulate cortex (ACC), waiting times became less diagnostic of perceptual uncertainty. We also computed metacognitive efficiency (meta- d'/d') that assesses how well waiting time tracked discrimination performance (d') across trials (Maniscalco & Lau, 2012), and found that this measure was significantly reduced following ACC inhibition. These results will be discussed in the context of our recent work in the orbitofrontal cortex and how animals may similarly show metacognition in more traditional reinforcement learning paradigms.