Symposia

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

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Sat. Aug 1, 2020 9:00 AM - 11:00 AM Room 3
*Videos are available throughout the meeting period.

[4S03m-05]Environmental Neuroscience from the Viewpoint of Multiscale Computations

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In contrast to the narrow and local computations in artificial systems, computations in the human and animal brains proceed in both local and global scales in time and space to try to achieve a hierarchy of short-term and long-term goals across both local and global environments. One clue of the unique nature of the local computations in human and animal brains comes from their anomalies: the observed phenomena include history-dependent inertia in decision making and biases in credit assignment in learning. These biases can make the computations in the local environment more efficient by reducing computational costs with successive repetitions of the same behavioral patterns. However, these biases can increasingly narrow down the scope of computations to the local situations, which can be detrimental for their survival. To counteract this tendency for the local adaptation, the brain seems to be equipped with the ability to model and implement long-term and large-scale predictive decisions. This topic has been recently examined especially in the experimental paradigms of foraging decisions that mimic the situations of foraging behaviors of animals in the wild. The animal foraging paradigm, where an agent alternates between global diffusive searches and fine-grained local searches, is actually a broadly relevant model for a wide range of human foraging-like behaviors including memory search, information seeking, problem solving and social learning. By integrating these findings with relevant literature, we would like to suggest that biological intelligent systems operate through a hybrid multiscale architecture of local and global computations.