第10回 人間知・脳・AIセミナー　CHAIN Academic Seminar ＃10

Neural mechanisms of supervised versus reinforcement motor learning

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Abstract:

Most researchers agree on that motor learning can be categorized into two distinct types, motor adaptation and skill learning. They are differentiated whether learners recalibrate well-trained movement to changes in environment (adaptation) or generate novel movement patterns (skill learning). The motor adaptation involves a parametric change of a motor controller driven by sensory-prediction errors potentially computed by internal models. Thus, motor adaptation can be considered as supervised learning based on directional error feedbacks. In contrast, the motor skill learning involves generating novel movement patterns to achieve task goals. For the learning signals, the skill learning requires evaluative feedback such as reward or penalty instead of directional errors, thus involving initial exploration to select motor controllers associated with higher rewards. This type of learning is known as reinforcement learning. In this seminar, I compare and contrast supervised learning and reinforcement learning and present a fMRI study for each type of learning. I discuss their neural substrates, notably cortico-cerebellar network (adaptation) and cortico-striatal network (skill learning). For the former, I introduce simple computational models for motor adaptation with multiple time scales and present a fMRI study based on the model. For the latter, I present a *de novo* motor skill learning task for fMRI experiment recently developed in my lab, in which participants learned to control a computer cursor by moving their fingers from scratch. Lastly, I briefly introduce other ongoing studies and future research related with motor learning & memory in my lab.

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Website →

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