Metacognition Supports the Solving of Complex Problems

～ Confidence May be the Key to Our Unconscious Brain Activity ～

概要

How can the brain solve problems with astronomically high number of dimensions, simply by trial and error? Combining fMRI measurements of brain activity, neurofeedback, and reinforcement learning computations, we show that humans can learn to use unconscious information in their own brain to select optimal behaviors. Moreover, the confidence in one's own cognition may be the secret of this learning ability.
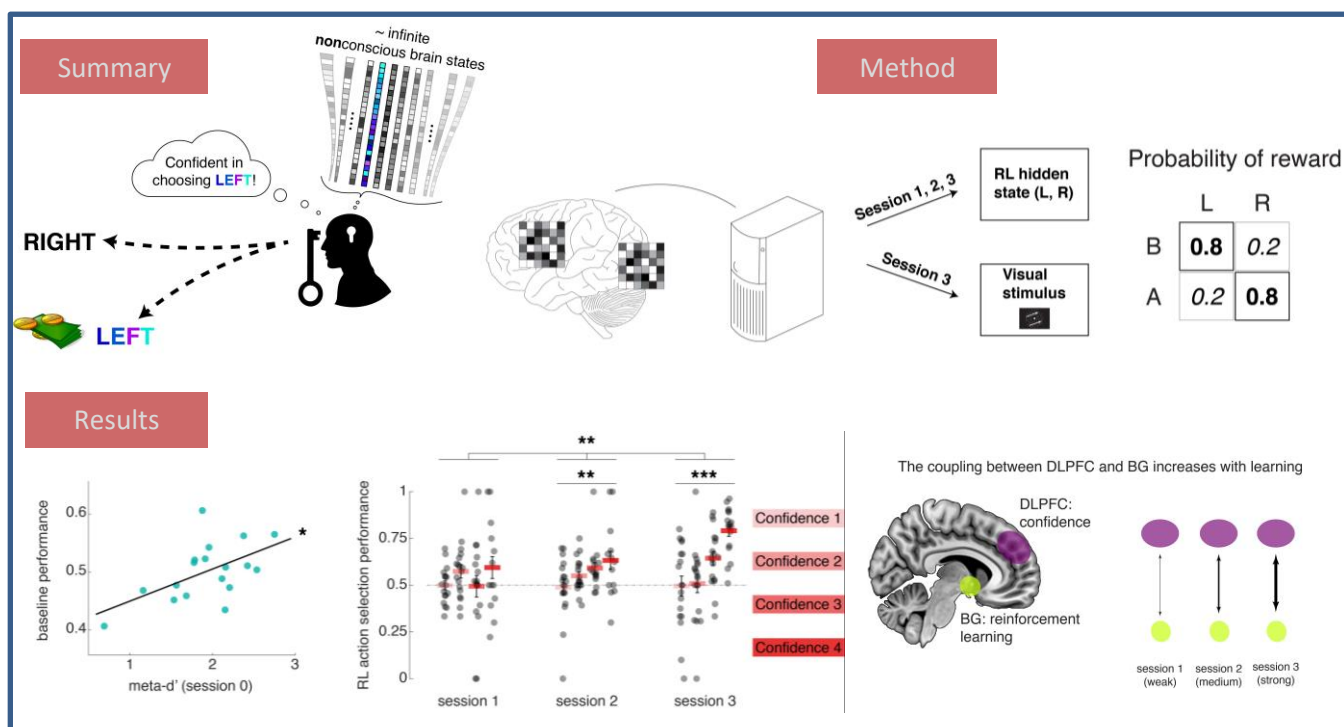
特徴

▌ Using fMRI neurofeedback, we set a trial-and-error betting game, where unconscious brain activity patterns determine the optimal responses, to strengthen learning in humans.

▌ Participants used their brain information to earn monetary rewards, and those with higher metacognitive (introspection) ability performed better.

▌ As learning progressed, the brain region that controls reinforcement learning and the brain region that controls metacognition became synchronized.

今後の展開

▌ We will study how other cognitive functions help reinforcement learning in the human brain to solve complex problems and test these ideas in artificial agents.

対コロナへの関連

▌ Understanding the neural mechanisms of the cooperation between learning and metacognition will contribute to future applications in brain science education and medicine, which are particularly important these days.

Summary

Method

Results