ポスター | G. 学習・記憶

[2Pm]学習

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# [2Pm-086]痛み予測のボラティリティと関連する前島の活動

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Many situations we encounter in our daily lives are characterized by uncertainty. One source of uncertainty is non-stationarity in the underlying causal structure, which is called volatility. One example of this volatility occurs when the contingency between actions and outcomes switches so that actions that were associated with one outcome become associated with another outcome. Previous neuroimaging studies on volatility have mainly used reinforcement learning tasks with monetary rewards and have shown that the anterior cingulate cortex (ACC) plays an important role in the processing of volatility. On the other hand, studies of pain avoidance learning tasks have reported that activity in the anterior insular cortex (AIC) is associated with pain prediction. In the present study, we added volatility changes to a pain reinforcement learning task to determine whether the ACC or AIC is associated with the volatility of pain probability. Participants performed a pain prediction task in which they learned the relationship between the cue and the probability of thermal pain during an MRI scan. In the volatile environment condition, the relationship between cue and pain probability switched with every 10 trials. In contrast, in the stable environment condition, the relationship between cue and pain probability remained constant over 20 trials. Participants predicted pain or no pain through two alternative forced choices after the cue was presented. Each participant' s behavior was modeled as a Bayesian learning agent, and parameters were estimated from the participant' s pain prediction responses. The model included hidden states related to pain probability and its volatility, the latter representing the participant' s subjective volatility from trial to trial. The parametric modulation analysis using estimated subjective volatility revealed that the activity of the right AIC during the anticipation period, immediately before the pain stimulus, was positively correlated with the volatility. In addition, activity in the AIC and parahippocampal gyrus during cue observation was also found to be correlated with volatility at a liberal threshold. These results indicate that activity in the AIC, but not the ACC, is associated with volatility in pain learning.

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