

論文の内容の要旨

論文題目 : Dissociating the Neural Mechanisms of Preference and Non-Preference
Judgments

(選好と忌避にもとづく判断の神経メカニズム)

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Abstract

People make decisions based on their preferences (preference-based choice), but can also make choices based on what they dislike more or what they want to avoid (non-preference-based choice). The majority of decision making research has examined preference-based choice but has not differentiated it from non-preference-based choice. The decision making process can be decomposed into multiple value-based computational processes, which are shown to be subserved by different regions in the prefrontal cortex (PFC). This study examines how decision making behaviour differs between preference and non-preference, and used functional magnetic resonance imaging (fMRI) to examine the activation patterns in prefrontal regions when subjects made preference and non-preference based judgments.

While being scanned, subjects completed a two-alternative forced choice task in which they were instructed to make decisions between various types of food based on either preference or non-preference (decision rule). Results showed behavioral differences between preference and

non-preference-based decisions, with non-preference decisions taking significantly longer than preference decisions. Moreover, interaction effects were found between decision rule and various types of decision values, suggesting that decision making processes are governed by a rule-based compatibility effect.

Meanwhile, fMRI results showed that the same decision circuits within the PFC are configured differently depending on whether decisions are made based on preference or non-preference criteria.

Activation in the dorsolateral PFC showed an interaction pattern, changing depending on both the values of the two choice options and the decision rule. It was also found that activation in the medial and lateral PFC was modulated linearly according to the difference in value between the two items and according to the value of the chosen item, respectively. In the medial and lateral PFC, there were also distinct patterns of activation observed between dorsal and ventral regions: in dorsal regions value-related changes in activation were modulated by the decision rule, whereas in ventral regions activation patterns were not modulated. Based on these results, it is proposed that preference and non-preference decision rules represented in the dorsal PFC differently configure decision processes, resulting in context-specific significance being attached to the choice values represented in the ventral PFC. These findings suggest that decision-making is supported by a fluid and flexible system, and inform the behavioral and neural mechanisms behind adaptive, criteria-based choice.