Universität Basel

Research Project

The influence of episodic memory on value-based decision making

Third-party funded project

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Any decision we make is influenced by our memory (Weber and Johnson, 2006). From everyday purchases at the supermarket to live-changing decisions such as choosing a partner: we recall the positive and negative experiences from the past as a guide to our current preferences. Previous research on the interplay of memory and decision making has been focused on how reinforcement history shapes behavior (Schultz et al., 1997; Sutton and Barto, 1998) and on how rewards facilitate memory formation (Lisman and Grace, 2005; Wittmann et al., 2005). However, little is known about the neural and cognitive mechanisms that underlie the impact of remembering (and forgetting) particular events on making value-based decisions.

Recently, I addressed this question in a neuroimaging study by asking participants to choose between options that they had to retrieve from memory (Gluth et al., 2015). Combining cognitive modeling with functional magnetic resonance imaging (fMRI), I could show that people's preferences are biased by their memories, and that this bias is mediated by functional network interactions in the brain. The goal of this proposed research project is to extend this work for achieving a broadened and deepened understanding of the influence of episodic memory on value-based decision making. I will employ multiple neural and psychophysiological measurement tools (i.e., fMRI, electroencephalography (EEG), and eye-tracking), as well as mathematical modeling of memory and decision-making processes to develop a comprehensive picture of the neural and cognitive mechanism of memory-based preferential choice.

The project is divided into three parts. Subproject A addresses the question of how people are biased by their memory. I will examine two different, not mutually exclusive hypotheses for the origin of the memory bias: biased attention and uncertainty. In Subproject B, I will combine cognitive modeling of decisions and response times with the temporally precise EEG technology to investigate how the processes of memory retrieval and decision formation emerge over time. The goal of this subproject is to develop a unified cognitive model of memory-based preferential choice. Finally, I will utilize the insights gained from the first two parts for a comparison of memory-based decision making between younger and older people in Subproject C. The proposed research will advance our knowledge of the interactions between the neural systems that mediate remembering and deciding, and it will shed light on inter-individual differences in people's susceptibility to the memory bias on choice.

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