

Publication

A reinforcement learning diffusion decision model for value-based decisions

JournalArticle (Originalarbeit in einer wissenschaftlichen Zeitschrift)**ID** 4515202**Author(s)** Fontanesi, Laura; Gluth, Sebastian; Spektor, Mikhail S.; Rieskamp, Jörg**Author(s) at UniBasel** [Gluth, Sebastian](#) ; [Fontanesi, Laura](#) ; [Rieskamp, Jörg](#) ; [Spektor, Mikhail](#) ;**Year** 2019**Title** A reinforcement learning diffusion decision model for value-based decisions**Journal** Psychonomic Bulletin & Review**Volume** 26**Number** 4**Pages / Article-Number** 1099-1121**Keywords** Bayesian inference and parameter estimation; Computational modeling; Decision-making; Response time models

Psychological models of value-based decision-making describe how subjective values are formed and mapped to single choices. Recently, additional efforts have been made to describe the temporal dynamics of these processes by adopting sequential sampling models from the perceptual decision-making tradition, such as the diffusion decision model (DDM). These models, when applied to value-based decision-making, allow mapping of subjective values not only to choices but also to response times. However, very few attempts have been made to adapt these models to situations in which decisions are followed by rewards, thereby producing learning effects. In this study, we propose a new combined reinforcement learning diffusion decision model (RLDDM) and test it on a learning task in which pairs of options differ with respect to both value difference and overall value. We found that participants became more accurate and faster with learning, responded faster and more accurately when options had more dissimilar values, and decided faster when confronted with more attractive (i.e., overall more valuable) pairs of options. We demonstrate that the suggested RLDDM can accommodate these effects and does so better than previously proposed models. To gain a better understanding of the model dynamics, we also compare it to standard DDMs and reinforcement learning models. Our work is a step forward towards bridging the gap between two traditions of decision-making research.

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