

Assembling old tricks for new tasks: A neural model of instructional learning and control

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We can learn from the wisdom of others to maximize success. However, it is unclear how humans take advice to flexibly adapt behavior. Based on data from neuroanatomy, neurophysiology, and neuroimaging, a biologically plausible model is developed to illustrate the neural mechanisms of learning from instructions. The model consists of two complementary learning pathways. The slow-learning parietal pathway carries out simple or habitual stimulus-response (S-R) mappings, whereas the fast-learning hippocampal pathway implements novel S-R rules. Specifically, the hippocampus can rapidly encode arbitrary S-R associations, and stimulus-cued responses are later recalled into the basal-ganglia-gated prefrontal cortex to bias response selection in the premotor and motor cortices. The interactions between the two model learning pathways explain how instructions can override habits and how automaticity can be achieved through motor consolidation.

