What is a Sequence? The Neural Mechanisms of Perceptual, Motor, and Task Sequences Across Species and Their Interaction with Addiction

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Summary and Keywords

Sequences permeate daily life. They can be defined as a discrete series of items or states that occur in a specific order with a beginning and end. The brain supports the perception and execution of sequences. Perceptual sequences involve tracking regularities in incoming stimuli, such as the series of sounds that make up a word in language. Executed sequences range from the series of muscle activations used by a frog to catch a fly to a chess master mapping her next moves. How the brain controls sequences must therefore scale to multiple levels of control. Investigating how the brain functions to accomplish this task spans from the study of individual cells in the brain to human cognition. Understanding the neural systems that underlie sequential control is necessary to approach the mechanistic underpinnings of complex conditions such as addiction, which may be rooted in difficult-to-extinguish sequential behaviors. Current research focuses on studies in both animal and human models and spans the levels of complexity of sequential control and the brain systems that support it.

Keywords: sequence, cognitive control, executive function, habit, addiction, primate, human, fMRI, electrophysiology

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