Motor Sequence Learning

Lab in Psychology

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Introduction

Motor sequence learning tasks (MSLTs) are essential experimental paradigms used to study how individuals acquire and refine sequential patterns of movement. One of the most prominent examples is the Serial Reaction Time Task (SRTT), which requires participants to respond to a series of visual or auditory cues by pressing corresponding keys in a predetermined sequence. Through repeated practice, individuals often demonstrate improved reaction times and greater accuracy, indicating that they have learned the underlying motor sequences. Research has shown that motor sequence learning can occur implicitly, meaning that individuals may not be consciously aware of the learned sequences, yet their performance improves significantly. This phenomenon is particularly interesting when considering populations with impairments in explicit learning, such as individuals with developmental dyslexia or certain neurological conditions. Studies have demonstrated that while these individuals may struggle with articulating learned sequences, they can still exhibit enhanced performance in motor tasks. Moreover, findings suggest that motor sequence learning is adaptable; learned sequences can transfer across different tasks or stimuli, highlighting the flexibility of the underlying cognitive processes. Neuroimaging studies have revealed that as individuals practice these tasks, there is a reorganization of brain networks involved in motor learning, shifting from a fast, labile learning phase to a more stable long-term memory phase. Despite extensive research, there remains a gap in understanding how unique sequential patterns are formed in MSLTs when participants are not provided with a fixed sequence to follow. This aspect raises important questions about the role of intentional decision-making in the learning process. By exploring how individuals generate and refine their own motor sequences through free-choice conditions, researchers can gain deeper insights into the cognitive mechanisms underlying motor learning.

Method

The experiment was designed in a way that allowed the participant to click the keys as they saw the

Stimuli. This experiment was conducted on Psychopy which conducts psychophysics experiment using python. The participant’s consent was taken and was given a comfortable environment.

The experiment had 4 rectangles which appeared on the screen, along with a tiny triangle on the top which kept on switching. The task was to detect the position of the triangle and press keys Z, X, Cor V as per the positioning of the triangle. 400 trials were done in which, half of them were sequential and half were random. The data was collected and the derivations were made

Results

This is the chart which shows the results of the reaction time. There is an evident difference between the reaction time as the trails goes by.

Discussion

line representing the sequential condition typically shows lower RTs compared to the random condition in the beginning. This suggests that participant were able to anticipate their responses based on learned sequences, leading to quicker reactions. Rt for random was lower around the end, which can be predicted as, that the participant got a hang of doing the task efficiently after these many trials.

References

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Github link