ABSTRACT

Dynamical processes between teacher-student dyads in rat observational learning

The project investigates the dynamics of observational learning in rat teacher-observer dyads by analyzing behavioral coordination and synchronization during a nose-poke task. The study uses both traditional behavioral analysis and nonlinear time series techniques to explore how teacher and observer behaviors relate to task success. Rats' positions were tracked using pose estimation software (DeepLabCut and SLEAP), and using Python, we generated heatmaps using the resulting coordinate data. Heatmaps provided visualizations of positional tendencies across correct and incorrect trials, revealing differences in path directness and movement hesitation. Recurrence Quantification Analysis (RQA) was then applied to compare temporal patterns in movement. By adjusting parameters such as radius, delay, and embedding dimension, we quantified recurrence rate (RR) and determinism (DET) across trial types. Results showed higher RR and more structured recurrence plots in correct trials, particularly in learner movements, suggesting increased behavioral coordination when the task was successfully performed. This analytical approach demonstrates the utility of combining spatial and temporal metrics to uncover subtle but meaningful indicators of learning-related interactions in social dyads. If you want to learn more, click here!