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Report

Computational Simulation of Time Perception: Model Implementation and Description

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1 Introduction

speed of neural trajectories experimentally found that neural activity in anticipation of a delayed response reaches a fixed threshold with rate inversely proportional to delay period Wang et al. 2018. flexible control of speed can be achieved by a simple model consisting of two units that have reciprocal inhibitory projections and the speed at which the output evolves can be controlled by a shared input A potential neural mechanisms for speed control.

2 Model Description

2.1 Circuit

circuit description u, v, y each representing the average activity of a neural population parameter: weights, threshold, tau, initial conditions noise modeled as independent white noise (stochastic synaptic inputs) fixed points, dynamical regime (depending on parameter, initial cond), towards stable FP ramp like behavior in y, rate of y inversely related to input I input - rate producing time interval

2.2 Update Mechanism and Experiment simulation

Updating I based on feedback to adjust rate in reproduction stages: measurement, update and reset, reproduction until threshold update: delta y-th,

weighted parameter: memory parameter K, reset, initial conditions, threshold timeouts

3 Implementation of Model

3.1 Modules

Euler Implementation to Solve Differential Equation parallel Simulation experiment simulation update mechanism

3.2 Structure of Code

parallel simulations, experiment simulation

4 Results and Outlook

experiment simulation plot behavioral plot parameter search, extending units, neural trajectories