Procedural Learning with Graded Entropy

Cherrie Chang (cchang@mghihp.edu)

Advanced Analytics & AI for Communication Science Group, Mass General Hospital Institute of Health Professions, Charlestown, MA, USA

Tianyi Li (lidzr@bc.edu)

Department of Psychology and Neuroscience, Boston College, Chestnut Hill, MA, USA

Joshua Hartshorne (jharts@example.edu)

Advanced Analytics & AI for Communication Science Group, Mass General Hospital Institute of Health Professions, Charlestown, MA, USA

Abstract

Your abstract text here. The abstract should be one paragraph. Following the abstract should be keywords.

Keywords: procedural learning, implicit learning, statistical learning

Introduction

Your introduction text here. You can cite references using `@NewellSimon1972a` or `[@ChalnickBillman1988a]`.

Method

Overall Design

Our experiment involves a set of keyuses transition matrices to generate the sequence of positions in which a mole appears. Each matrix defines the probabilities of transitioning from one position to another on the screen, with the size of the matrix corresponding to the number of positions. For example, a 4x4 matrix defines transitions among 4 positions, while an 8x8 matrix defines transitions among 8 positions.

Participants

We recruited 251 participants (133 female, 118 male) on the online recruitment platform Prolific, with 50 participants per condition (51 in 5x5 condition). We screened for participants with an approval rating above 95% from previous Prolific studies. Participants ranged in age from 18 to 75 years (μ=35.6, Mdn=33, σ=11.8748024), spanning 32 nationalities and 20 languages spoken. Participants were compensated at a rate of $12.00 per hour, with the experiment expected to take ~20 (4x4 condition) to ~40 (5x5 condition) minutes in total. Partipants provided informed consent prior to beginning the experiment and all procedures have been approved by the Institutional Review Board at the MGH Institute of Health Professions.

Transition Matrices

We between-subjects manipulation of the number of positions to handle, which is the same thing as the size of the transition matrix used to generate the position sequence. Participants are randomly assigned to one of five matrix size conditions (4x4, 5x5, 6x6, 7x7, 8x8). The transition matrix describes the number of positions on screen to respond to, and the probabilistic structure the transitions between positions follow.

Because larger matrix sizes/sequences with more positions require more trials for the participant to observe the same number of trials on average for each position compared to smaller matrix sizes, we also vary the total number of trials across conditions, setting it as 20 blocks * 10 * matrix_length for each condition. We also vary the total number of practice trials similarly, with each condition getting 2 * matrix_length number of practice trials.

Hypotheses

Matrix Construction and Verification

Method

Participants

Protocol

Materials

Results

H0

H1

H2

H3

Discussion

References