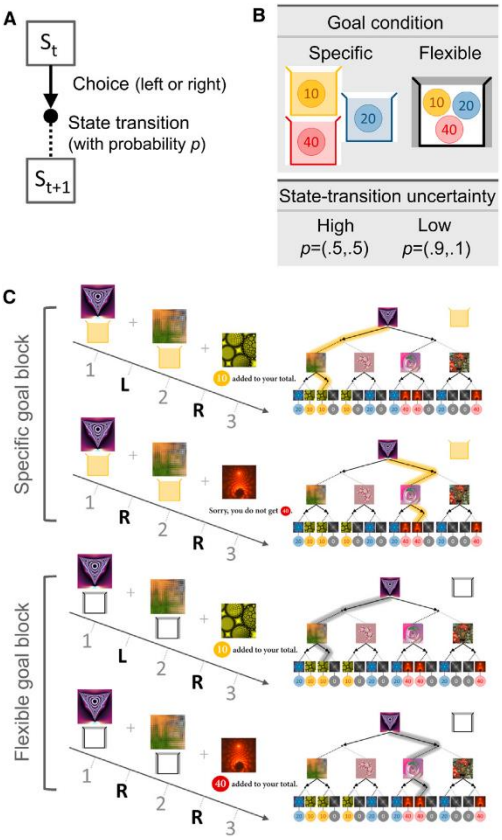
Two-stage markov decision task (64 channel EEG DB)

** We encourage you to use eeglab, which is a common toolbox for EEG analysis on MATLAB.

1. General description



During the two-stage markov decision task [1], we collected 18 subjects EEG data. There are two variables, one is the goal condition and the other is the state-transition uncertainty. Any change of the goal condition is explicitly presented, and a change of redeemable condition. During specific goal condition, you are redeemable only if you received same color of coin as specific goal color. However, during flexible goal condition, you can receive reward from any color of coins. On the other hand, any change of state-transition uncertainty is fully non-observable (implicit). During the low/high state-transition uncertainty, you have different set of state transition probability.

From theses task setting, specific goal / low-uncertainty encourage model-based reinforcement learning, and flexible goal / high-uncertainty encourage model-free reinforcement learning.

2. How to load data

EEGLAB : File -> load existing dataset : select any *.set file you want to load

In the workspace of MATLAB you can find raw data from EEG.data as struct format.

3. Epoching data

EEGLAB : tools -> extract epochs : you should type your wanted event-type in the “time locking event types”, then set wanted time window in the “

epoch limit”.

4. Scripting

EEGLAB : File -> History Script : save session or dataset’s script

** Guide for python use : You can load matlab file format(*.mat) from python with scipy library.

5. Data set description.

Filename : [name of the subject]_[session number]_[anything you did : resampling, artifact removal]_[band name].set
e.g.1) CYY03_1_resampled_AR_full.set : first session EEG data of subject “CYY03” with no band pass (“full”)
e.g.2) BMR10_1 resampled_AR_ALPHA.set : first session EEG data of subject “BMR10” with alpha

band.

6. RAW DATA

** some files with postfix “_full” as band name are raw data. Filtered from 0.5 to 20Hz with 500Hz sampling rate.
Path : eeg_save

7. Band-passed data details

Band name = {'DELTA','THETA', 'ALPHA', 'BETA', 'LOWBETA','HIGHBETA', 'MU'}s;
Band lim (band pass filter lower and upper bound) = [0.5 4 ; 4 8; 8 15; 15 30; 12 20; 20 30; 8 12];
Path : eeg_save/[bandname]

8. Subjects’ details

List of subjects = {'KJA01' 'PCH02' 'CYY03' 'JGS04' 'HJH05' 'GBY06' 'YCH07' 'HWP08' 'OYK09' 'BMR10' 'KWK11' 'PSJ12' 'HGY13' 'JYJ14' 'JYR15' 'LYP16' 'KSY17' 'OCK18'};
The maximum session number of each subjects as follows (respectively) : [3 3 5 3 5 5 5 5 3 5 5 4 4 3 5 5 5 5];
CAREFUL : 'PSJ12' didn’t respond at first stage of 36th trial of second session. **(PSJ12_2_*.set has no act1 at 36th trial)**

9. Behavioral data

SBJ_data.mat : use with care (there are no partitions among sessions.)
For i-th subject, you have two behavioral data. (SBJ{1,i}.pmb SBJ{1,i}.goal)
SBJ{1,i}.goal : specific or flexible goal condition. (-1 : flexible goal ; 6/7/8 : specific goal(40/20/10 for each))
SBJ{1,i}.pmb : context information, which is probability of MB reinforcement learning based on the computational arbitration model reported [1]

REFERENCE

1. Lee, S.W., S. Shimojo, and J.P. O’Doherty, *Neural computations underlying arbitration between model-based and model-free learning.* Neuron, 2014. **81**(3): p. 687-699.