

EEG DATA ACQUIRED FROM RISK TAKING BALLOON TASK (BART)

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Article for citation: TBD

EXPERIMENTAL PARADIGM

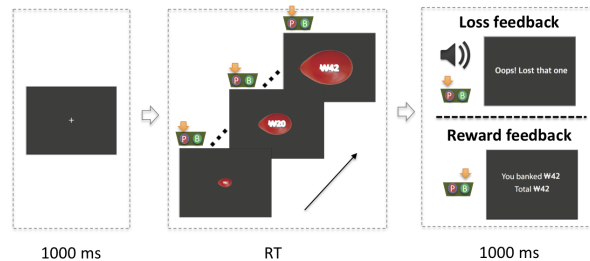


Figure 1: screenshot of paradigm

The BART paradigm was implemented in python using psychopy. Before starting, participants filled in questionnaires assessing state-trait anxiety (State-Trait Anxiety Inventory, STAI) and impulsivity (Barratt impulsiveness scale, BIS). During the paradigm, participants were asked to inflate a balloon that could either let it grow or lead it to burst. The balloon stimuli were red spheres that increased proportionally to the amount of money that was added with each inflation. Each inflation was worth 2 Korean Won. Participants were given two options in each trial: to press a button to continually inflate the balloon, or to press another button to collect the reward for the current balloon. If participants chose to continually press the inflation button and the balloon burst, a pop sound effect was generated from the computer and a text indicated the loss of the reward presented on the screen - this was then a "loss" trial. If participants chose to stop the inflation and press the collection button, they won the reward for the current balloon and the money was added to their accumulated earnings - this was then a "reward" trial. Participants were instructed to win as much money as possible. The paradigm was slightly modified from previous studies to be adapted for EEG data collection: a total of 500 trials (balloons) were performed, such as to increase the number of negative feedback epochs available for averaging. Each trial was started with a fixation cross shown for 1000 ms and visual feedback indicating reward or loss was shown for 1000 ms. In order to keep the experiment within a reasonable time length, the maximum bursting point for each balloon was set to 50 pumps. The probability of the balloon bursting after the first inflation was 1/149, after the second inflation was 1/148, and so on, until the 50th inflation. Pops resulting from the first pumps of an empty balloon were disabled to prevent negative feedback in this non-risky decision scenario. During the experiment, the reward value corresponding to each size increase of balloon and cumulated earnings were displayed in the center of screen, whereas the probability of the bursting was unknown to participants. Prior to the actual experiment, participants practiced 3 balloon trials for both loss and reward for the balloon. Following the original suggestion of Lejuez and colleagues, the behavioral risk-taking measure for the BART score was "adjusted pumps", which is defined as the average number of pumps on balloons, excluding those that burst.

DATA ACQUISITION

55 participants (30 males and 25 females, aged 19-35, mean= 24 yrs., S.D.= ±4.34) were recruited. All participants were Korea University students and healthy volunteers, who reported no neurological diseases or injury. In addition, each participant signed an informed consent form before the experiment and received payment for taking part in the study. Furthermore, all participants were naive with respect to the BART paradigm and had normal or corrected-to-normal vision. 28 participants' EEG signals were recorded with a sampling frequency of 1000 Hz using 34 passive electrodes system and a 40-channel Digital DC NuAmps amplifier (Neuroscan Inc., NC, USA). 27 participants were recorded using ActiCAP electrodes and BrainAmp Amplifier manufactured by Brain Products, Germany. All electrodes were positioned according to standard 10/10 system, namely: Fp1, F7,3,z,4,8, FC3,z,4, PT7,8, T7,8, C3,z,4, TP7,8, CP3,4, P7,3,z,4,8, O1,z,2. EOG electrodes were placed below (VEOL, VEOR) and on the outer canthi (HEOL, HEOR) of each eye. Three bipolar EOG channels were computed with channels HEOL, HEOR for horizontal EOG and VEOL, Fp1, VEOR, Fp2 for two vertical EOGs. Reference electrodes were placed on both mastoids for offline re-referencing and Fpz was used as forehead ground. Impedances of all electrode were maintained below 10 kOhm during measurement. Average setup time for the electrodes configuration was 42 minutes. Data were recorded for approximately 44-65 minutes for the BART experiment. Experimental stimuli were presented on a monitor with a refresh rate of 60 Hz and resolution of 1980 x 1020

pixels.

DATA FILE DESCRIPTION

Data file is in Matlab compatible format (.mat extension) version 7.3. It should be noted that .mat files saved using this version requires libraries that support reading HDF5 formats for use in python. All data are preprocessed and epoched to a range of -200 ms to 1000 ms with respect to feedback stimulus onset. Structure of this dataset is compatible with the BBCI toolbox.