

Lie detection database

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1 Experimental paradigm

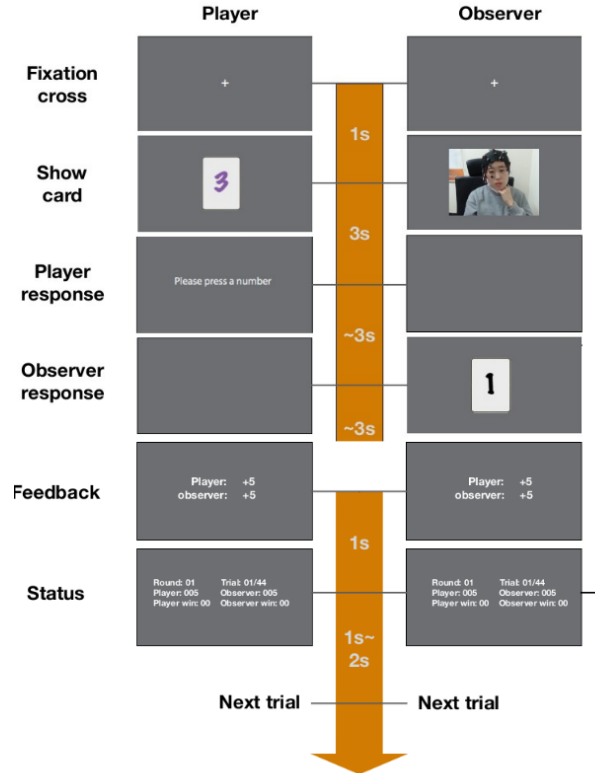


Figure 1: screenshot of paradigm

The BART paradigm was implemented in python using psychopy. In the experiment, participants were asked to play a deception card game with their counterpart. They were assigned the role of player, while their counterpart was assigned the role of observer. Generally, the player is assigned a card with a number on it in each trial, they were asked to tell the observers what number they saw on the card. Based on the player's facial expression while they were looking at the card, the observers then decide whether it is a lie or truth. The game has 11 rounds in total with 44 trials in each and 30 seconds break in between the round. In the 44 trials, half are spontaneous trials, 11 trials are instructed lie, and remaining 11 trials are instructed truth, the order are randomly shuffled. After the game, player and observer switch their roles to perform another session.

The stimuli in the card game consist of cards with 1–6 numbers in 3 different colors. The game starts with card color instructions showed to the player where black, purple and blue are randomly assigned by instructed lie, instructed true and spontaneous. Each trial starts with a 2 seconds fixation cross, followed by a card displayed for 3 seconds in the center of the monitor. The player is instructed to focus on the card in the 3 seconds while they are making the decision and their facial expression is showed to the observer in real time. Players then followed the card color which indicates a certain type of response and press a corresponding number on the cedrus pad. Specifically, players have to press a different number to that they saw on the card if it is the instructed

lie color, they have to press the same number that they saw on the card if it is the instructed truth color, and if it is the spontaneous color they can decide freely. The observers then see the card with the number player pressed in black color and decide to press lie or truth. The feedback with gained scores or penalty for player and observer shows after the observers response. when players were lying, the winner gets +15 points and the loser gets -5 points penalty; if players were being honest, winner gets +10 points and loser gets -5 penalty. The trial ends with status screen showing the information of total score earned, won trials, won rounds and game progress.

2 Data Aquisition

4 participants (12 males and 12 females, aged 19-34, mean = 25 yrs , S.D. = 4.34) took part in the experiment. All had normal or correct-to-normal visual acuity and none of them had a history of neurological disease or injury. Subjects were members of Korea University and healthy volunteered to participate in the study. All the participants were naive to the card game paradigm. The participants gave written informed consent before the experiment and received payment for taking part in the study. EEG with wet electrodes was recorded with a sampling frequency of 500 Hz, using BrainAmp amplifiers and Easy-Caps with a passive electrode system (Brain Products, Munich, Germany). The measurements were performed with 31 EEG electrodes, namely: Fp2,F9,7,3,z,4,8,10, FC5,1,2,6, T7,8, C3,z,4, CP5,1,2,6, P7,3,z,4,8, PO3,4, O1,z,2 as well as one EOG electrode below the right eye (EOGv1). Two bipolar EOG channels were computed with channels F9,10 and Fp2, EOGv1 for horizontal and vertical EOG, respectively. All other 28 EEG electrodes were nasion-referenced and a forehead ground was used (Fpz). Impedances of all electrodes were kept below 10k during the experiment. Setup time for the electrode configuration was 35 minutes on average

3 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 -500 ms to 3000 ms with respect to card show stimulus onset. Structure of this dataset is compatible with the BBCI toolbox.