Sharif University Of Technology

Electrical Engineering

Neuroscience Lab

Homework 01- Psychotoolbox

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1 Overview

Experiment Settings

I randomly separate 48 fractals in two group, bad or good. So, I have 24 good and 24 bad fractals. The classification of fractals are different for each subject. In experiment, good fractal is surrounded with green rectangle and bad is shown in red.

Search phase

Subject has to find the good fractal in each target value (TP) and reject the target absent (TA) trials, which just have bad fractals. Half of the trials randomly are set TA and half TP (12 trials on average for each good fractal in each session, total of 144 trials per session).

Search Steps:

1. Enter subject information (ID and session number).
2. Press Enter to start the experiment.
3. Fixation at the center (300-500 ms random assignment).
4. Fixation point disappears, objects onset.
5. Select an object or reject the trial

- Select: click on the object.

- Reject: press 'space' button.

6. Display off.
7. Delivering the corresponding reward (*More info in state diagram*).
8. Go to the next trail

Display Size (DS):

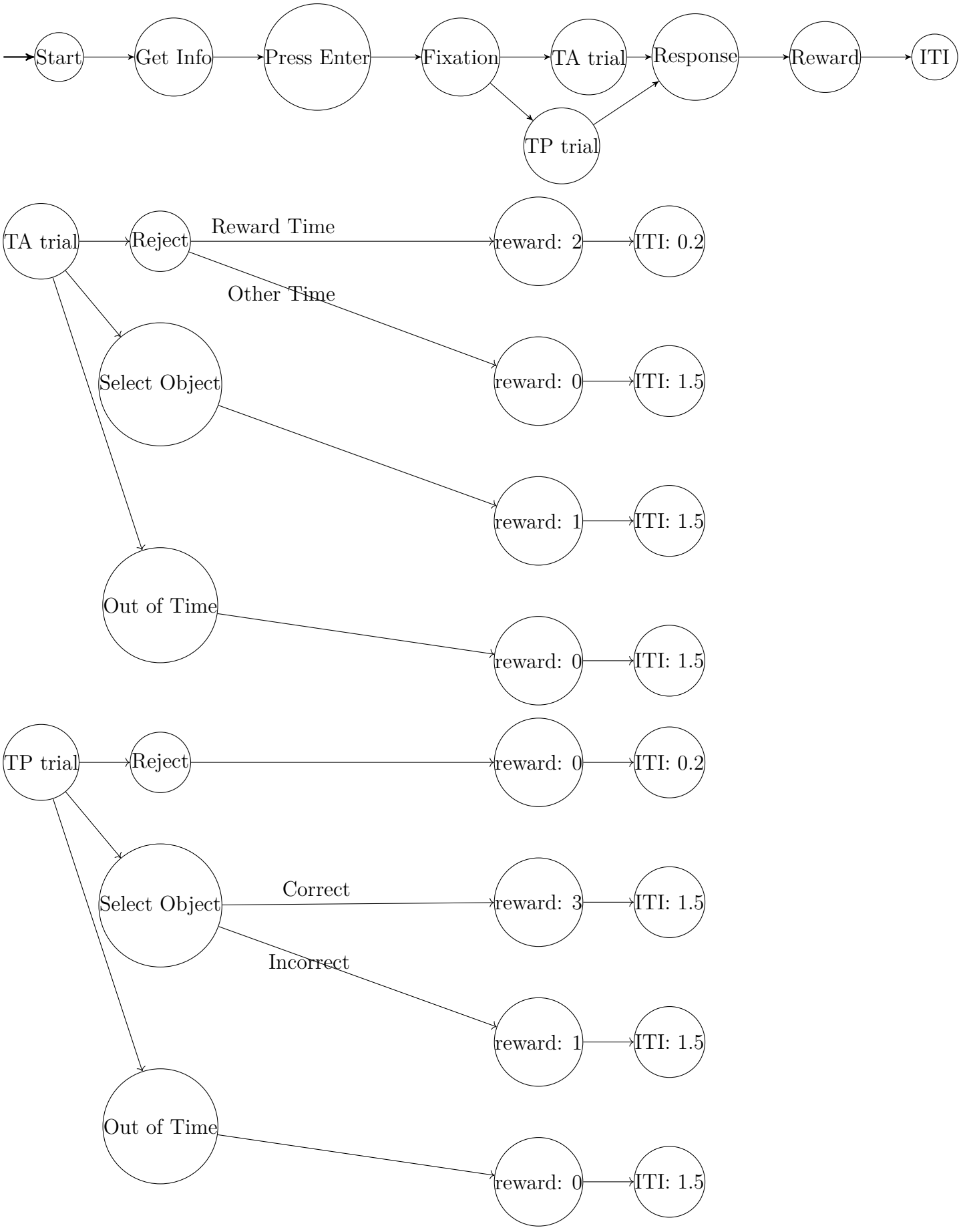
Randomly assign 3, 5, 7, 9 object on the screen. In TP, a good object position is randomly chosen to avoid the bias against the location.

Rotation:

1-360 deg random assignment (In other word, the zero angle is randomly assign on the screen).

2 Tasks:

Question 1: State Diagram



Question 2

In this task, we just have one subject and I just randomly group the objects. But to control the bias of low-level guiding features and recognition difficulties among fractal objects, we can use randomness to see each fractal equally in each of the 2 categories.

How many subjects do we need for equal appearance? (consider 4 categories (Value/Perceptual, Good/Bad))

We have 48 choice in each category, so we need 4^{48} subjects.

Question 3

Fractals should appear equally at each conditions in all N Trials.

1- I in each four trials, I randomly assign DS. So we equally have each displace size.

2- For TA, I repeat 1 to 24 number (24 bad fractal) and store them in array of length M (After determine DS for all trial, randomly grouped them in TA and TP. M is the whole fractal we need N trials). Then I shuffled the array.

3- As same as 2, we do again for TP (Bad and good fractal is assigned separately).

As I said earlier, the zero angle is randomly change in trials and the position of good fractal in TP is assigned randomly.

Question 4

In the beginning of script I collect subject ID and session number. Mouse position is used to track eyes movement. Use keyboard for key pressing (Accept: Space, Reject: X). Good and bad fractals is shown in green and red rectangle.

Question 5

At the end of each trial, you see the information box in the center of screen which contain subject information, key was pressed, this trial score and total score.

Question 6

I save some output in 'Subject.mat' file.

Question 7

We set different ITI for TA and TP because monkey has to reject TA and find the good fractal in TP. So, if the monkey reject TP, ITI is more to avoid reject all trials and try to find the good object. But in TA, the ITI (no reward time) is 0.2 to choose faster and see the TP with higher score. The reward of TP is more (when it answer correct) for this reason.

3 My Code Function

"Draw-cross-func" : Drawing a blue cross on the middle of screen between each trial. Duration is randomly assign between 300 to 500 ms.

"info-show-func" : Getting the user information and store it in 'text.txt'. It show the information at the top, in the middle of screen before the experiment begin.

"label-func" : Grouping the images into bad and good.

"Randomization" : Randomly set the trials in TA or TP and shuffle the images in trials to see them equally in whole experiment.

"reward-show-func" : Changing the reward of previous trial and total reward in 'text' file.

"set-condition-func2" : Base on subject response, it determine the state.

"set-ITI-func" : Setting the inter trial interval base on states,.

"set-reward-func" : Setting the reward base on states,.

"show-image-func" : It get the radius and zero angle ans find the fractals location.

"Show-text-func" : It get the text and show it on the screen.