BSE662A : DECISION MAKING AND THE BRAIN

REPLICATION and EXTENSION: ANALYSIS

GROUP : Psyched

Team Members:

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- EXECUTION INSTRUCTIONS

1. Unzip the zip file replication.zip. You will get a directory named 'replication'
2. Inside the directory, there are several files:
    a. main_expt.py : the python file containing the code for the main experiment
    b. trial_expt.py : the python file containing the code for the trial experiment (for the same task)
    c. Other files : these files include images, and other meta files created and used while designing the experiment
3. To run the experiment, open the 'main_expt.py' file in the "Coder view" of Psychopy
4. Click on "Run Experiment". You will be asked to fill in your Roll Number, and Name

Both the extension files can be run in a similar manner.

- DATA STORAGE

1. After completion of the experiments in the replication and extension_1 parts, 4 csv files will be created:
    a. untimed_trialWise_data.csv : contains data for every 4 trials in each payoff condition for the untimed version
    b. timed_trialWise_data.csv : contains similar data as above for the timed version of the experiment
    c. untimed_overall_data.csv : contains the overall data for the untimed version of the experiment
    d. timed_overall_data.csv : contains overall data for the timed version of the experiment
2. After completion of the experiments in the extension_2 part, 2 csv files will be created:
    a. trialWise_data.csv : contains data for every 4 trials in each payoff condition for the untimed version
    b. overall_data.csv : contains the overall data for the untimed version of the experiment
3. The data consists of : average rewards received and the number of repeat choices made by the participant

- ANALYSIS CODE

1. The code for analysis is contained in the respective directories : replication, extension_1, extension_2.
2. The code contains several python files with the names: analysis.py, analysis_overall.py, and rep_choices_plots.py.
3. Executing these analysis files (similar to a normal python file) will produce the desired plots.

- REPLICATION

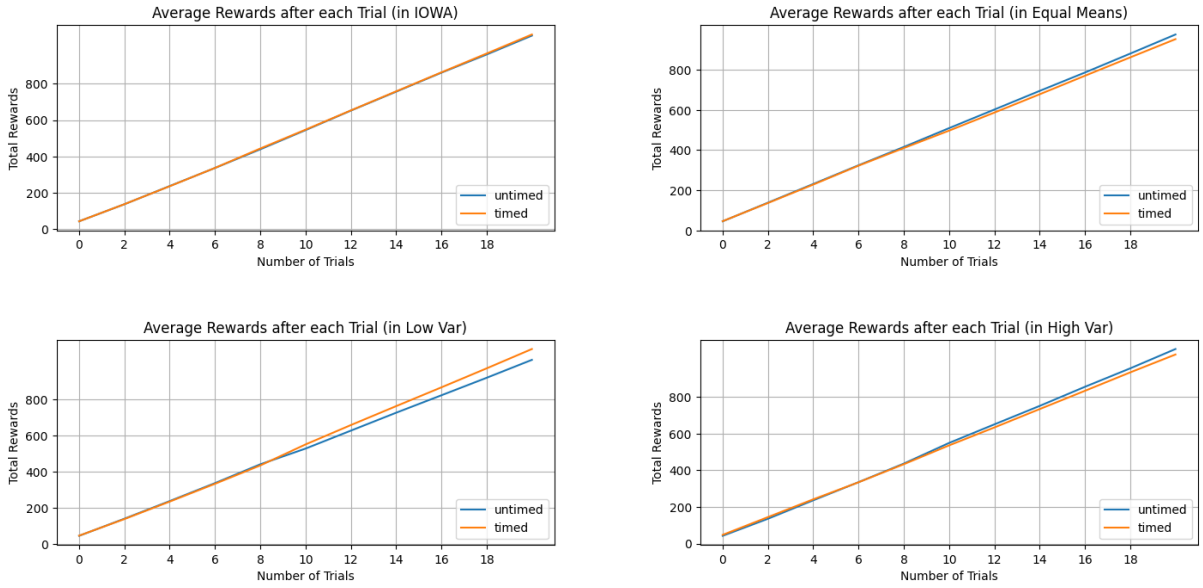

Figure 1 (a) : Trial-wise comparison of average rewards gained in untimed and timed versions of the Replication task

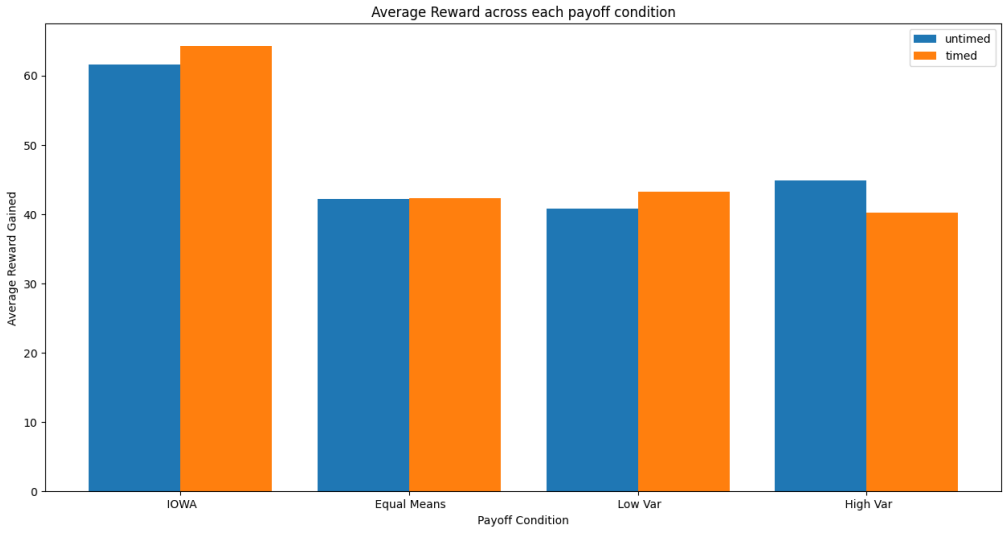

Figure 1 (b) : Overall comparison of average rewards across different payoff conditions in both timed and untimed versions of the replication task

While we do not see very significant differences in average rewards across all Payoff Conditions in timed and untimed cases, Equal Means and High variance payoff conditions displayed better average rewards in untimed conditions when compared to the timed conditions (as expected). Further, the highest rewards were observed under the IOWA conditions (similar to the replication task

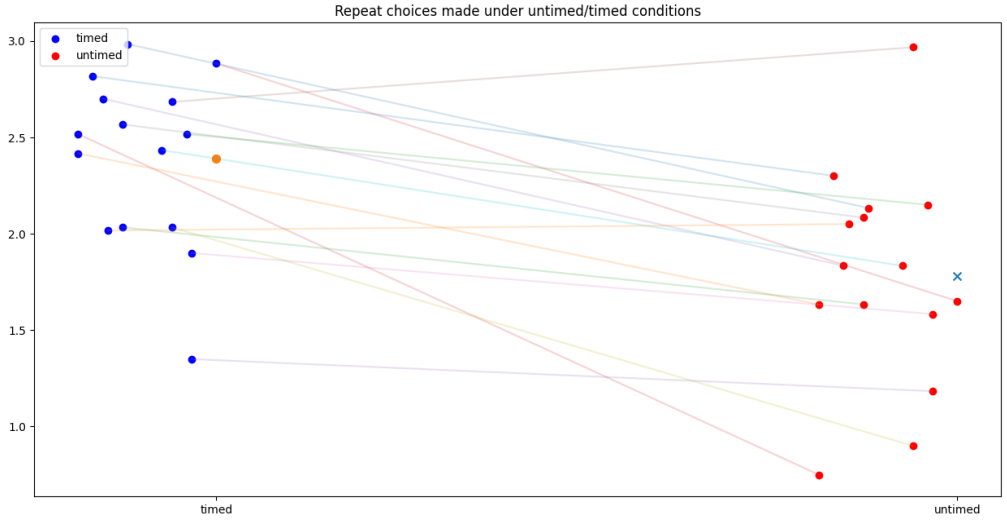

Figure 1 (c) : Comparison of repeat choices made (on an average) in timed and untimed conditions. Each line represents one participant. The yellow dot (in the left distribution) and the blue cross (in the right distribution) represent the mean of the respective distributions

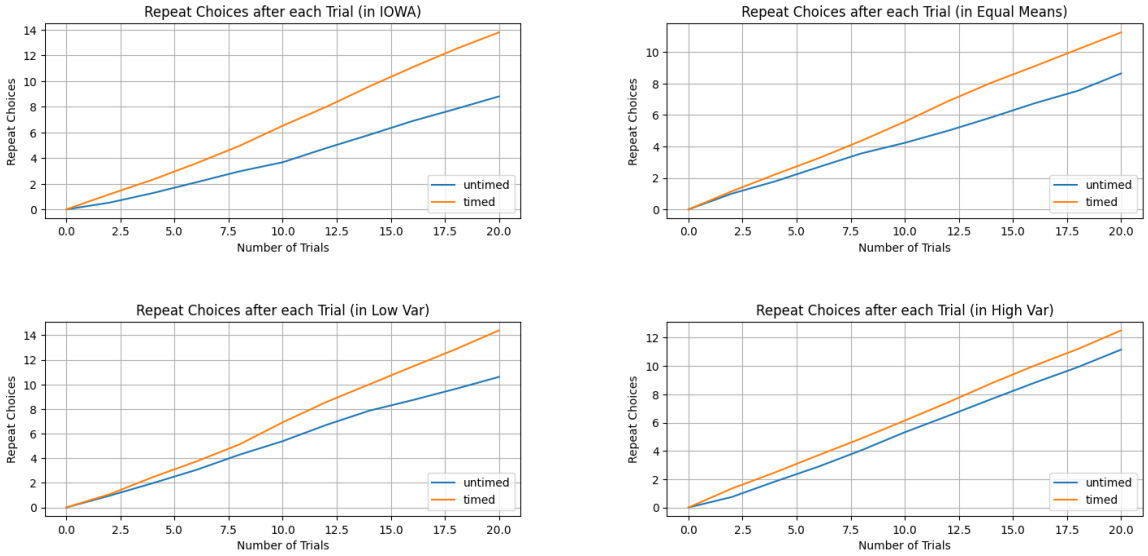

Figure 1 (d) : Trial-wise comparison of average repeat choices made in untimed and timed versions of the Replication task

On an average, the timed conditions showed higher repeat clicks than the untimed conditions in all four Payoff conditions (as expected). Further, repeat choices were more frequent in low var conditions as compared to the high var conditions. This is also similar to the corresponding result obtained in the original experiment. The reason might be the relative ease in finding the highest rewarding arm under low var conditions.

- EXTENSION-1

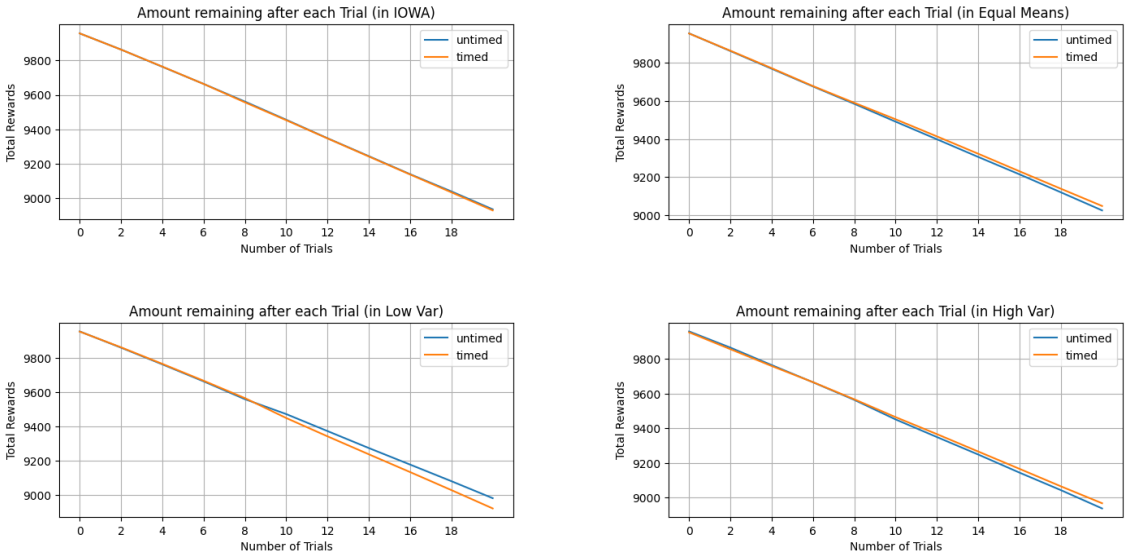

Figure 2(a) : Amount remaining (Trial-wise depletion) in untimed and timed versions of this extension task

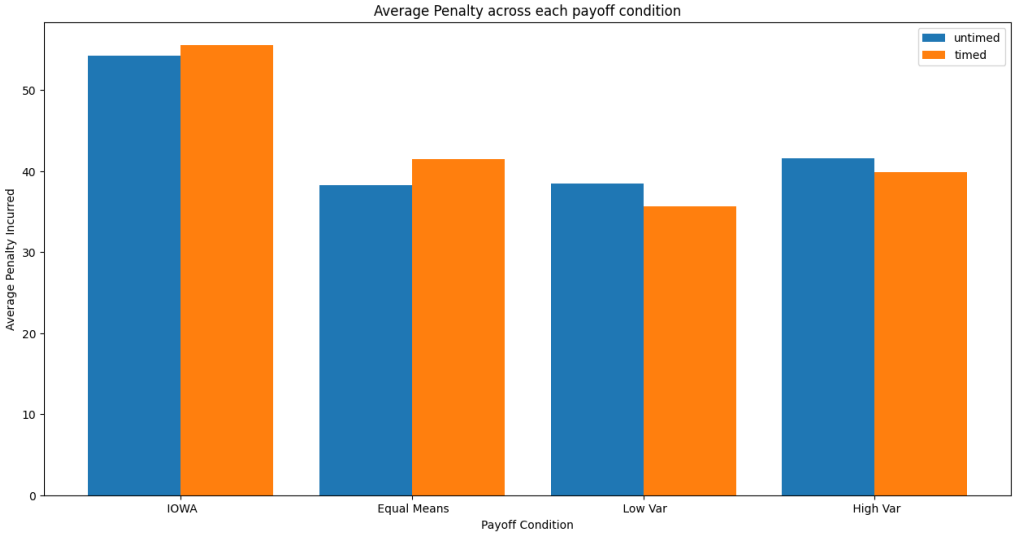

Figure 2 (b) : Comparison of the Average penalty incurred after completion of experiment (in untimed and timed versions)

While we do not see very significant differences in Payoff Conditions in timed and untimed cases in terms of trial wise average rewards, the overall rewards were highest in the case of IOWA conditions. The overall distribution in the loss domain was almost similar to that in the gain domain (in the replication task).

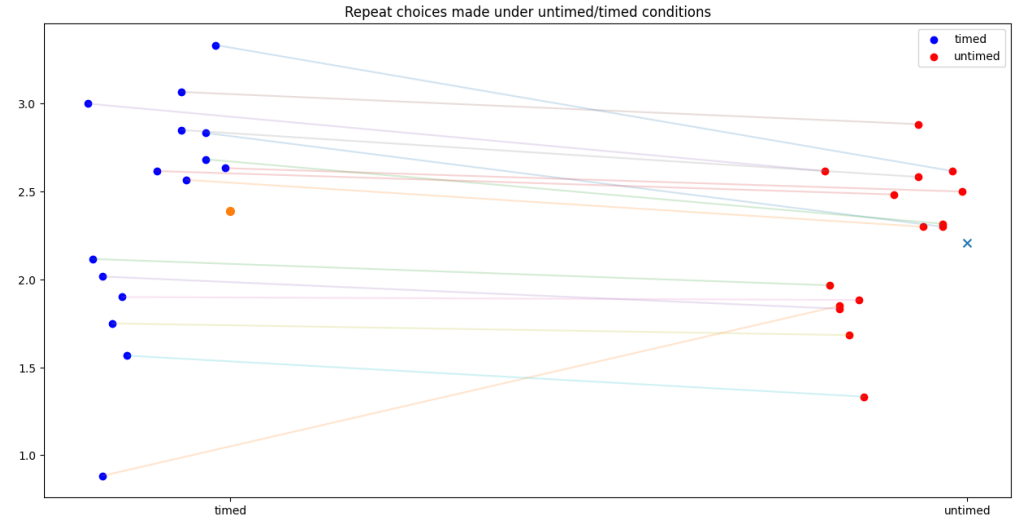

Figure 2 (c) : Comparison of repeat choices made (on an average) in timed and untimed conditions. Each line represents one participant. The yellow dot (in the left distribution) and the blue cross (in the right distribution) represent the mean of the respective distributions

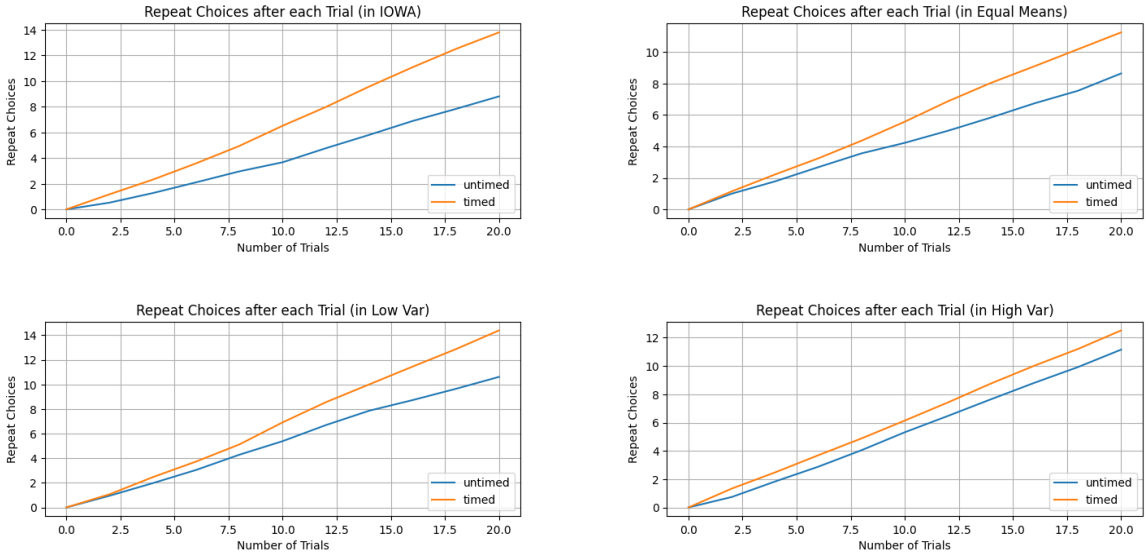

Figure 2 (d) : Trial-wise comparison of average repeat choices made in untimed and timed versions of this Extension task

Similar to the replication task, the timed conditions showed higher repeat clicks than the untimed conditions in all four Payoff conditions as expected. When compared with the gain domain, there were more repeat choices in the loss domain (the height of the blue cross was lesser in the case of Figure 1(c)). Hence, the results were again as expected.

- EXTENSION-2

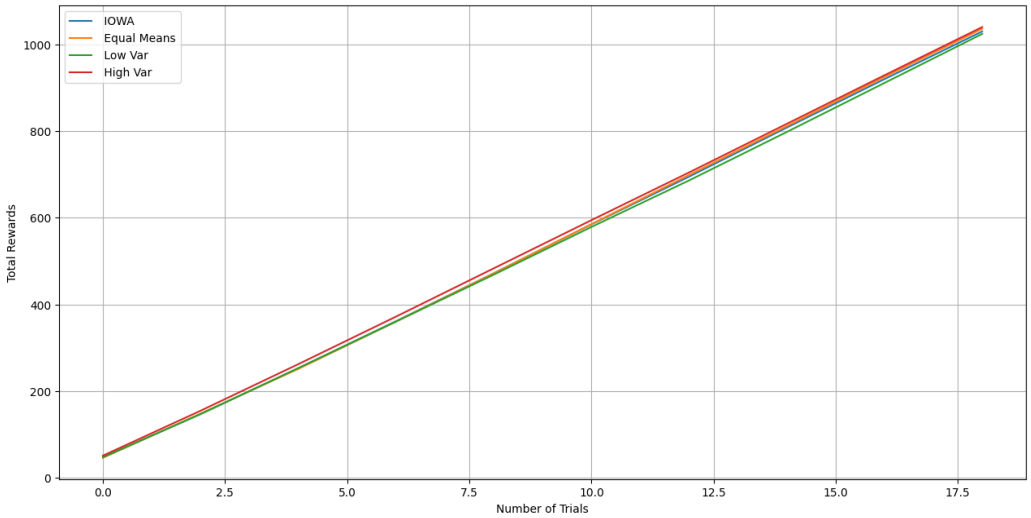

Figure 3 (a) : Trial wise average rewards in this Extension task (compared across the four different payoff conditions)

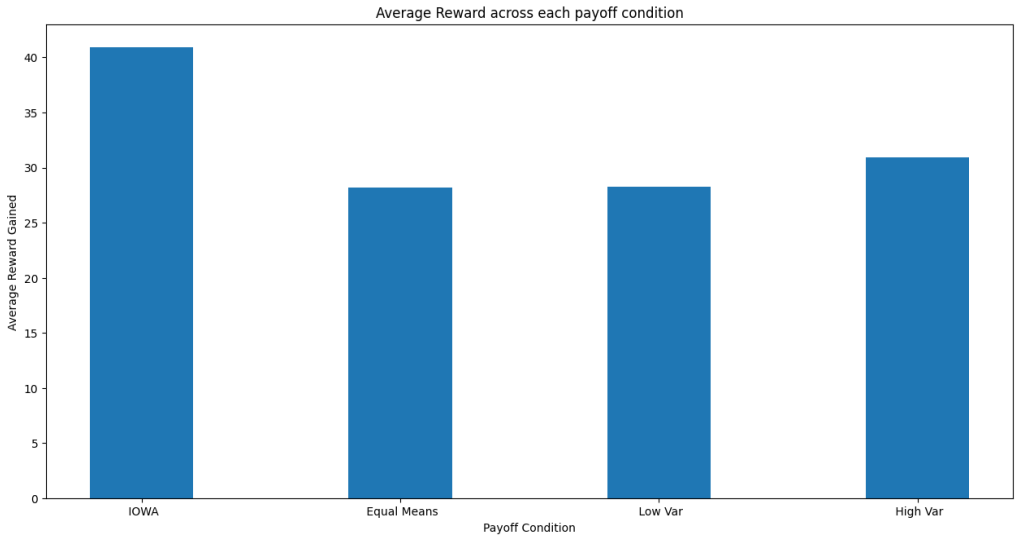

Figure 3 (b) : Overall comparison of the average rewards (after completion of the experiment)

The distribution from figure 3(b) is quite similar to the original replication task. The relative values of the average rewards gained across the payoff conditions remains almost same (IOWA the highest, and so on)

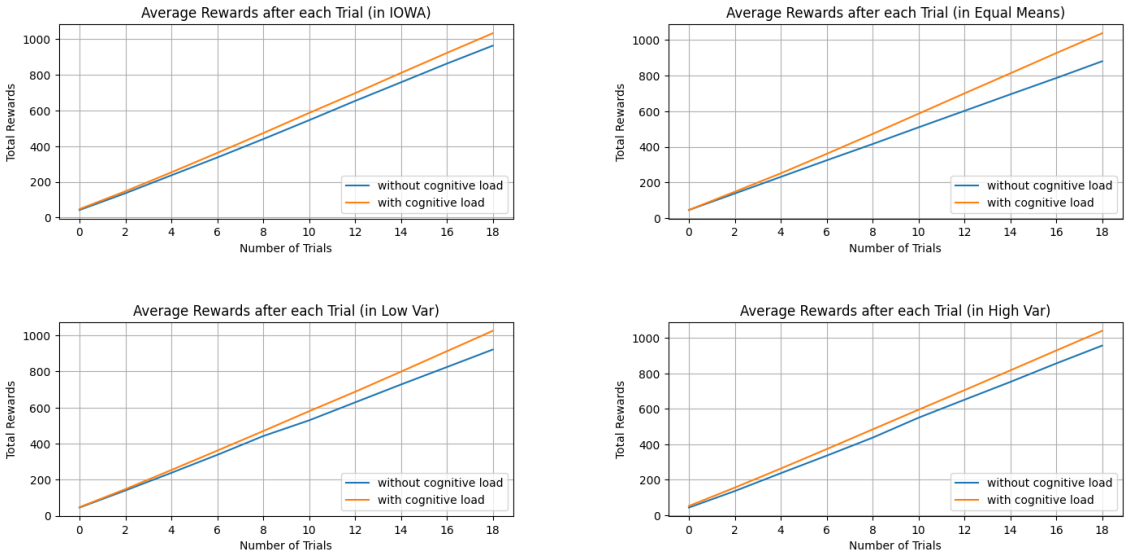

Figure 3 (c) : Comparison of trial wise rewards gained in the replication task (without any cognitive load) with this extension task (with some cognitive load)

On an average, slightly higher average rewards were observed in cognitive load conditions as compared to no load conditions across all payoff conditions. There might be two possible reasons:

i. The numbers used to increase the cognitive load were not too complex, and hence, easy to remember by the participants.

ii. The replication task was performed in the beginning, and hence, the extension task (performed in the last) gave an unintentional advantage of task experience to the individuals. Combined with the first point above, this resulted in higher average rewards in the extension task.

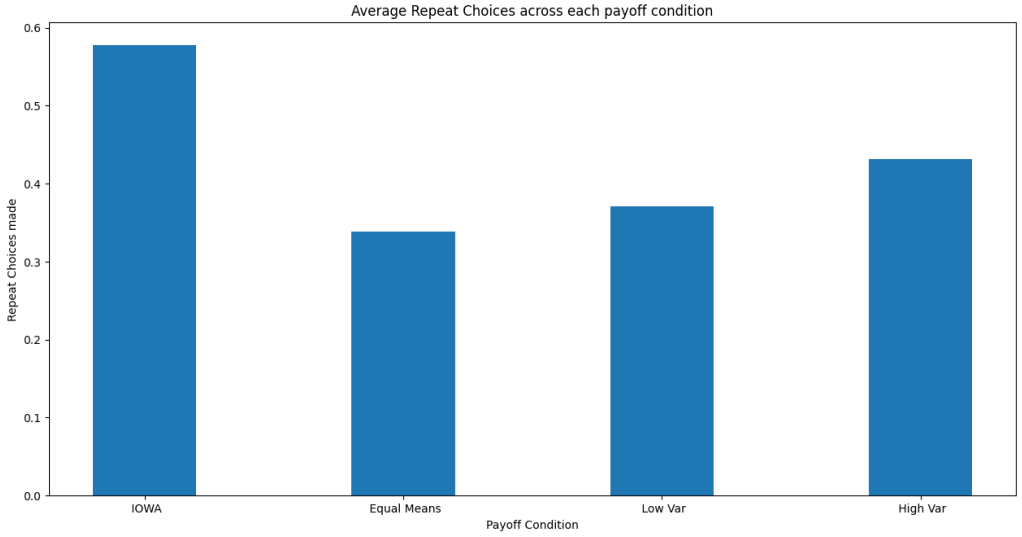

Figure 3 (d) : Average repeat conditions observed after completion of the overall experiment

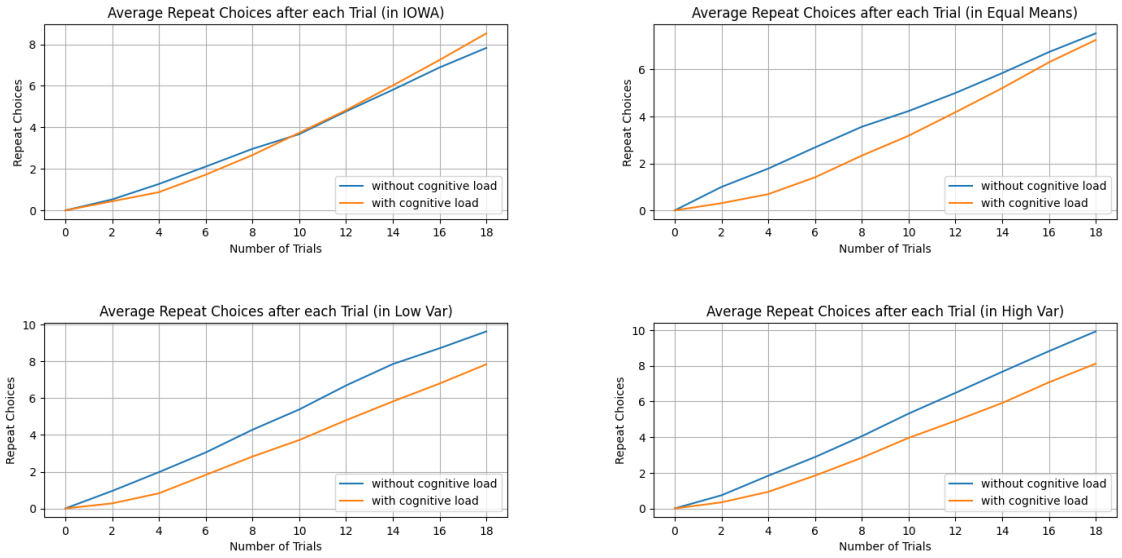

Figure 3 (e) : Comparison of the trial wise repeat choices made in the replication task (without any cognitive load) and this extension task (with some amount of cognitive load)

Lesser number of repeat choices were observed in the cognitive load case as compared to the no load case. But, the repeat choices were nearly equally distributed across all four payoff conditions which demonstrated that exploration is higher in load conditions.