

Instructions

Human behavior in contextual multi-armed bandit problems figshare fileset contains raw data from the experiment described in an article **Stojic, H., Analytis, P.A., and Speekenbrink, M. (2015). Human behavior in contextual multi-armed bandit problems, Proceedings of the 37th Annual Conference of the Cognitive Science Society. Austin, TX: Cognitive Science Society.** We refer users to the article for all the details about the experimental design, experimental stimuli and software used to collect responses. The experiment itself can be tried out at the following URL: <http://experimentnext.com/CMABvsMABexp1/>.

File is in a comma separated values (CSV) format, with the first row being a header row with names of the variables. There are no missing values in the whole dataset. The data was minimally processed before being published on Figshare. Only variables that could potentially be used to identify the participants was removed.

For any question not addressed here, contact the corresponding author, Hrvoje Stojic, at hrvoje.stojic@upf.edu.

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Figshare issued a DOI for this article: <http://dx.doi.org/10.6084/m9.figshare.1314099>. Please use this DOI as a reference whenever you use the dataset and publish something based on it.

Files

Fileset consists of two data files and current instruction file. The data files are the following:

1. `exp1_questionnaireData.csv`
2. `exp1_banditData.csv`

Unique identifier that connects both files is `subjectID` variable. The fileset contains results of 193 individuals, and content of each data file is described in details below. Code sheets consists of three elements, each separated by a hyphen, first being the exact name of the variable used in the dataset header,

second element is a brief description of the variable while the third element is the type of the variable.

Files are minimally processed. Potentially identifying information was removed and experimental runs that at end were not analysed and published in the above mentioned article were removed.

File `exp1_banditData.csv`

In total there should be 28190 observations of 141 variables.

Code sheet

1. **browser** - browser that participant has used when doing the experiment - string
2. **platform** - operating system that participant has used when doing the experiment - string
3. **subjectID** - unique identifier of a participant in the experiment - numeric
4. **expID** - identifier of the experiment run, there were more than one experimental runs but only `exp1highReward` run was reported in the paper - string
5. **expCond** - experimental condition identifier, three values: `CMAB_Lin_NoIns`, contextual implicit condition; `CMAB_Lin_Ins`, contextual explicit condition; `MAB_Lin`, classic multi-armed bandit task - string
6. **totalTime** - total time in minutes that the participants has taken to complete the whole experiment - numeric
7. **phase** - the phase of the current trial, either “training” or “test” - string
8. **trial** - number of the trial, 1 to 100 for the training phase and 1 to 70 for the test phase - numeric
9. **keyPress** - what object on the screen was chosen in the trial by clicking on it with a mouse, values from 1 to 20, same as the number of alternatives in the trial - numeric
10. **chosenArm** - same as `keyPress` variable - numeric
11. **choiceRT** - response time in a trial, measured from the onset of the trial until the choice is made by clicking on one of the alternatives with a

mouse - numeric

12. **rewardObtained** - reward from the chosen alternative, a function of two feature values multiplied by weights with an addition of a noise term - numeric
13. **rewardMax** - maximum reward that could have been obtained in the trial by choosing the best alternative - numeric
14. **regret** - maximum reward minus the obtained reward - numeric
15. **correct** - binary indicator whether the alternative with maximum reward was chosen (0 if not and 1 if the best one was chosen) - numeric
16. ***switch** - binary indicator whether the participant has chosen a different alternative than in the previous round (0 if not and 1 if yes) - numeric
17. **runningTotal** - cumulative earnings until the current trial in the experiment - numeric
18. **valArm1** to **valArm20** - value of the alternative or earnings that the participant would obtain if he would choose it, each alternative value is placed in its own variable indexed by the number in the variable name - numeric
19. **randArm1** to **randArm20** - at the beginning of the experiment positions of the alternatives for each participant were randomly placed into positions on the screen, these variables indicate the randomization sequence used for particular individual - numeric
20. **randFeat1** - by default feature 1 was a vertical line and feature 2 is a horizontal line within the box denoting the alternative, but at the beginning of the experiment position of the features for each participant position of features was randomized, if the variable takes value 1 that means that feature 1 was assigned to vertical position, if it takes value 2 feature 1 was assigned to horizontal position - numeric
21. **randFeat2** - by default feature 1 was a vertical line and feature 2 is a horizontal line within the box denoting the alternative, but at the beginning of the experiment position of the features for each participant position of features was randomized, if the variable takes value 1 that means that feature 2 was assigned to vertical position, if it takes value 2 feature 2 was assigned to horizontal position - numeric
22. **valArm1feat1** to **valArm20feat1** - value of feature 1 for each alternative, for training phase these were drawn once at the beginning of the

experiment and they remain fixed throughout the training phase, for the test phase they are drawn anew in each trial - numeric

23. **valArm1feat2** to **valArm20feat2** - value of feature 2 for each alternative, for training phase these were drawn once at the beginning of the experiment and they remain fixed throughout the training phase, for the test phase they are drawn anew in each trial - numeric
24. **noiseArm1** to **noiseArm20** - normally distributed noise term that was added to each alternative value after multiplying feature values with feature weights, drawn anew in each trial - numeric
25. **nameArm1** to **nameArm20** - these variables are relevant for test phase as there trials differed the way they were constructed, this information was used in the data analysis, possible values: easy-intra-dominating/middle/dominated, easy interpolation items; diff-intra-dominating/middle/dominated, difficult interpolation items; easy-extra-dominating/middle/dominated, easy extrapolation items; diff-extra-dominating/middle/dominated, difficult extrapolation items; norm-dominating/bait/dominated, weight knowledge items - numeric
26. **weight1** - objective feature 1 weight that was used in computing the value of each alternative, randomization is taken into account - numeric
27. **weight2** - objective feature 1 weight that was used in computing the value of each alternative, randomization is taken into account - numeric

File `exp1_questionnaireData.csv`

This file contains answers to questions in the questionnaires. In the experiments there were three questionnaires, one at the beginning with basic sociodemographic questions, one at the end of the instructions that checked how attentive were participants while reading the instructions, and one at the end where participants provided feedback about their experiences during the experiment. In total there should be 2316 observations of 7 variables.

Beginning of the experiment questionnaire

1. What is your gender?
 - Male
 - Female
 - Do not wish to answer

2. How old are you?
(open ended)
3. What is the highest educational degree that you have obtained?
 - Pre high-school
 - High School
 - College
 - Masters/Phd
 - Do not wish to answer
4. To verify you are not a bot: $2+2$ equals...
(open ended)

Attention check questionnaire

Before you start with the experiment we would like to check you can recall some important information from the instructions.

1. What is the shape of the option buttons?
 - “Round”,
 - “Square”,
 - “Ellipsoid”,
 - “Triangle”,
 - “None of the above”
2. From how many options you can choose from?
 - “10”,
 - “40”,
 - “20”,
 - “100”,
 - “None of the above”
3. What is the fixed payment you will receive regardless of your performance in the experiment?
 - “0.1”,
 - “0.4”,
 - “1”,
 - “0.25”,
 - “None of the above”

4. How many experimental units can you exchange for a dollar?
 - “100”,
 - “50”,
 - “45”,
 - “30”,
 - “None of the above”

End of the experiment questionnaire

1. Were instructions for the experiment easy to understand?
 - Yes
 - No
2. How enjoyable was the experiment?
 - “Very boring”,
 - “Boring”,
 - “Neutral”,
 - “Enjoyable”,
 - “Very enjoyable”
3. Did you have any technical issues? E.g. some shapes appearing strangely or overlapping.
 - “Not at all”,
 - “Some”,
 - “A lot”
4. If you have any suggestions about how we could improve the user experience in the experiment or if you have any other comment use the text box.

Code sheet

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3. **expCond** - experimental condition identifier, three values: CMAB_Lin_NoIns, contextual implicit condition; CMAB_Lin_Ins, contextual explicit condition; MAB_Lin, classic multi-armed bandit task - string

4. **questType** - variable identifying which of the three questionnaires is the answer from, three values: initialQuestionnaire, attentionCheck, finalQuestionnaire - string
5. **rt** - response time for answering the question - numeric
6. **question** - number of the question, values from Q1 to Q4 - string
7. **response** - participant's response - string