Recency, Similarity, and Confidence in Item Recognition

Mini-Project 1
Michael Jacob Kahana

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Part 1: Experiment

The first part of this project will be a research experience, running as a subject in a recognition memory experiment. The second part of this project will involve analyzing these data. This experiment was designed for your educational benefit, to help you benefit from the analyses you will do in the second part of the assignment. Before you run in the experiment you will be asked whether you "consent" to participating (your data will not be shared with anyone or used in your grade for the course); if you don't wish to participate, you can fulfill this requirement by writing a one-page report on a continuous recognition memory experiment published in a scientific journal described from the perspective of a participant.

At the beginning of the experiment you will receive a random "ID number" certifying your participation. Copy that ID number down immediately; you will not be shown it again. If you do not copy that number down, you will need to complete the experiment a second time. Enter that ID number (and only that ID number) in Canvas for your Part 1 assignment submission (or alternatively submit your report if you do not consent to completing the study).

To run in the experiment, please link to this URL Course Experiments and click the button for "experiment 1" to link to the experiment. Make sure to turn off ad blockers or tracking blockers in your browser (or potentially, VPNs) or the experiment will not run (you will likely see a blank webpage in this case).

Part 2: Data Analyses

Data Description

You will find a spreadsheet with all of the data from the recognition experiment posted on *Canvas* (under "Files/Mini-projects/Mini-project 1"). The spreadsheet is a comma-separated file (CSV), in which each row represents one

record, and columns are separated with commas. The CSV file can be opened in Microsoft Excel. The five columns are:

1. Subject index;
2. Timestamp;
3. Confidence rating (`1`= sure "New Item", `8`=sure "Old Item");
4. Study-test lag (the number of items intervening between when an item was studied and when it was tested; a lag of one indicates that the item was tested immediately after it was studied). A lag of zero means an event is the first presentation of a word (i.e. a "new" word). You can construct a column indicating old or new by just checking whether this column is equal to zero or not.
5. Reaction time (blank cells indicate time-out trials)

Questions:

Understanding and measuring memory rely on the ability to analyze and interpret scientific data. Here you will learn to carry out basic analyses of the recognition memory dataset by answering these questions.

This is not a group project. I want you to learn to correctly answer these questions on your own. If you have questions, please post them to Ed Discussion. Each of you will be given a unique dataset to analyze, so the correct answers will be unique to your assignment.

For each of the problems that ask you to provide graphs, please make sure that your graph has clearly labeled X and Y axes. In other respects try to match the formatting of the graphs in our book (e.g., appropriate ranges for variables, etc.). For questions requiring a numeric response, report answers with two decimal points ($X.YY$).

1. Report the hit-rate and false alarm rate using each confidence level as a threshold for your dataset.
2. Calculate a ROC curve for each subject and upload a plot of the resulting curves for the first ten subjects in your data set (the ten subjects nearest the top of your data set). Include the ten curves on a single plot with a legend showing the subject indices.
3. Calculate a ROC curve averaged across all subjects. To produce the average ROC, first calculate the HR and FAR *for each individual subject* and then average these across subjects.
4. Averaged across all subjects, plot the hit rate as a function of study-test lag.

5. Averaged across all subjects (i.e., produce a "between-subject average"), report the mean reaction time for hits, false alarms, misses, and correct rejections.

6. For hits, plot the between-subject average reaction time as a function of study-test lag.

Software for analysis

Although you are encouraged to use Microsoft Excel for this assignment (it is easy to use and readily available), you may use one of the following software packages: MATLAB, Python, and R. If you want to use a different software, please email the TAs for approval. It is important that you write your own code or functions to obtain the ROC curves.

Submission

You should save your report as a PDF and submit it electronically through the *Canvas* site. Word documents are not accepted. You also need to submit the Excel spreadsheet or the code you used to do your analyses.