Dynamics of Memory Search

Mini-Project 4
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The Free Recall Experiment

In this project you will analyze data concerning the manner in which people search their memory for lists comprising many studied items. These analyses will help you understand some of the main issues discussed in Chapters 6 and 7.

The first part of this project will be a research experience, running as a subject in a study of free recall. This experiment was designed for your educational benefit, to help you benefit from the analyses you will do as described below. 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 two page report on a continuous recognition memory experiment published in a scientific journal described from the perspective of a participant.

To run in the experiment, please link to this URL: Free Recall Experiment. At the end of the experiment you will receive a random number certifying your participation. You will enter that number in Canvas along with your report.

The free recall experiment has two conditions with fast and slow presentation rates (1000 and 2000 ms). Each subject was randomly assigned to one of the two conditions. Following each list presentation, subjects recalled as many items as they could remember during the recall interval.

For the purpose of this assignment, you may treat all the data as if it came from a single participant. If you can efficiently analyze the data from each of the participants individually, it is more accurate to analyze each person's data, and then average across people to create your final results.

The Excel file has three spreadsheets. The sheet **data** contains data needed for Q1, Q2 and Q4. The sheet **CRPs** contains additional data needed for Q4. The sheet **RandomList** contains the data required for Q3.

Data Format

The format of spreadsheet **data** is as follows.

1. Subject index

2. Presentation rate

3. List number

4. The total number of times a transition of lag -2, -1, +1, or +2 could have been made.

5. Recalled serial position (multiple columns, e.g., 'recall 2' for serial position of second recalled item): contains serial positions (i.e., order in the study phase) of recalled items in order of recall. `-1` is a place-filler denoting an intrusion error. `-2` is a place-filler denoting duplicate items that are recalled multiple times from that list. Each list had a length of twelve items.

The format of spreadsheet **RandomList** is as follows.

1. List length

2. Recall positions (multiple columns): contains recalled item numbers, in order of recall. `-1` is a place-filler denoting an intrusion error.

The **CRPs** spreadsheet contains computed CRP values for lags -5 to 5 excluding lags -2 to 2. The **CRPs** spreadsheet has columns 'Presentation Rate', 'Lag', and 'CRP'.

Analysis Questions

1. Plot serial position curves separately for each of the two experimental conditions on a single graph. Each curve should average the data across participants.

2. Graph the probability of first response as a function of serial position for the fast- and slow-list conditions (two curves) on a single graph.

3. Manually (as in by hand, rather than Excel, if you wish) compute the full lag-CRP for the three recall lists in the spreadsheet **RandomList** for lags -5 to 5. For a tutorial on computing the lag-CRP, see the Lag-CRP Tutorial. Remember to exclude transitions containing repetitions or intrusions in computing the lag-CRP (e.g., excluding the transition from recall 3 to recall 4 if either recall 3 or 4 is a repetition or an intrusion).

4. To measure the influence of contiguity on the dynamics of recall, plot the conditional response probability as a function of lag (the lag-CRP) for both of the conditions on a single graph. You will need to compute the CRP for lags -2, -1, +1, and +2. CRPs for the other lags can be found in the spreadsheet 'CRPs'; these CRPs are computed for all of the data.

5. Answer the following conceptual questions about the lag-CRP analysis you performed in Question 4:

    • In what ways are associations measured by the lag-CRP in free recall different from associations measured in the paired associate task discussed in Chapter 4?

    • How would you expect the manipulation of presentation rate to affect the lag-CRP and why? How did your expectation compare to what you observed in the data?

Software for analysis

Although you are encouraged to use Microsoft Excel for this assignment, you may use one of the following software packages: MATLAB, Python, R, Java, C. If you want to use a different software, please email the TAs for approval.

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 code or the Excel spreadsheet you used to do your analyses.
Assignments must be submitted via Canvas. No other forms of submission are accepted.