Project in MATLAB

n-back task

Introduction

The ***n*-back** task is a performance task that is commonly used as an assessment in psychology and cognitive neuroscience to measure a part of working memory and working memory capacity. The N-Back task goes back more than half a century, developed in the 1950s by Kirchner.

In short, in the N-Back task, participants are presented a sequence of stimuli one-by-one. For each stimulus, they need to decide if the current stimulus is the same as the one presented *N* trials ago.

The *N* can be 1 trials, 2 trials, 3 trials, etc. The higher the number, the more difficult the task. The factors that seem to influence the performance are not only the *N*, but also the speed of presentation and the size of the set of stimuli.

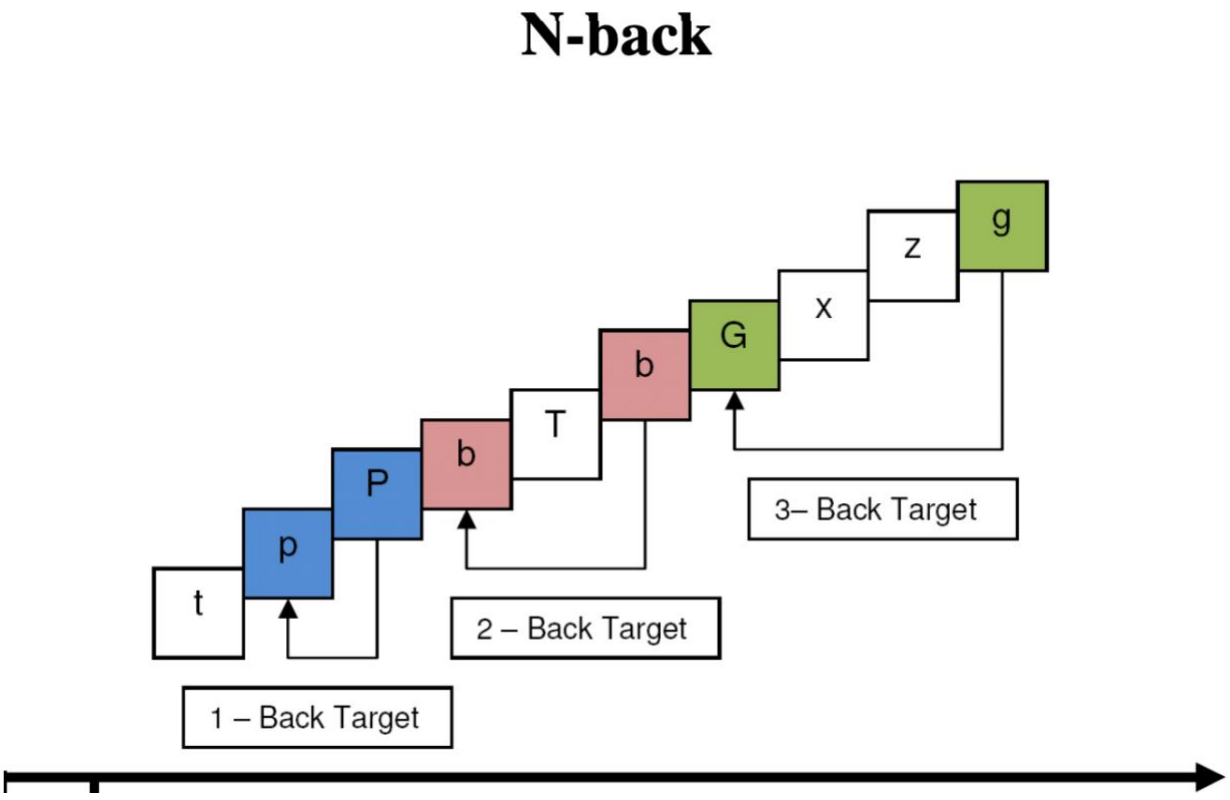
In a typical experiment, you see that letters are presented for 500 ms followed by a 2500 ms black period. This timing seems to be used in lots of N-back studies (e.g., Kane & Conway, 2007).

In total, people get 3 seconds (500 ms + 2500 ms) to respond if the letter matches the letter *N* trials ago. If there is no match, people do not need to respond.

There are different typical types of response (or lack thereof):

Name of response	**Type**	**Meaning**
Match	Correct	Participant correctly pressed the `m` key because the letter *matches* the letter of 2 trials ago
False Alarm	Error	Participant pressed `m` key wrongly, because the letter 2 trials ago was a different one
Miss	Error	Participant did not press `m` key, but they should have because the letter 2 trials ago was the same

A schema of the task:



The details of task you need:

- This is a 2-back task.
- The total stimulus set is 15 stimuli (letters).
- Each stimulus is presented for 500 milliseconds.
- Participants respond in a self-paced manner (i.e., participants are not forced to choose within a limited time).
- They should respond with type *'y'* letter as *yes*, and *'n'* letter as *no*.
- The letter is removed from the screen, and a new stimulus is presented after 500 milliseconds.
- The letters A, B, C, D, E, G, I, K, L, M, O, P, T, X, and Z should be used.
- The letters should be presented in a random order.
- There is 1 block of 50 trials.
- Detailed feedback is given to the participants: '*correct'*, '*wrong'*
- Some guide: you can use,
    - the *disp* or *fprintf* commands to show the letters.
    - the *input* function to get the data from the participants
    - the *clc* command to clear the window after presenting each letter.
    - The *pause(n)* command to pause the experiment.

The expected Result

Your code must save the data of each participant as a .mat file and print the following information in the Command Window, at the end of the task.

- There were 50 trials in total in this task
- Total trials that had a match: ?
- Total trials that had not a match: ?
- Number of correctly matched items: ?
- Number of false alarms: ?
- Percentage correct matches; ?%
- Percentage false alarms: ?%

To become more familiar with the task, see the following link:

- https://www.psytoolkit.org/experiment-library/experiment_nback2.html
- https://www.psytoolkit.org/experiment-library/nback2.html

Deadline: 12 Shahrivar