4GC3: Assignment 2

Due: Monday, March 13, 2017, 23:59 EDT
Worth 15 % of the final grade, may be done in groups of 2

Motivation

This assignment will allow you to explore the effects of distractors on target recognition.

Introduction

Earlier in the course we learned that *(1) Susceptibility to distraction is greater when the task involves low perceptual load than when it involves high perceptual load. Perceptual load depends on factors such as the number of task stimuli that need to be perceived or the processing demands of each stimulus. The argument is that, "High perceptual load that engages full capacity in relevant processing would leave no spare capacity for perception of task-irrelevant stimuli" (p. 75). (2) Susceptibility to distraction is greater when there is a high load on executive cognitive control functions (e.g., working memory) than when there is a low load. The reason for this assumption is that, "Cognitive control is needed for actively maintaining the distinction between targets and distractors" (p. 81). This is especially likely when it is hard to discriminate between target and distractor stimuli.*

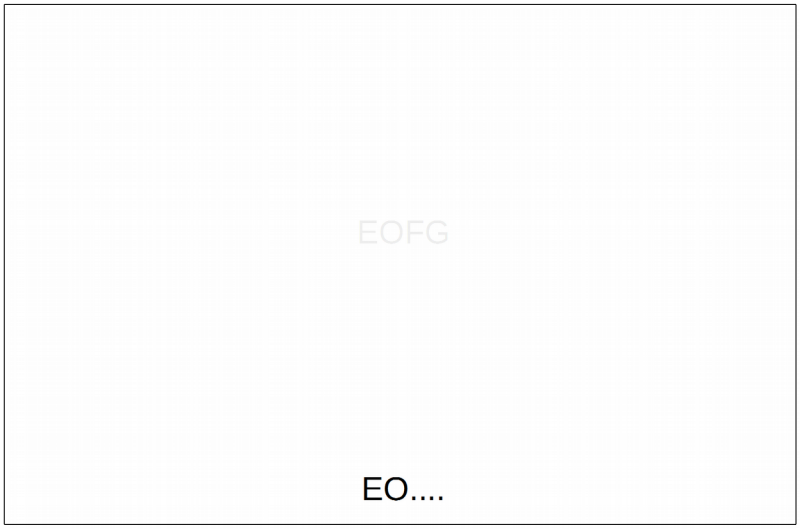
(Cognitive Psychology, A Student's Handbook, 6th Ed., pp. 167–168)

Description of the Assignment

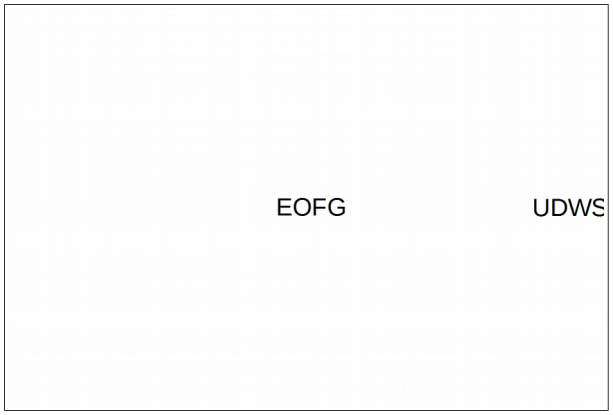
In this assignment you will have to implement an application that allows one to explore the effects above. Then you will have to perform a short user study to collect the results and finally you will need to write a short report summarizing them.

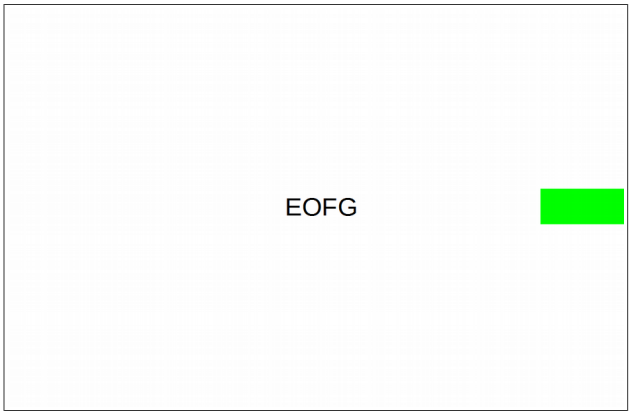
The suggested scenario is the following:
The application normally displays a uniform white (or medium grey) background. Periodically (e.g., every 3–5 s) a sequence of random letters, ranging in length between 3 and 9 characters, flashes on the screen in the middle for 100–200 ms (see the screenshot below).

After that (the letter sequence is going to disappear, and the screen is blank after that) the participant will be expected to transcribe the sequence:



In some of the cases, you will see distractors on the left or on the right. Some of them will be other characters, and some will be blobs of colour:





Details to consider:

- Field of view: at the very least, report it and keep it consistent. For a typical 23" desktop monitor at 45 cm, the horizontal FOV is about 60 degrees. The experiment might be less sensitive for smaller angles.
- Intervals between character sequences: I suggest modelling them using Poisson distribution (https://en.wikipedia.org/wiki/Poisson_distribution), i.e., the intervals are exponentially distributed (https://en.wikipedia.org/wiki/Exponential_distribution). Determine the actual range via preliminary testing.
- Time to display the characters: use 100–200 ms as a guideline; feel free to adjust it if needed.
- Place for distractors: you might want to display them randomly on the left or on the right. I don't think it matters though, assuming the participants look straight at the screen.
- Character size: report the sizes you used, and make sure it's possible to determine both linear and angular sizes from your description.

What to vary

- Character sequence length: 3 to 9
- Conditions: no distractors, character distractor, colour blob.

What to measure

- Percentage of correct recalls for sequences (I suggest recording them into a CSV file together with conditions above, and maybe the character sequences shown and transcribed) – for further analysis.

Analysis

- Plot the results using appropriate charts.
- Describe the findings (e.g., X leads to 50 % better performance than Y).
- Test if the findings are statistically significant (e.g., using ANOVA).

Report

I suggest using one of the ACM templates: https://www.acm.org/publications/proceedings-template, e.g., **ACM_SigConf**. You may also use any other format you prefer (IEEE, APA etc.) You report need not be long; it only needs to contain the information relevant to this assignment. Generally, a short abstract, intro, description of the experiment, analysis of the results, discussion and summary are always expected. Please format the figures appropriately, with appropriate captions, and make sure you reference them from the text (confirming the figures *are* relevant).

If you have questions, do not hesitate to contact the instructor (pavlovya@mcmaster.ca).

Grading

The assignment is worth 15 % of the final grade. The points will be given as follows:

- 5 points: experiment execution;

- 5 points: data analysis;
- 5 points: report (presentation and formatting)

Submission

What to submit electronically:

- your code (project zipped, or 7z-d)
- report in PDF format
- **readme.txt** file in which you list group members, briefly describe your application, approaches you took, and choices you made.

Late penalty is 20 % per day. Submissions 5 days or more after deadline will be given a mark of zero (0). Contact the instructor *in advance* if you cannot meet the deadline explaining your circumstances.

Academic Honesty

Direct collaboration (e.g., sharing experimental data) is not allowed. However, you're allowed to discuss the requirements, approaches you take, etc.

State all sources you use (online sources, books, previously written code, etc.).