PSY305 : Attention & Perception

Assignment 2: Project

Experiment: Inhibition of return

Introduction:

The cues which shift attention to a particular area for detection of targets is known as peripheral visual cues. And detection of targets away from the cued area have a delayed detection than the targets in the cued area. This happens because of the shift in the eye position towards the cue and the target is in peripheral vision. Also, the targets in the peripheral vision are more difficult to detect than the cues in the direct line of vision. We want to study the impact of changes in the visual information on our understanding of that information. The experiment to study these effects was proposed by Michael Posner.

Methodology:

1) The experiment has 3 grey boxes, one in the centre, and other 2 on each side of this central box (the peripheral boxes).

2) Each trial has one of the peripheral boxes lit with a yellow border for 150ms, as the cue in this experiment

3) Black square appears for 15 ms at the centre of one of the 3 boxes, either 0, 50, 100, 200, 300 or 500 ms after the cue appears

4) The target appears 60% of the time in the central box, 10% of the time in the left box, 10% of the time in the right box. The rest 20% of the time, no target is presented (these are the catch trials)

5) The subjects have to respond immediately by pressing a computer key after detecting the target. In some cases, as no target will appear, the subjects have to press the same key in recognition that no target appeared. The target appears only for 15 ms.

6) The reaction time of the subject is measured, from the time the target appears to the time the key is pressed.

7) The trial is repeated 120 times for each subject

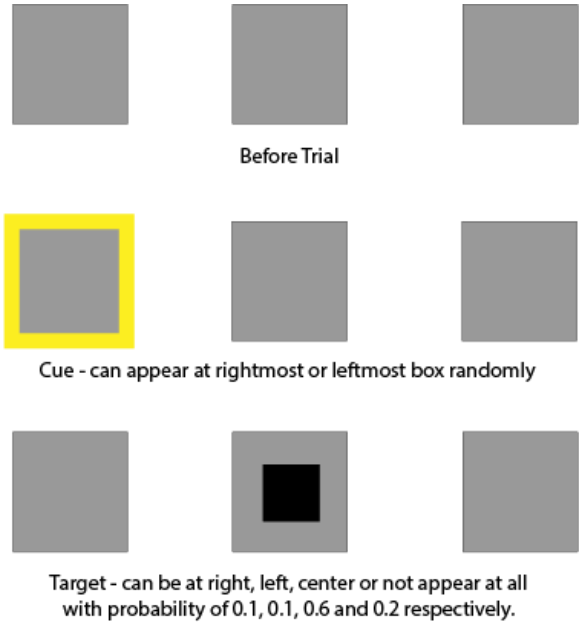

Figure 1

Results:

The plot contains 3 types of data points of RT corresponding to the timestamp of the appearance of the target, ***cued target, uncued target and central target***.
Cued Target - Target and cue appear in the same peripheral box
Uncued Target - Target and cue appear in different peripheral boxes
Center Target - The Target appears in the central box

- **Expected Results:**

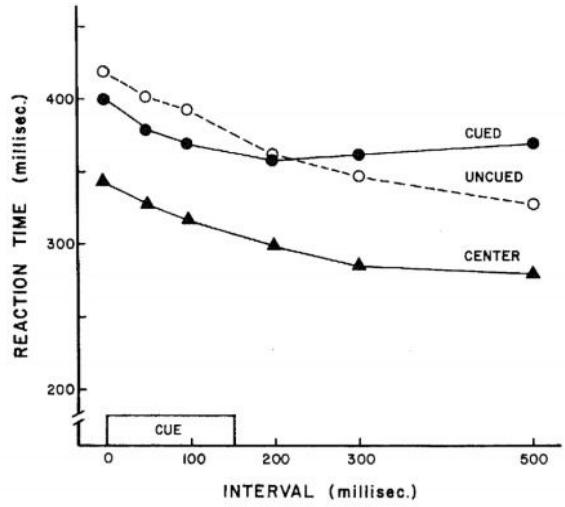

Figure 2

- The cued targets have less RT than the uncued targets only for first 150 ms
- The cued targets have almost the same RT as uncued targets at 200 ms mark
- The cued targets have more RT than the uncued target for more than 300 ms mark
- The central cue targets remain the fastest to decide among all the targets.

- **Experimental Results:**

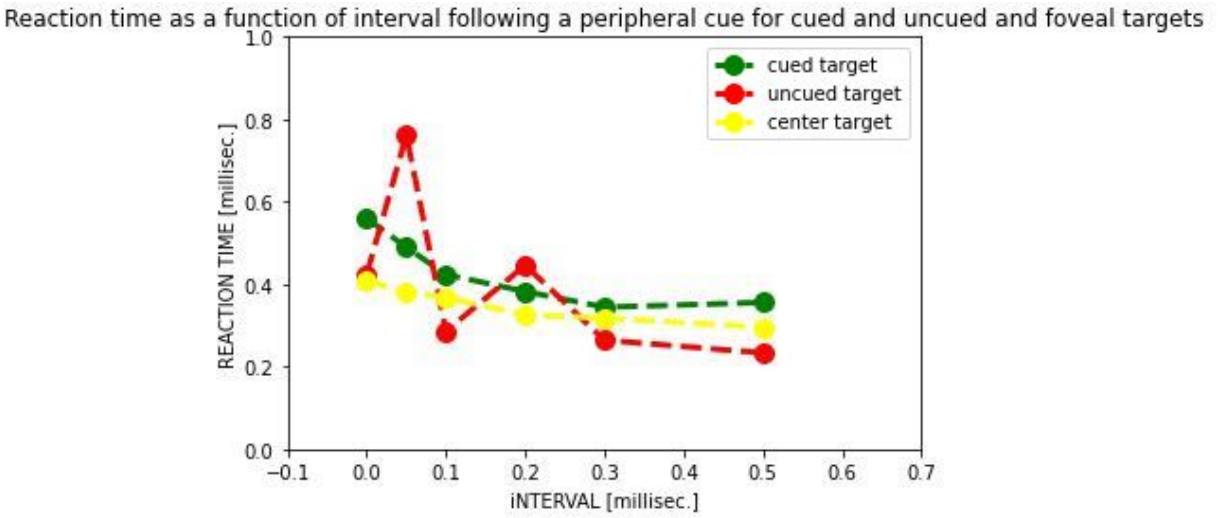

Figure 3

- This figure shows the relationship between the Inhibition of Return(IOR) and cue-target duration.
- When the time between the target and cue is short, then the subjects tend to respond with less reaction time to cued than uncued targets.
- Central cue-targets are faster to detect than cued targets at every interval.
- The point when cueing changes from facilitating responses to inhibiting responses is called the **crossover point**. According to our graph, we've achieved this point after 200 msec.
- Uncued Targets are faster to detect than other targets after 300 ms mark
- Why do expected results not match with our results?
    - Posner used EOG electrodes to monitor eye movements. We did not have access to that equipment so maybe it could be the reason why our results did not match the expected result.
    - The experimental setup was done on personal laptops, the subjects accessed the experiment using Teamviewer, which might have added some lag in recording the results.

Analysis and Discussion:

The trial begins with a 150 ms brightening of the outline of one of the two peripheral boxes selected at random. Then target appears after either 0, 50, 100, 200, 300 or 500 ms.

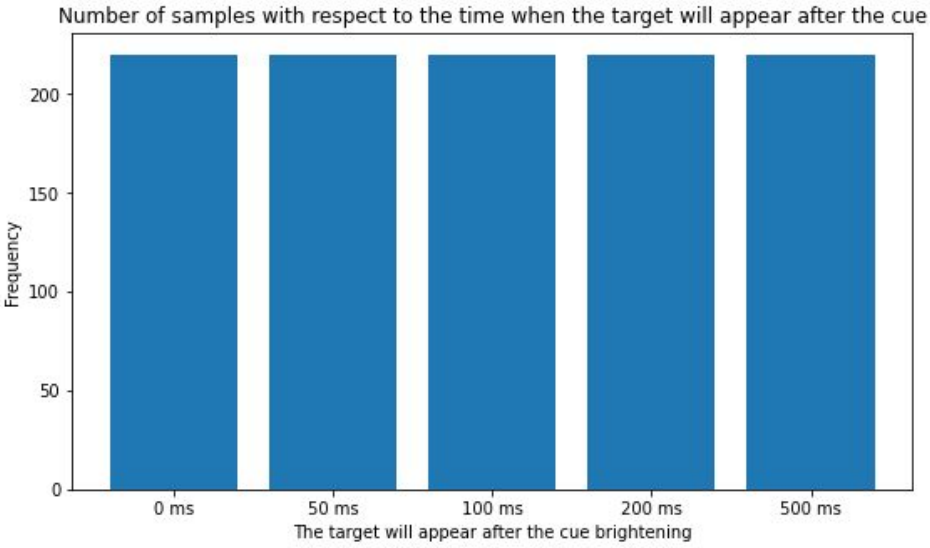

Figure 4

The above graph depicts the number of samples with respect to the time when the target appeared after the brightening of the cue. It shows that we have the even distribution of the all samples of the bright target when occurs at the centre of a box, either 0, 50, 100, 200, 300 or 500 ms.

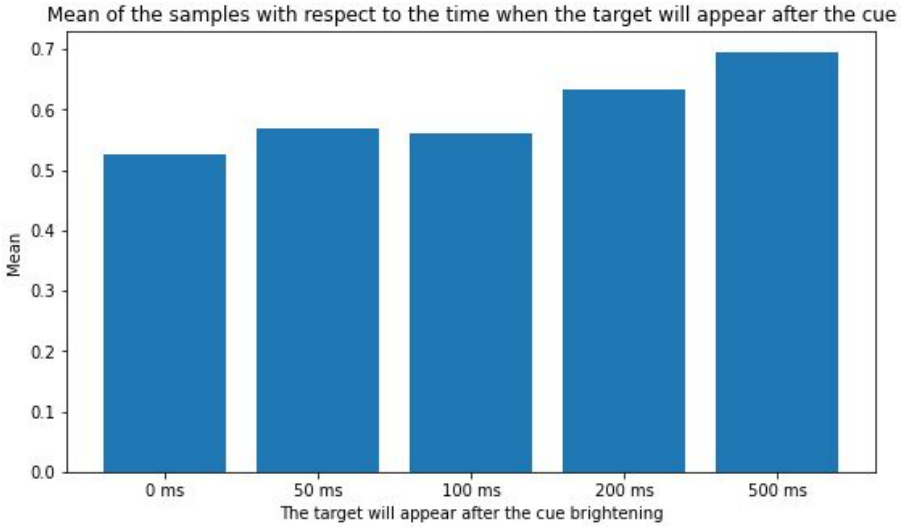

Figure 5

The above graph depicts the mean of the samples with respect to the time when the target appeared after the cue brightening. It shows that the mean of the key_response_time of the

sample when the target appeared after 0 ms is the lowest whereas the mean of the key_response_time of the sample where the target appeared after 500 ms in the highest.

From *Figure 3* we can see that at 300ms there is a clear inhibition of the target reaction time (RT). This is because of the shift of attention of the participant from the cued position to the uncued position to locate the target. Thus, when the target appears at the cued position it slows the participant down as they have to bring the attention back to the cued position leading to an increase in RT. While if the target appears at the uncued position, the participant's attention is already there, thus, leading to a faster RT. This leads to the formation of the **crossover point** before the 300ms mark. Thus, in order for the inhibition effect to occur there is no need to employ any strategy on the subject's part, it occurs on its own without any intervention.

References:

- **Github Repo:** https://github.com/akanshagautam3751/Inhibition-of-Return-
- Components of Visual Orienting(Reference) - https://drive.google.com/file/d/1HsrroZKpNl28LfrLOEEa-OvFtLz8_E6C/view
- Components of Visual Orienting (Original Paper)- https://www.researchgate.net/publication/203918232_Components_of_visual_orienting
- https://www.psytoolkit.org/lessons/ior.html

Contribution: GROUP: 7

Akansha Gautam - Experiment design and coding
Ahilya Sinha - Data Collection
Anushika Verma - Data Analysis
Arnav Kumar - Report

*The presentation would be done with everyone's efforts when the dates are finalized.

Resources:

- This is the report for the experiment
- The attached git repository has the following items:
    - Experiment design code
    - Consent forms (with only the names as discussed over email)
    - Collected data
    - The images used in both report and in the experiment
    - The analysis code performed on data