

Visual Search Experiment

PSY310: Lab in Psychology

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Aahna Sanyal

AU2010463

GitHub Link: <https://github.com/AahnaS/Visual-Search-Experiment>

Introduction:

Visual search is a crucial topic in psychology, providing a framework to study attention. It depends on sensory, perceptual, and cognitive factors and is used to explore various phenomena. Manipulating the parameters of a visual search task can adjust attention demands. For example, changing the set size (the number of items to search through) can affect the task's difficulty and comprehension ability.

A visual search experiment can be demonstrated by a life example- a particular child looking for a specific brand of chocolate he likes. He knows the colour scheme and font of the brand name and can search for the bar of chocolate among many available brands in a given store. There are plenty of distractors (other brand chocolates, food items and essentials) and the child's ability to find the target in a given time and visually stimulating environment can be measured.

Method:

The visual search experiment consisted of 200 trials attempted by each participant, including self and four fellow psychology students, which makes the data analysed to a sum of a thousand trials.

The experiment is run on the PsychoPy Software. It begins with adding a fixation that is a cross, in this case, with no duration mentioned anchored at the centre. A target "T" is fixed, which would be the task of the experimenter to find within given distractors (Ls)- again, no specific duration is mentioned, so the participant's exact duration to spot the target (or not) can be noted. Following this, specific codes are placed to mention the exact details of the experiment-

Begin Routine:

```
if random() > 0.5:
```

```
    num_distr = 10
```

```
    thisExp.addData('num_distr', num_distr)
```

```
else:
```

```
    num_distr = 5
```

```
    thisExp.addData('num_distr', num_distr)
```

```
distractors = []
```

```

for i in range(num_distr):
    distr = visual.TextStim(win=win, name='distr',
        text='L',
        font='Open Sans',
        pos=(random()-0.5, random()-0.5), height=0.1, wrapWidth=None, ori=randint(0,360),
        color='white', colorSpace='rgb', opacity=None,
        languageStyle='LTR',
        depth=0.0);

distractors.append(distr)
    for distr in distractors:
        distr.setAutoDraw(True)

```

The End Routine:

```

for distr in distractors:
    distr.setAutoDraw(False)

```

The mouse is used as a response tool for the participants. It is meant to click on the assigned \$Target. As a last step, the following is set on a loop with random trails with n reps set to 200. The participants must identify T among the L-shaped distractors (bigger and bolder than the target). The set size varied from 5 and 10 at random as input in the experiment.

After the completion of the experiment, the data is stored in the form of Excel in the same folder as the PsychoPy file. The following information was obtained- trials.thisRepN, trials.thisTrialN, trials.thisIndexnum_distr, fixation.started, target.started, mouse.started, mouse.x, mouse.y, mouse.leftButton, mouse.midButton, mouse.rightButton, mouse.time, mouse.clicked, name participant, session date, expName, psychopyVersion, and frameRate.

Data cleaning was undertaken to analyse the information efficiently to compute the necessary calculations- trials.thisN, num_distr, mouse.time and mouse.clicked_name.

Based on this, the mean Reaction Time of all five participants was calculated for the respective set sizes of 5 and 10. Post finding, the mean slope is calculated (Y_2 and Y_1 is the mean of set sizes 5 and 10; X_1 and X_2 are the respective set size)

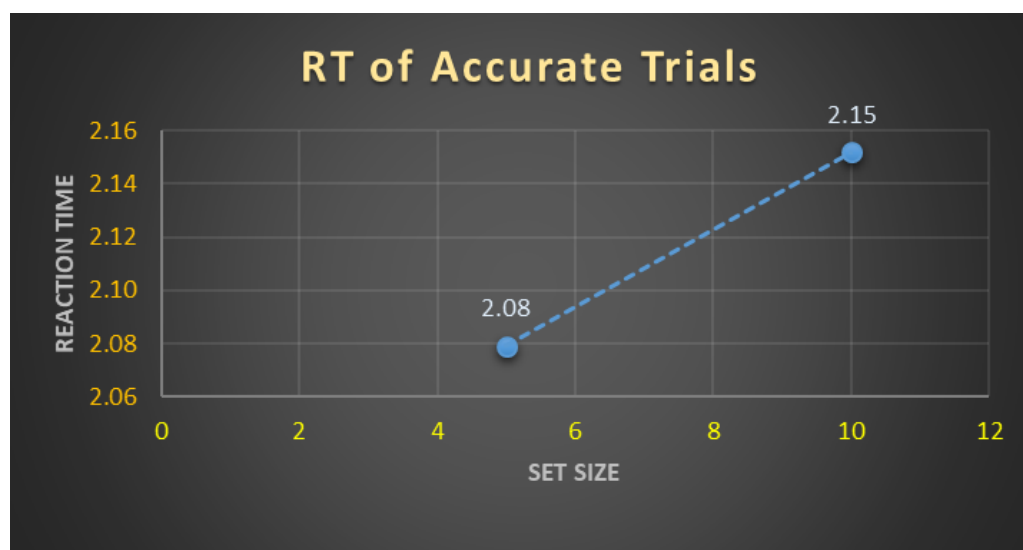
Results:

The results obtained are as follows-

Set Size	Average RT of Accurate Trials
5	2.08
10	2.15

For set size 5 and set size 10, the values were obtained after calculating the average of the five participants' data altogether. Only accurate trials were considered, the only ones where the participants correctly identified the target. The wrongly pressed were not considered in this case.

The representation can be seen in the graph below of the difference observed between the two set sizes in terms of the associated attention-



Following this, the slope was calculated using the formula: $(y_2 - y_1) / (x_2 - x_1)$. This came out to be 0.01 $[(2.15 - 2.08) / (10 - 5)]$.

Discussion:

A slope of 0.01 in the context of a Reaction Time (RT) by set size function for a visual search task indicates that the increase in reaction time as the set size (the number of items in the display) increases is very gradual. This means the participants could easily identify the target despite the increased number of distractors (5 to 10) and could effectively press on the target “T”.

Visual search effectively understands the cognitive process involved, including the steps and how effectively attention is allocated given a certain task and associated stimuli.

A limitation of a task such as this would be the homogenous distractors (same in terms of their colour and shape), which do not capture the distractions of the outside world, which are much more dynamic and cluttered. Also, participants are motivated to find the target when observed in a controlled environment, which is not true regarding the general outside environment. However, the intensity of 200 trials or more can compensate for the same.

Hence, visual search is an effective method with various applications to understand attention and other domains.

Reference:

Davis, E. T., & Palmer, J. (2004). Visual search and attention: An overview. *Spatial Vision*, 17(4–5), 249–255. <https://doi.org/10.1163/1568568041920168>