Tutorial 1: Staircase Procedure To Find The Threshold Contrast Of A Visual Grating

PSY310: Lab in Psychology

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GitHub link:
[Add the GitHub link of your work]

Introduction :

The definition of staircase method is a research method for determining the sensory threshold at which participants can detect a specific stimulus in a specific criterion such as sound, light, or touch. The staircase method also known as the up-and-down method is a specific variant of the staircase method often used in psychology and experimental research.

The staircase method consists of the following steps - (1) initial stimulus,(2) Response,(3) Adjustment,(4) Repeat and (5) Threshold Estimation. It allows researchers to determine sensory thresholds with a high degree of accuracy by adjusting the stimuli based on individual performance which relates to sensory perception, vision, hearing, touch, and also in areas such as psychophysics and threshold testing.

The procedure is repeated until the absolute threshold, a precise measure of their sensitivity, is determined by averaging the stimulus strength across these changes. The staircase procedure is very well known for its effectiveness in determining sensory threshold with fewer trials than other methods.

Method :

The experiment will be conducted by using a software called PsychoPy. The main objective of this experiment is to determine the absolute threshold and the accuracy of the participant's ability to detect contrast changes in visual gratings using a staircase procedure.

Participants :

The test was conducted by me as a part of the experiments given in the PSY310 Lab in Psychology at Ahmedabad University.

Materials and Procedure :

- We received a video wherein the instructor explained the procedure before the experiment was performed. The application that we used was our personal laptop with the latest version of PsychoPsy.
- Following are the procedures for the staircase experiment on PsychoPy:

1. Open PsychoPy-2023
2. Stimuli >Polygon Properties > Basic >Name-Fixation >Duration-0.5; Layout >Size[w,h]-$(0.1,0.1) > Position[x,y]-$(0,0)
3. Grating Properties >Basic>Name-grating >time(s)-0.5 >Duration-0.3;Layout >Size(w,h)-$(0.3,0.3) >set every repeat;Apperance >Contrast-$ 0.5; Texture >Mask-gauss > Spatial frequency-$ 8
4. Responses >Keyboard >Key_resp Properties >Basic >Name-key_resp >time(s)-0.5 > Allowed Keys -$'left', 'right' ;Data > Click - Store correct > Correct answer
5. Custom >code Properties >Name-fiftyfifty >Begin Routine

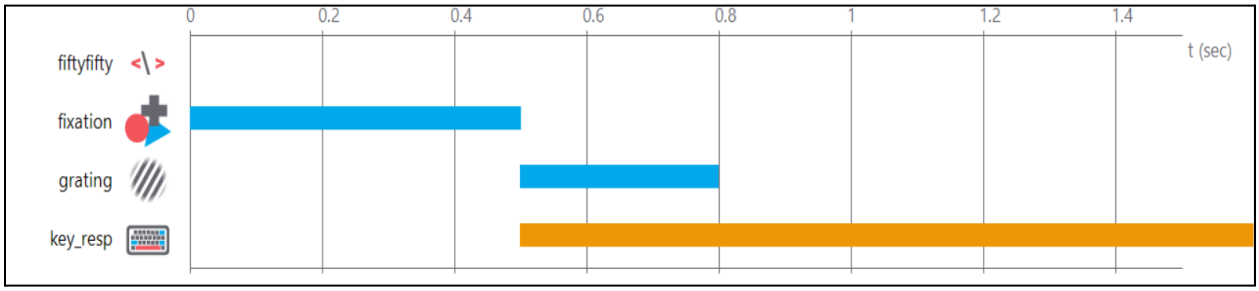

Table 1

6. Click on key_resp Properties > Data >Correct answer-$corr_resp
7. Click on grating Properties >Layout >Orientation-$direction >set of repeat
8. Click on fifty-fifty >move to up
9. Click on insert loop > Loop properties >Loop type-staircase >start value-$10 >max value-$20 >min value-1 >step sizes-$(2,1,1,0,5] > step type-lin > Name-stair
10. Click on fifty-fifty>end routine

Before Experiment | Begin Experiment | Begin Routine * | Each Frame | End Routine * | End Experiment

```
if random()>0.5: # 50:50 probability
    direction = -level
    corr_resp = 'left'
else:
    direction = level
    corr_resp = 'right'
```

```
if ((Math.random() > 0.5)) {
    direction = (- level);
    corr_resp = "left";
} else {
    direction = level;
    corr_resp = "right";
}
```

Table 2

11. Click on settings > save it as an adaptive staircase >window size (pixels)-$(1000,600)
12. Run the experiment >click left and right

- In total, the no of trials used was 49 trials for the experiment

Results

The correct answer is right tilt.

i	thisRow.t	notes	trial.started	fixation.sta	grating.start	key_resp.st	fixation.sto	grating.stop	trial.stoppe	corrAns
	0.0435645		0.01153	0.0435645	0.5469732	0.5469732	0.5625282	0.8464842	2.3779118	right

Table 3