Ahmedabad University

Adaptive Staircase

Subject- PSY 310 Lab in Psychology

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Submitted to faculty: Prof. Nithin George

Student Details

Roll NO.:	**Name of the student**
AU2120205	Meshwa Vaghela

GitHubLink: - https://github.com/Meshwa205/PSY310_LAB-REPORTS_MESHWA.V_AU2120205/upload

Excel Link: - https://1drv.ms/x/s!AhA_2YOyhGzfgiu76Hw7Ri5lyze8

Meshwa Vaghela_AU2120205

Introduction: -

Adaptive Staircase is a method that helps in determining an individual's threshold for detecting or distinguishing a sensory signal. This approach is intended to swiftly and effectively assess an individual's sensitivity or discriminating ability in several sensory modalities.

The adaptive staircase approach involves presenting the participant with a sequence of stimuli and adjusting the strength or amplitude of the stimuli based on the subject's reactions. The fundamental concept is to determine the stimulus level at which the person responding can reliably detect or distinguish the desired signal.

Prior to the adaptive staircase approach, psychophysicists frequently employed the limits method to estimate perceptual thresholds. The strength of the stimulus is progressively raised or lowered in this manner until the subject can or cannot perceive it.

In the 1920s, it was the German psychologist, Georg von Békésy, who introduced this method, which is, in present time used in various fields like: -

1. Vision and Optometry
2. Audiology
3. Psychology and Neuroscience
4. Environmental and Safety Assessments
5. Art and Design and many more…

Meshwa Vaghela_AU2120205

Method: -

The respective experiment was performed by the self; MeshwaVaghela, a female of 21-year of age, who is in her 3rd year of B.A. HONS. with Psychology as major from Ahmedabad University, wherein 50 trials were conducted and completed in one session itself.

Materials and Procedure: -

A video describing the research was delivered to the experimenter, a day before it was conducted, by the respective faculty. The experiment was created using the experimenter's personal device with the latest version of PsychoPy (PsychoPy-2023.1.3).
For the experiment to be highly result oriented, it was made sure that there are no disturbances to the subject and thus was conducted in a closed setting.

A minimum of 50 trials were recorded in which a fixation point in the shape of a '+' appeared in the center of the screen along with a concentric grating mask appeared on either the left or right side of the screen (it will be tilted).
Participant/Participants is/are required to press the appropriate direction keys i.e. ‘Right Arrow’ key or ‘Left Arrow’ key accordingly.

Below mentioned are the detailed steps done to conducted the whole experiment: -

1. Open PsychoPy-2023.1.3 builder file.
2. Component> Stimuli> Polygon> ‘Polygon Properties> Basic> Change the name to ‘fixation’> duration to be ‘0.5’> shape to be ‘cross’. Now go to

Layout> change the size of the shape to(0.1, 0.1)> for the Spatial Unit stick to the ‘from exp settings’.

3. Next comes the Grating settings. Stimuli> Grating> Basic> keep the name as it is> change the time to ‘0.5s’> duration to be ‘0.3’. Next in the layout of grating, keep the size to (0.3, 0.3)> it is very IMP to change the orientation to ‘direction’> from constant to ‘set every repeat’. Under the appearance section, contrast to be ‘0.5’ as 1 is the max. value> texture> mask> gauss> spatial frequency to define the no.of stripes on grating = 8.
4. Responses> keyboard response> allowed keys> ‘left’, ‘right’> start time, ‘0.5s’> in the data tab check the ‘store correct’ box> correct response = ‘$corr_resp’
5. Custom> code> begin routine> name it as ‘fiftyfifty’> enter the code> this line of code should be ‘moved to the top’.
6. Insert loop> loop properties>name = ‘stair’> loop type to ‘staircase’> nReps = ‘50’> start value = ‘10’> max value = ‘20’> min value = ‘1’> step sizes = ‘[2, 1, 1, 0.5]’> step type = ‘lin’> N up = ‘1’> N down = ‘3’.
7. Fiftyfifty properties> end routine> enter the code.
8. Before running the experiment, go to settings section> basic> uncheck the ‘show info dialog’ box> screen> uncheck the ‘full screen’ box> window size = ‘[1000, 600]’.
9. Run the experiment to see if it is correct and if it has any errors then correct it and run again.
10. Save the experiment.

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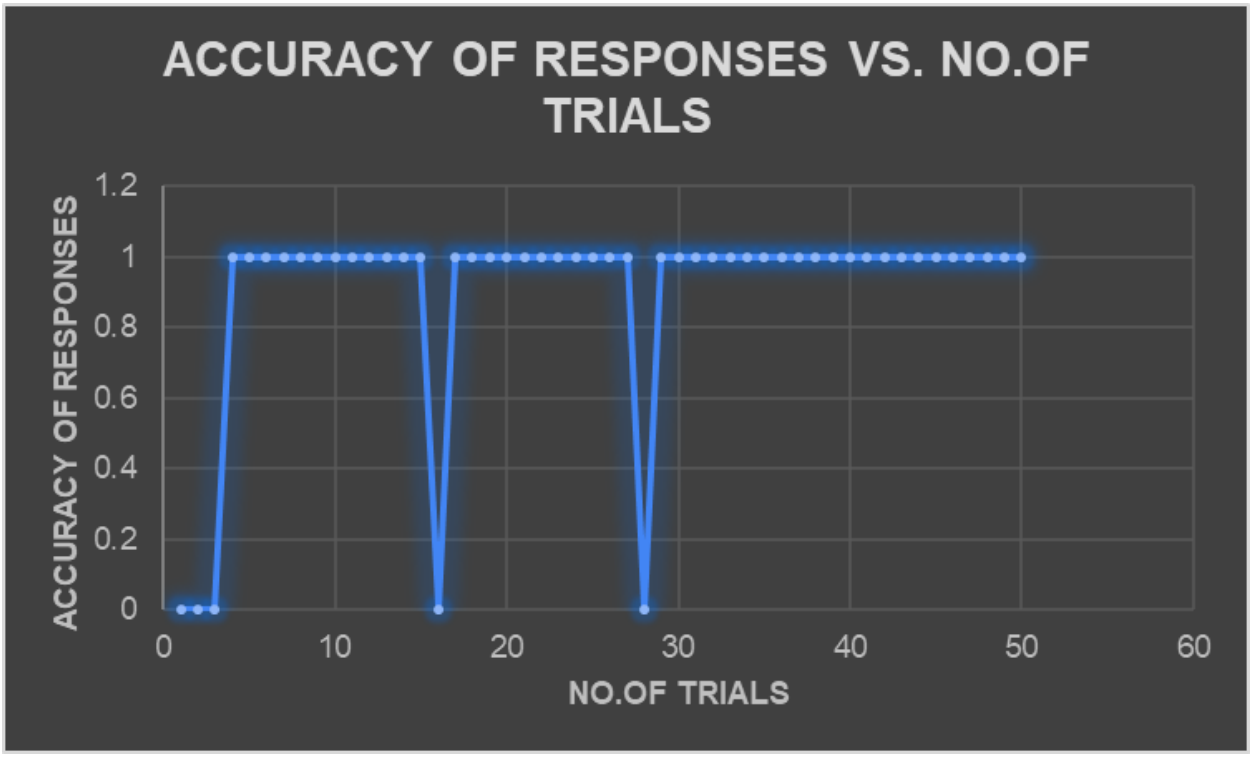
Result: -

After conducting **50 trials** successfully**,** the average absolute threshold intensity achieved is **-0.071428571.**

Graph 1: -



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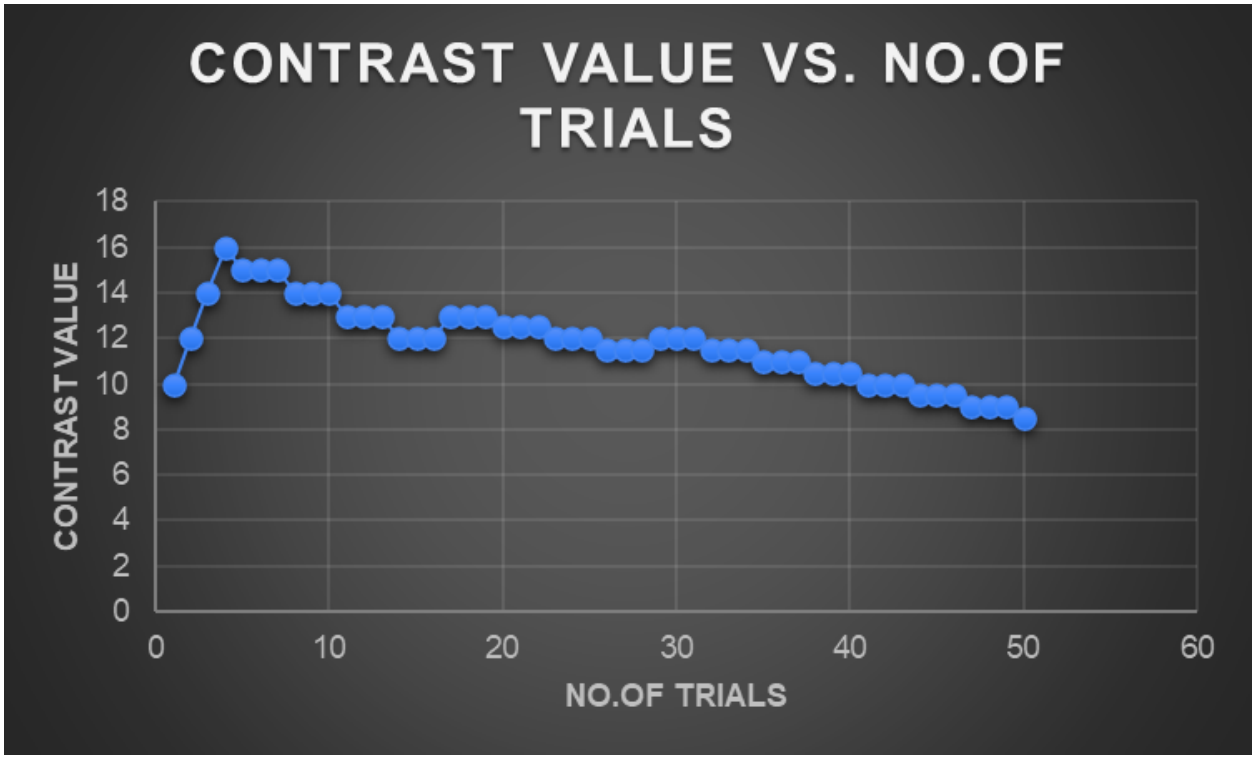

Discussion:- While effective for predicting psychophysical thresholds, the adaptive staircase technique has disadvantages. It presupposes consistent perception throughout time, which may not be the case owing to factors such as weariness or learning effects. Individual differences among participants might have an impact on findings. It is frequently restricted to two-alternative forced-choice tasks and may be ineffective for continuous perception. Converging to extreme thresholds can be difficult, and the procedure is based on subjective participant answers, which introduces bias.

References: -

Cheng, A. L. (2020, August 15). *(PDF) Development of An Adaptive Staircase System Actuated by Facial-, Object-, and Voice-Recognition*. ResearchGate. Retrieved September 6, 2023, from https://www.researchgate.net/publication/334883084_Development_of_An_Adaptive_Staircase_System_Actuated_by_Facial-_Object-_and_Voice-Recognition