Lab Report -1

Adaptive Staircase Method

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**Introduction**

Adaptive staircase method is a method used in classical psychophysics experiments. This method is also known as the newer version of method of limits as it is more efficient. It was believed by the classical psychophysicists that stimuli had to crossed over a specific threshold to enter the brain or mind to produce a response. The adaptive staircase method helps us determine the intensity or the strength of the stimuli to cross the threshold. This is done by increasing or decreasing the intensity of the stimuli based on the previous responses of the participant. The starting point of the experiment is any arbitrary value. The aim of the using this method is to find the point of subjective equality which is the lowest intensity of stimulus which can be identified and cross the threshold. This method has many different types which uses different mechanisms/rules such as one-up one-down, one-up two-down etc. Hence this procedure is also known as a method of ups and downs.

Applications of adaptive staircase method can be seen in fields like engineering, digital signalling, product comparisons, medical research and studies involving our senses, attention, perception, auditory and vision-related tasks.

**Method**

The participant recruited was an undergraduate student with an age of 21. The experimental setup was designed using PsychoPy software on a 16’’ laptop. The experiment designed consisted of a circular shape with a gaussian mask texture which was displayed with different degrees of tilt in one-up, three-down rule of adaptive staircase method. The degree of the tilt is decided by the response of the participant in previous trials. The stimuli would appear for about 300 milliseconds, followed by a cross fixation. The maximum and minimum degree of the tilt is set to 20 and 1 respectively, and experiment beginning with 10 degrees of tilt. The degrees of tilt can either be towards left or right. The participant is supposed to press the right arrow key when the tilt is towards right and press left arrow key when tilt is towards left.

**Result**

To calculate the threshold, I took the values of the tilt for the last five reversals in responses. Reversal is when a participant is responding correctly in the previous trials, and then responds incorrectly in the next trial, basically when the responses go from correct to incorrect (from 1 to 0). The average of degree of tilt from the last five reversals is taken to calculate the threshold. The values of degrees of tilt of the last five reversals are 2, 2.5, 2, 2.5, 2, and the average equals to 11 divided by 5 which is 2.2. The threshold or point of subjective equality (PSE) is 2.2 degrees, implying that the minimum intensity of threshold which is recognised by the participant is 2.2 degrees of tilt.

**Discussion**

While the adaptive staircase method is quite efficient when compared to the method of limits, it does have some limitations. One being that the threshold estimates can be easily biased depending on the step size rule incorporated and initial stimuli level. This experiment is not efficient when the number of trials is less than 20. With adaptive staircase method, there is a risk of focus being on narrow range of stimuli intensities, while not taking broader perceptual variation. Although, the adaptive staircase method has some limitations, it is widely used in fields where research related to the accuracy of the senses is tested and perceptual response is determined.

**References**