Topic 11 problems

1. With the method of constant stimuli we choose a number of stimulus levels before the experiment begins, and we show each of those stimulus levels the same number of times. One problem with this approach is that all the stimulus levels we choose might be too high or too low, so that the observer gets all the trials correct or incorrect. This makes it impossible to measure the observer's threshold.

An alternative approach is to use a staircase. With this method we change the stimulus level from trial to trial in a way that depends on the observer's responses. In a 1-up 2-down staircase, we keep count of the observer's correct and incorrect responses. When the observer gets one trial incorrect, we raise the stimulus level and reset our counts to zero. When the observer gets two trials correct (not necessarily consecutively), we lower the stimulus level and reset our counts to zero. This keeps the stimulus level in a range where it is neither too easy nor too hard, and in practice a 1-up 2-down staircase tends to stay around the stimulus level where the observer gets 71% correct. Other common staircases are 1-up 3-down, which stays around 79% correct, and 1-up 1-down, which stays around 50% correct.

Revise the orientation discrimination experiment covered in the lecture so that instead of using the method of constant stimuli, it uses a 2-up 1-down staircase.

For those of you who find these methods useful in your own work, the classic reference on staircases is:

Wetherill, G. B., & Levitt, H. (1965). Sequential estimation of points on a psychometric function. *The British Journal of Mathematical and Statistical Psychology, 18,* 1-10.