**Signal Detection Theory**

PSY310: Lab in Psychology

27th September 2023

**Anah Patel**

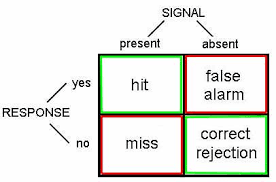
**AU2220165**

**GitHub link:**

**Introduction:**

Signal Detection Theory (SDT) in psychology refers to the notion that a person's ability to detect stimuli depends on a variety of factors, including the intensity of the stimuli and their psychological and physical conditions. It's a means of comprehending how individuals decide when they have to choose between crucial messages and unclear or distracting stimuli. It assists us in examining how we make decisions when the available information isn't always obvious.

In simpler terms, it helps us decide whether or not we have actually heard or seen something in a room, for example, when we are uncertain. We might have detected the stimulus when it was actually present (Hit), or could have not detected it (Miss), or could have falsely interpreted it as a stimulus (False Alarm), or correctly recognized it as not present (Correct Rejection).



*Fig.1 Signal Detection Theory*

**Method:**

It assesses an individual’s ability to detect a signal embedded in noise, measuring sensitivity and response bias to understand perception and decision-making in various tasks. The purpose of this experiment is to quantify an individual's ability to discriminate between signal and noise, providing insights into their sensory processing and decision-making capabilities. The experiment was conducted on a software named PsychoPy. There was one participant, and she completed 300 trials.

* First, the software PsychoPy was opened. A fixation (a small triangle) was added.
* Next, the stimulus (a grating, which would be changing its direction of tilt automatically) was added.
* Next, the key response was added where the “up” key was assigned for left-tilted gratings and the “down” key was assigned for right-tilted gratings.
* Finally, the code was added, which would store the answers according to the code.

The participant was instructed to press the “down” arrow key (↓) for right-tilted gradients and the “up” arrow key (↑) for left-tilted gradients. She had 300 trials and all of the observations were recorded in Excel.

**Results**

The following are the results obtained from the experiment:

|  |  |  |
| --- | --- | --- |
|  | Responded YES | Responded No |
| Signal PRESENT | *198* | *27* |
| Signal ABSENT | *50* | *25* |

|  |  |
| --- | --- |
| 1. Proportion Hit (Hit/Hit+Miss) = *0.88* |  |
| 1. Proportion False Alarm (FA/FA+CR) = *0.66* 2. d’ (ZProp Hit) – Z(Prop FA) = *0.74426* 3. c – [((Z Prop Hit) – (Z FA))/2] = *-0.3721* |  |

**Discussions**

Here, the participant’s results indicate *a liberal bias (bias to respond YES)* to the stimulus. She has a hit rate of 0.88 and a False Alarm rate of 0.66.

Clearly, the hit and false-alarm rates reflect two factors: response bias (the general tendency to respond yes or no, as determined by the location of the criterion) and the degree of overlap between the signal and the noise distributions. The latter factor is usually called sensitivity, reflecting the perceptual origins of SDT: For example, when an auditory signal is presented, the decision variable will have a greater value (the stimulus will sound louder) in listeners with more sensitive hearing. The major contribution of SDT to psychology is the separation of response bias and sensitivity.

**References**

* [**https://www.keiseruniversity.edu/signal-detection-theory/**](https://www.keiseruniversity.edu/signal-detection-theory/)
* [**https://www.sciencedirect.com/topics/biochemistry-genetics-and-molecular-biology/signal-detection**](https://www.sciencedirect.com/topics/biochemistry-genetics-and-molecular-biology/signal-detection)
* [**https://www.cns.nyu.edu/~david/handouts/sdt/sdt.html**](https://www.cns.nyu.edu/~david/handouts/sdt/sdt.html)
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