

Fechnerian Psychophysics

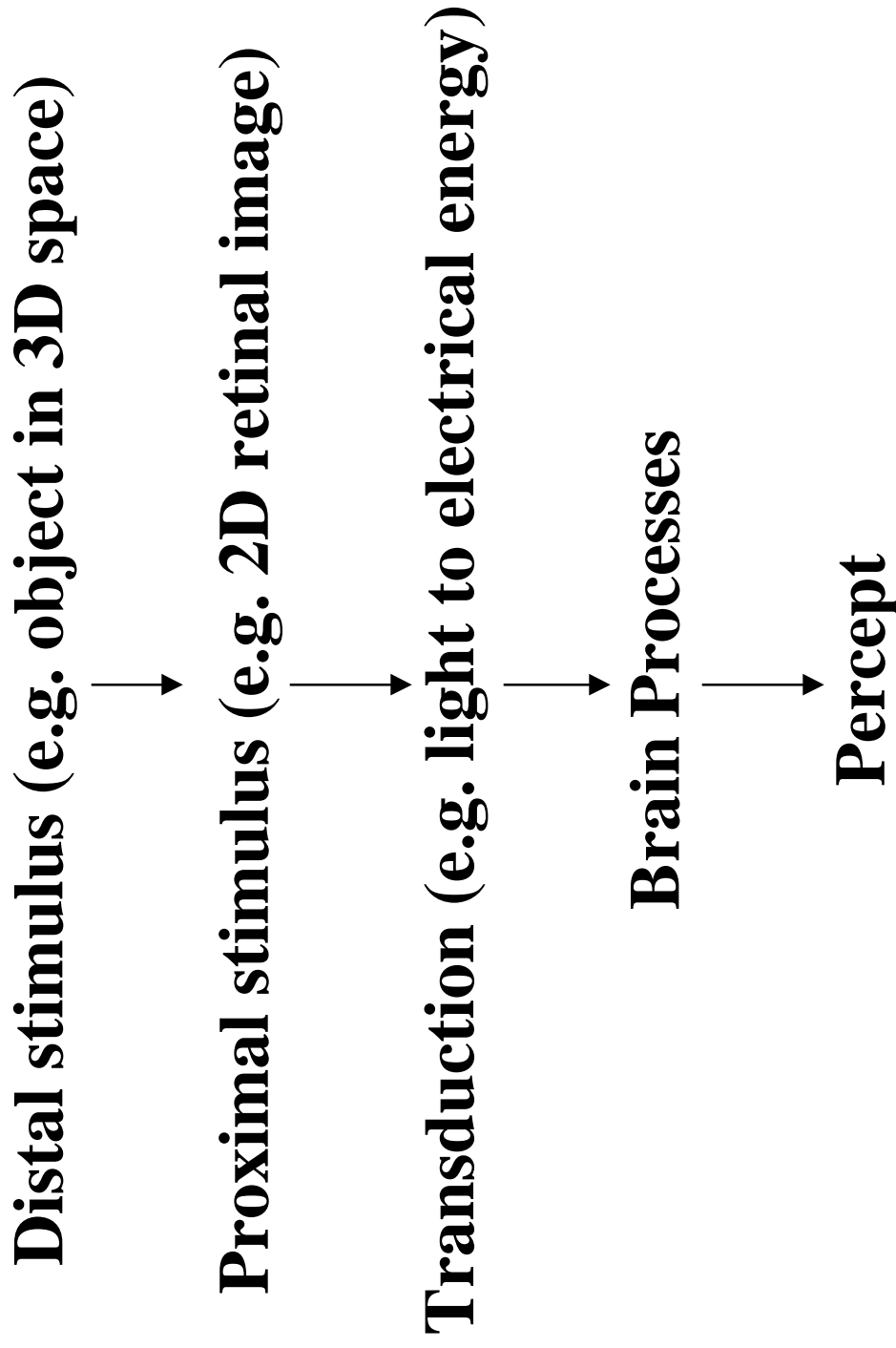
Outline

- **Definition of perception**
- **Fechnerian causal chain of events**
- **Inner and outer psychophysics**
- **Percept viewed as an inverse problem**
- **Definition of absolute and difference threshold**
- **Classical threshold theory**
- **Weber's Law**
- **Fechner's and Steven's Laws**

Definition of Perception

The goal (task) of perception is to acquire accurate and reliable precise information about the environment.

Fechnerian causal chain of events



Inner and Outer Psychophysics

- Inner psycho-physics refers to the relation between the brain and the percept (mind-body problem)
- Outer psycho-physics refers to the relation between the stimulus (distal or proximal) and the percept

This course covers the methodology of studying outer psychophysics

Percept Viewed as an Inverse Problem

Outer psychophysics can also be viewed as a composition of forward and inverse problems:

distal stimulus → proximal stimulus

this is a forward problem and it is expressed in the rules of physics

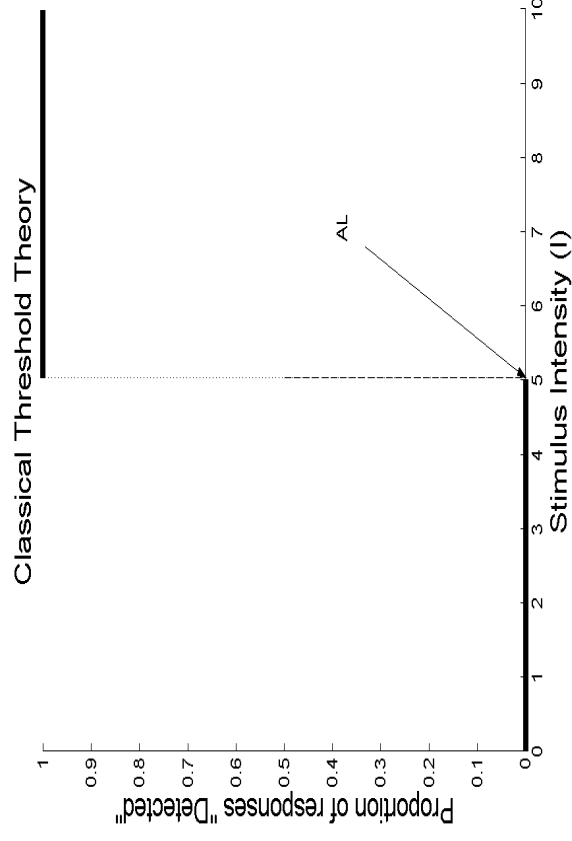
proximal stimulus → percept

this is an inverse problem and it involves perceptual inferences - inverse problems are difficult

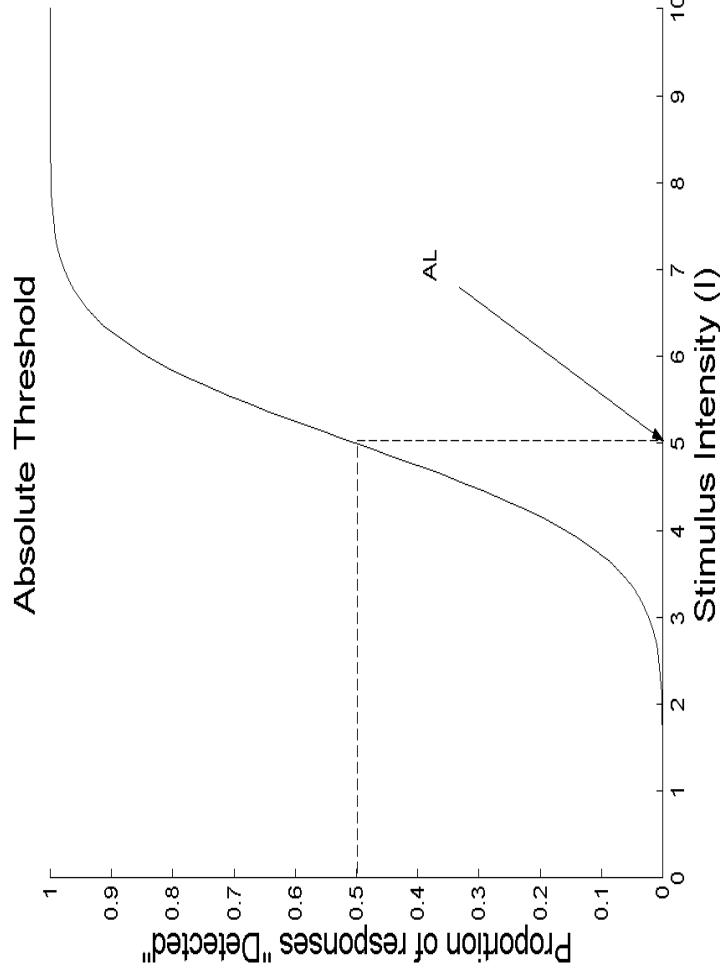
Absolute threshold

Absolute threshold (AL) is the smallest amount of stimulus energy that can be reliably detected

Classical Threshold Theory:

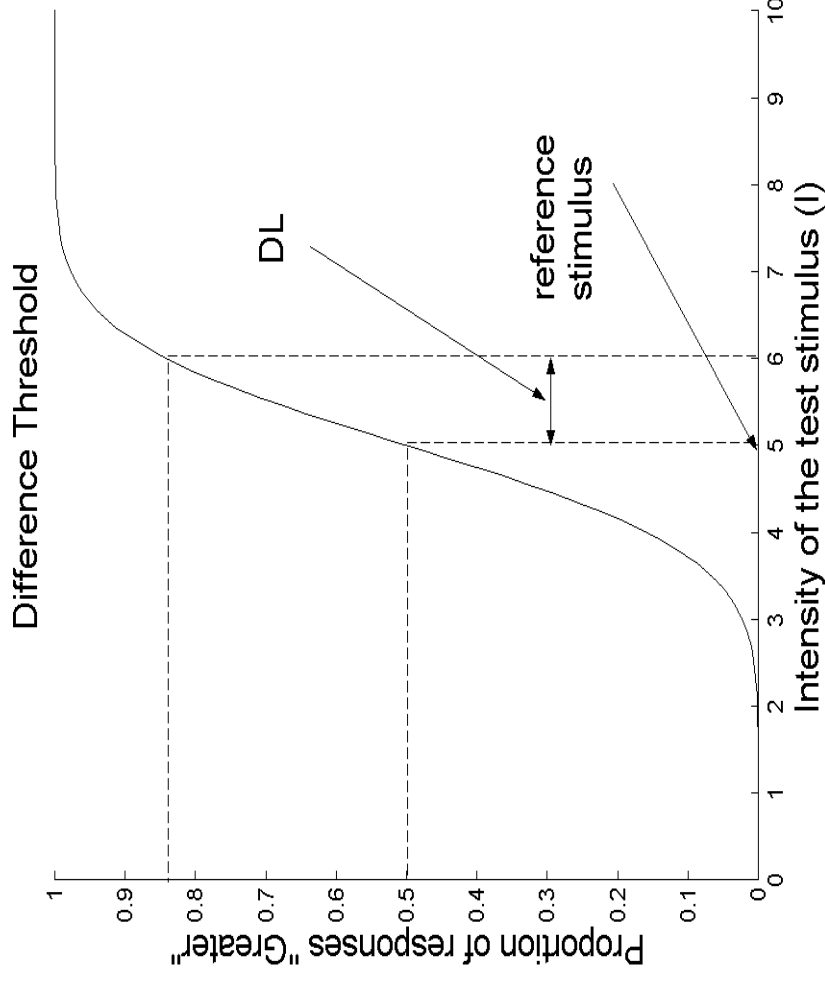


Perceptual representation of a stimulus is not constant; it involves an additive random error. It follows that the psychometric function is not a step-function. Instead it is an S-shaped curve. AL is defined as the 50th percentile point:



Difference threshold

Difference threshold (DL) is the smallest difference between two stimuli that can be reliably detected



Weber's Law

Difference threshold is proportional to the magnitude (intensity) of the stimulus:

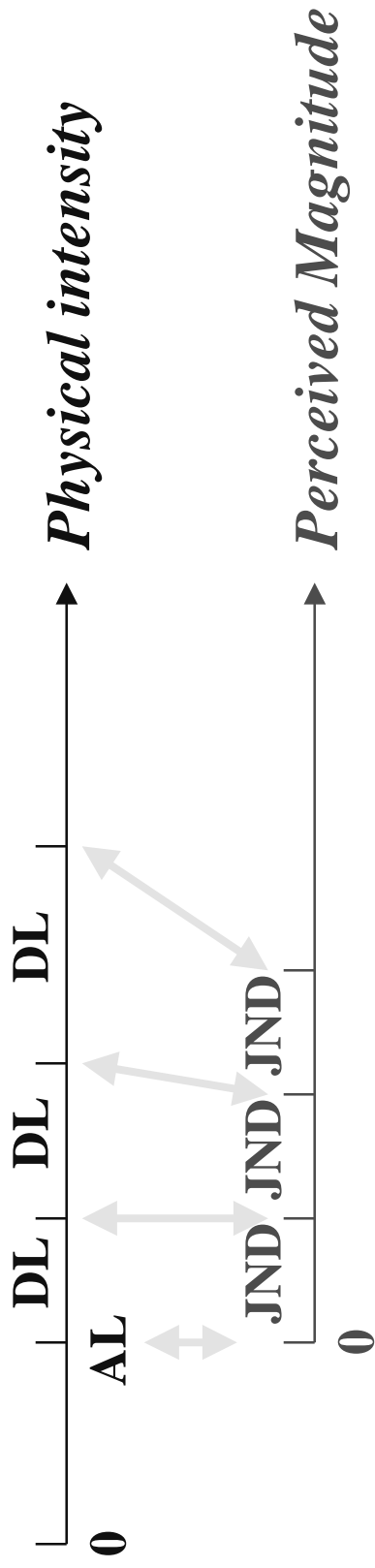
$$DL = w \cdot I$$

w - Weber fraction

Perceived Magnitude

- Fechner's Law:

$$dP = c \cdot dI/I \longrightarrow P = c' \cdot \log(I/I_0)$$



Perceived Magnitude (cont.)

- Stevens's (power) Law:

$$dP/P = c \cdot dI/I \longrightarrow P = c' \cdot I^n$$

Break

- **Learning Style Survey**