

Lecture 1: Sensation and Perception

- **Sensation:** The ability to **detect** a stimulus and, perhaps, to turn that detection into a private experience
- **Perception:** The act of giving **meaning** to a detected sensation.

Brain

- Neurons basic elements of brain, when they fire we receive info (80-120 in brain with over 100, 000 connections)
- Brain has ten watts of power and weighs 1.4kg
- The brain interacts with the world through transduction by the sense organs
- Brain communicates with world through transduction of sense organs
- **Functionalised/modularity of function:** different parts of the brain do different things
- **Frontal lobe of brain:** associated
- **Broca's area/left temporal lobe:** speech centre

Senses

- **Sense organs:** systems that allow us to transduce info from the world into neural energy via action potentials
- **Vestibular system:** self-motion/balance (in ear)
- **Proprioceptive system** (sense of body in space)
- **Tactile:** changes in pressure at skin
- **Auditory:** sensations in movement of air
- **Vestibular:** sense of movement of body with respect to gravity

Three categories of senses sub-divided **based on info they are sensitive to**

- **Photo sense:** vision (**electromagnetic radiation**)
- **Mechanical sense:** tactile/touch, audition/sound, vestibular/self-motion (**mechanical energy/info about movement**)
- **Chemical sense:** taste/gustatory, olfaction/smell (**chemical energy/info about environment**)
- PMC

Localisation of function: lesion studies

- **Lesion studies:** demonstrate that damage to certain parts of the brain effect behaviour in a very specific way
- **Phineas gage:** frontal lobe damage
- **Tan:** left temporal lobe damage (broca's area)
- **Wilder Penfield:** electrically stimulated exposed brain of alert patient

Functional modularity of human cortex

- **Primary motor area (MT):** movement
- **Primary somatosensory area:** touch
- **Parietal lobe:** ability to see things in space
- **Primary visual area (V1):** vision
- **Primary auditory area:** audition
- **Temporal lobe:** language
- **Frontal lobe:** planning and emotional regulation

Psychophysics

- Oldest discipline within psychology

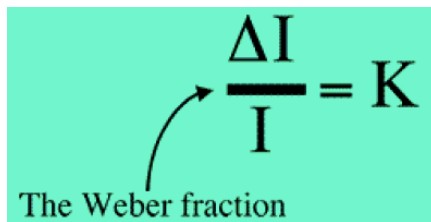
- Science of **defining quantitative relationships between physical and psychological events**
- Trying to understand basic elements of experience (**dimensions of perceptual experience**) ie vision = colour, shape, texture
- We have perceptual bias
- **Illusion**: situation where we misperceive the physical world

Psychophysical methods

- **Absolute thresholds**: the minimum amount of stimulation necessary for a person to detect a stimulus 50% of the time
- **AT experiments**: present a varied amounts of one stimulus and ask if they perceive it
- **Relative threshold**: how different do two stimuli need to be to detect a difference
- **Superant threshold**: our every day threshold where we can clearly hear things
- **Weber-Fechner Law**: our ability to discriminate between things is proportional to the intensity of the object. Basic unit = JND
- **JND**: The smallest detectable difference between two stimuli that enables it to be correctly judged as different from a reference stimulus. Jnd increases in proportion to the intensity of the stimulus

$$\text{JND} = \frac{75\% - 25\%}{2}$$

- **Weber fraction**: The constant of proportionality in Weber's law



The Weber fraction

JND (ΔI) : stimulus intensity (I)
is constant (K)

- **receiver operating characteristic (ROC) curve**: In studies of signal detection, the graphical plot of the hit rate as a function of the false-alarm rate. If these are the same, points fall on the diagonal, indicating that the observer cannot tell the difference between the presence and absence of the signal. As the observer's sensitivity increases, the curve bows upward toward the upper left corner. That point represents a perfect ability to distinguish signal from noise (100% hits, 0% false alarms).

What is psychophysics?

Psychophysics is the science of defining quantitative relationships between physical and psychological (subjective) events.

What is the "just noticeable difference" (JND)?

The JND is the smallest detectable difference between two stimuli, or the minimum change in a stimulus that can be correctly judged as different from a reference stimulus. It is also known as the "difference threshold." It is a key tool for

investigating psychophysiological phenomena.

Describe two psychophysical methods used to measure people's sensations.

Why is the JND important in psychophysics?

The JND, or “just noticeable difference” is the smallest detectable difference between two stimuli, or the minimum change in a stimulus that can be correctly judged as different from a reference stimulus. It is important in psychophysics because psychophysics involves measuring people's perception, and the JND is an important landmark in understanding their perception. Using this landmark experimenters are able to make conclusions about the way in which we perceive stimuli. In fact, the JND is a constant fraction of the comparison stimulus (Weber's Law).