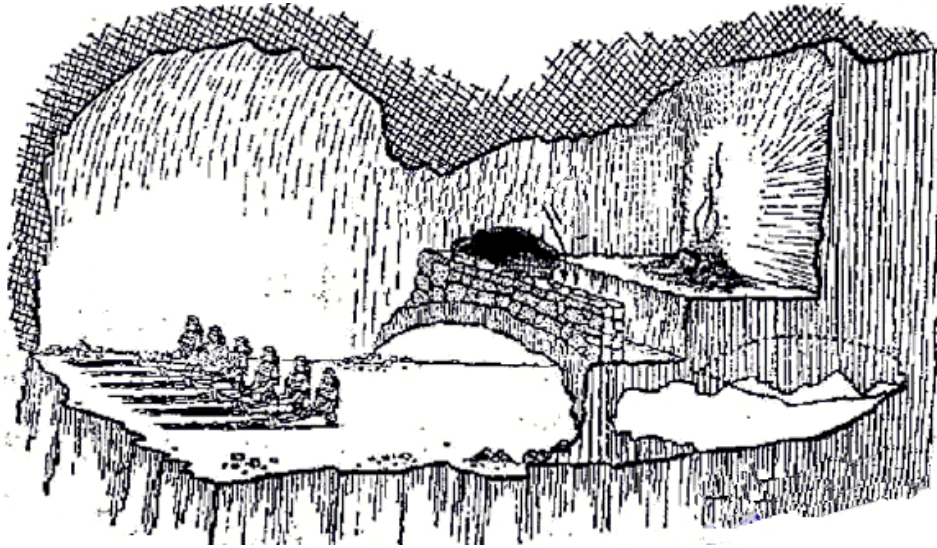
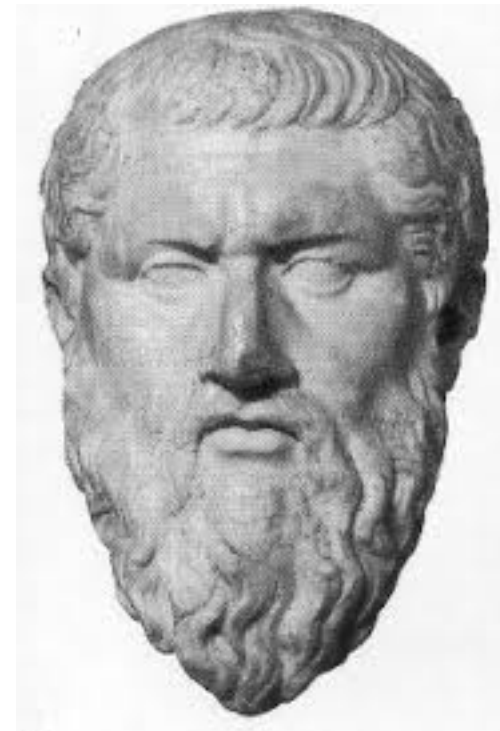


# What is real..?

## Early history of perception



**Allegory of the cave:** Prisoners, tethered together since childhood, in a cave lit by a fire, only able to stare at the wall (and the shadows of people walking in front of the fire)...



Plato,  
428 – 348/7 BCE

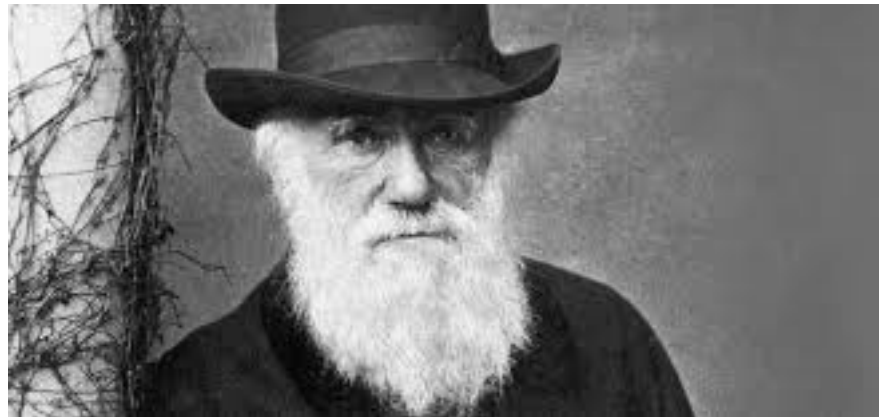


Not Plato

**Perception of the world depends on sensory experience**

# Sensation and perception, are the results of natural selection

- **Sensation:** sensory detection; selective!
- **Perception:** sensory experience, identification, interpretation
- Helps keep us alive



Charles Darwin, 1809 - 1882



# Sensory detection links to behavior

## Example: Dead ants (E. O. Wilson)



When an ant dies, other ants just walk right over it for about two days - *until the corpse emits a chemical signal, which provokes the other ants into carrying it out...*

E.O. Wilson looked for chemical signal, and found **oleic acid**.  
He put one drop on a live ant - *what do you think happened..?*



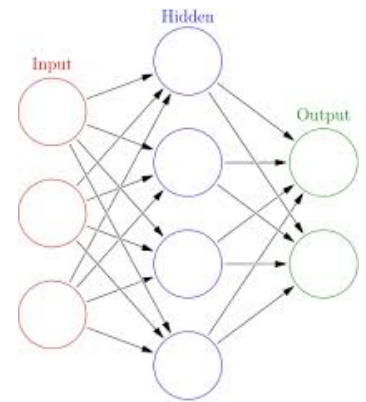
“You can never step in  
the same river twice...”



But in addition to the change in the river...  
...there is also a subsequent change in YOU...

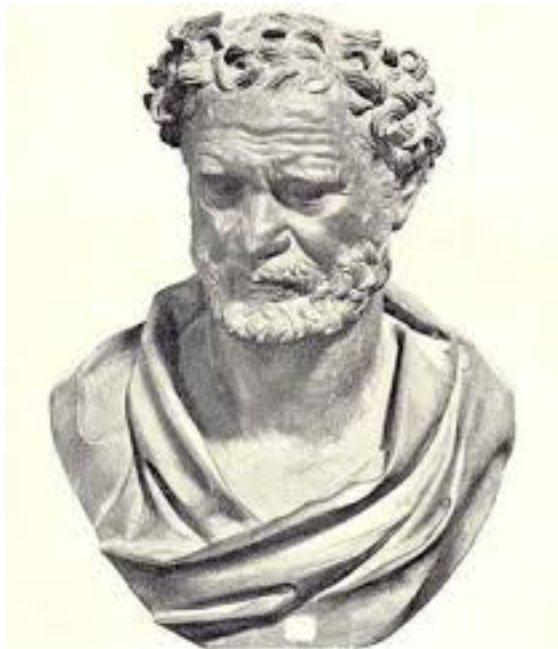


Heraclitus, 540 – 480 BCE



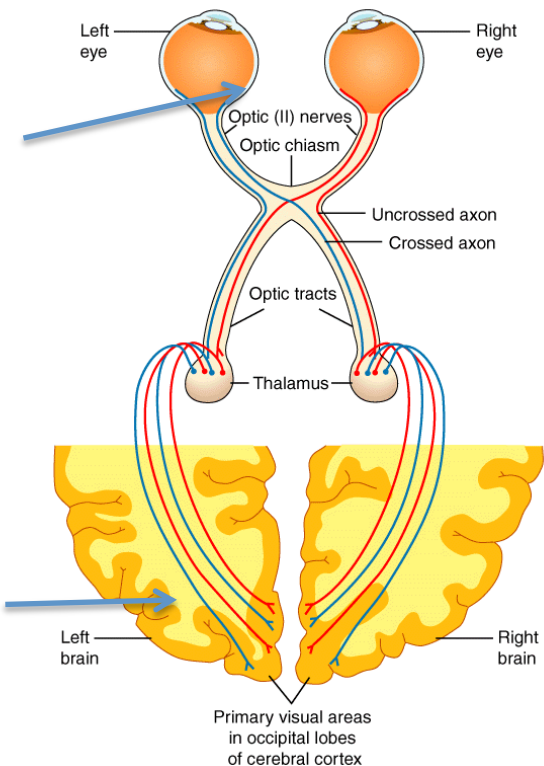
# Should you trust your senses?

- **Democritus** thought so\*. Suggested that “atoms” leave objects and then collide with our eyes, ears, nose...
- \*Most reliable senses: weight, texture (**primary qualities**)
- *What do you think..?* 😊



Democritus, 460 – 370 BCE

Sensory  
transduction



Perception?

# Dualism vs. Monism



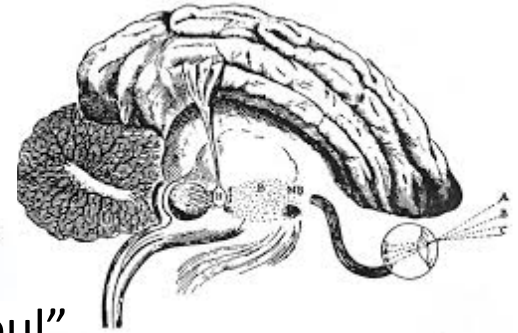
Rene Descartes  
(1596 – 1650)

Published “The Description  
of the Human Body” (1647)

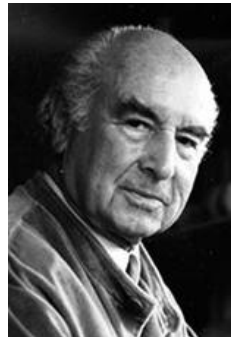
Mechanistic, BUT...

**Cogito ergo sum**

Pineal gland: “seat of the soul”



Albert Hoffman  
(1906 – 2008)



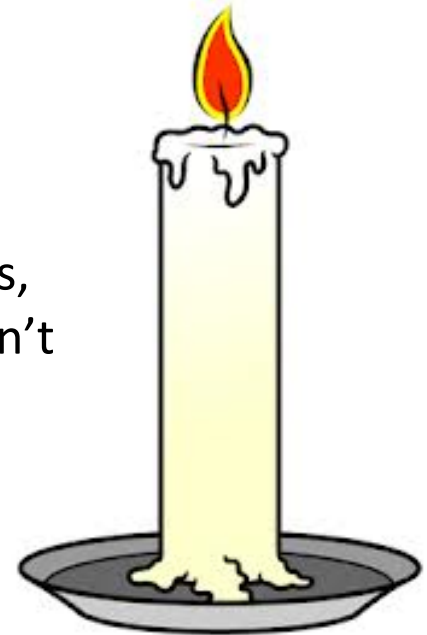
"Outside is pure energy and colorless substance," he said. "All of the rest happens through the mechanism of our senses. Our eyes see just a small fraction of the light in the world..."

## The Wax Argument

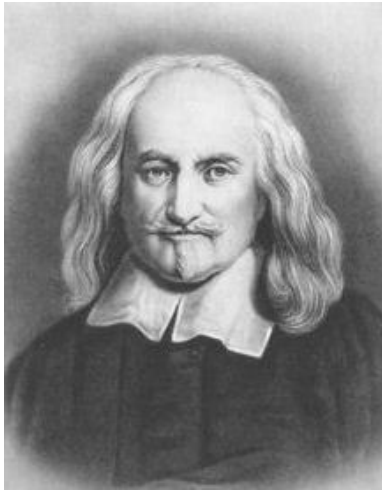
Senses tell you about physical characteristics, which change. You can't trust your senses...

But your thoughts are more trustworthy...

Res Cogitans > Res Extensa



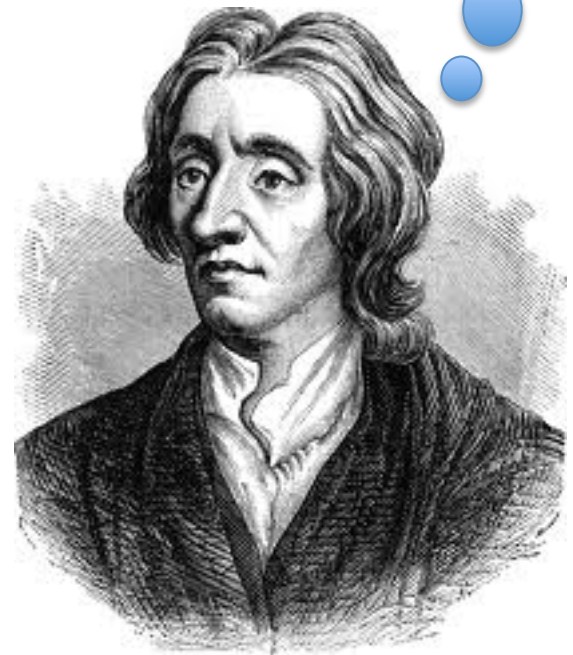
# Empiricism



Thomas Hobbes  
(1588 – 1679)

Only matter exists  
All knowledge arises from sensation  
“For there is no conception in man’s mind, which hath not first, totally, or in parts, been begotten upon the organs of the Sense...”

All thoughts could be constructed from experience with various sensations. Start with “simple ideas,” and add complexity over time...



John Locke  
(1632 – 1704)



# “Esse est percipi”



George Berkeley  
(1685 – 1753)



“To be is to be perceived”

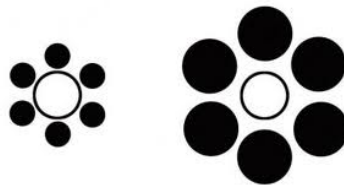
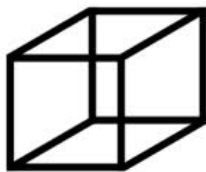
*How do we know how near  
or far objects are when  
we see them..?*

Perceptual experience

*Why does the world seem so real..?*

HUME: **Reliability** and **validity** (why?)

Reliability without validity: ILLUSIONS

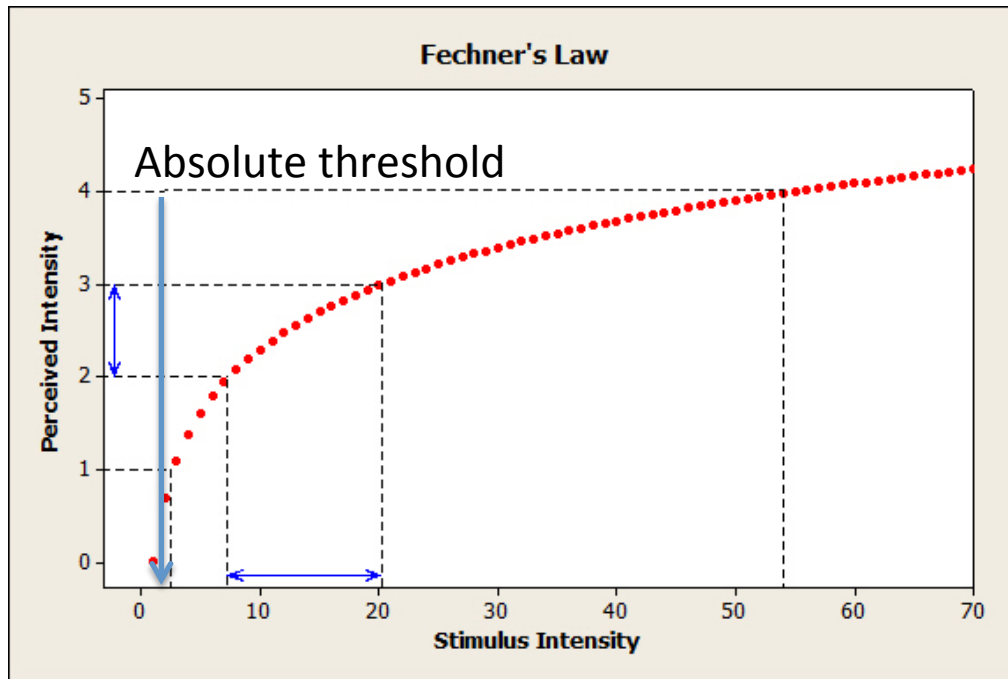


David Hume (1711 – 1776)

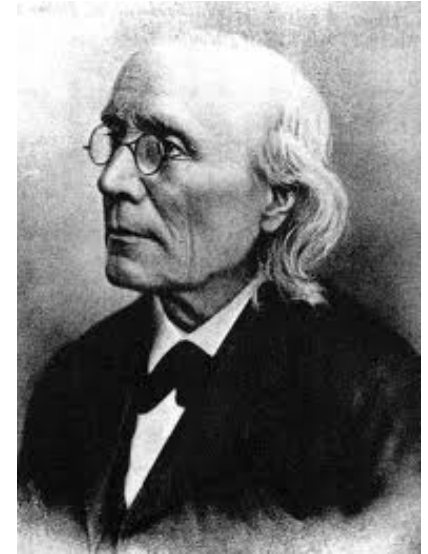


# Psychophysics

Relating changes in the physical world to changes in our psychological experiences



Our experience of stimulus intensity (e.g., loudness) increases less quickly than the actual physical stimulus (e.g., in decibels) increases...



Gustav Fechner  
(1801 – 1887)

$$S = k \log R$$

Perception

Physical stimulus



MIND

Matter too ☺

MATTER



# Measuring the absolute threshold

Auditory example: How quiet a sound can you hear..?

*NOT a sharp border: thresholds are probabilistic...*

1. **Method of constant stimuli:** many tones of varying intensity presented randomly; those loud enough are always detected, but where detection is only 50/50: **Absolute threshold.**



2. **Method of limits:** tones presented in order of increasing or decreasing intensity.

3. **Method of adjustment:** Subject adjusts intensity. Least reliable method 😊

# Signal detection theory

- Why the variability in signal detection? Why is the absolute threshold probabilistic, and not clear cut and consistent?*

## Signal vs. Noise, Bias...

