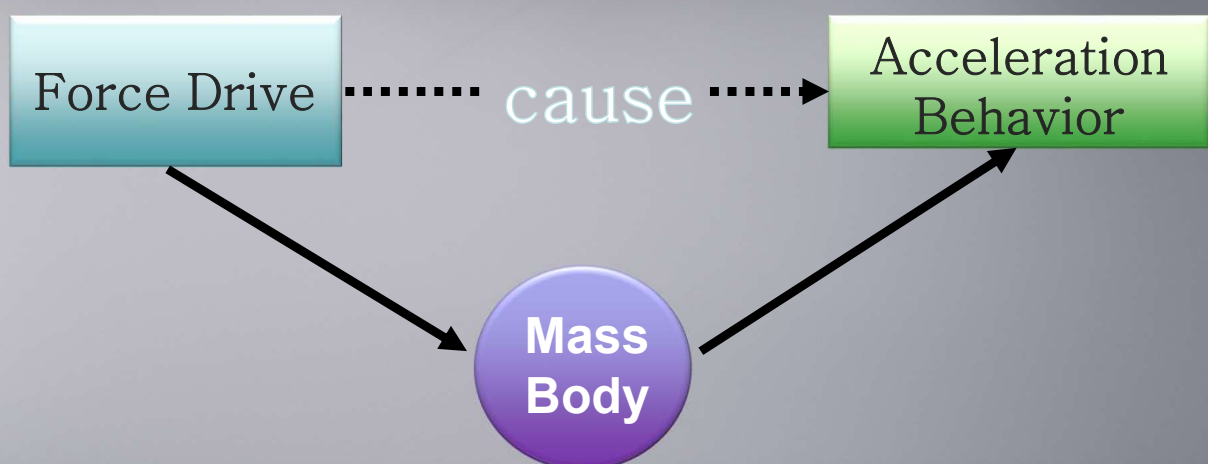


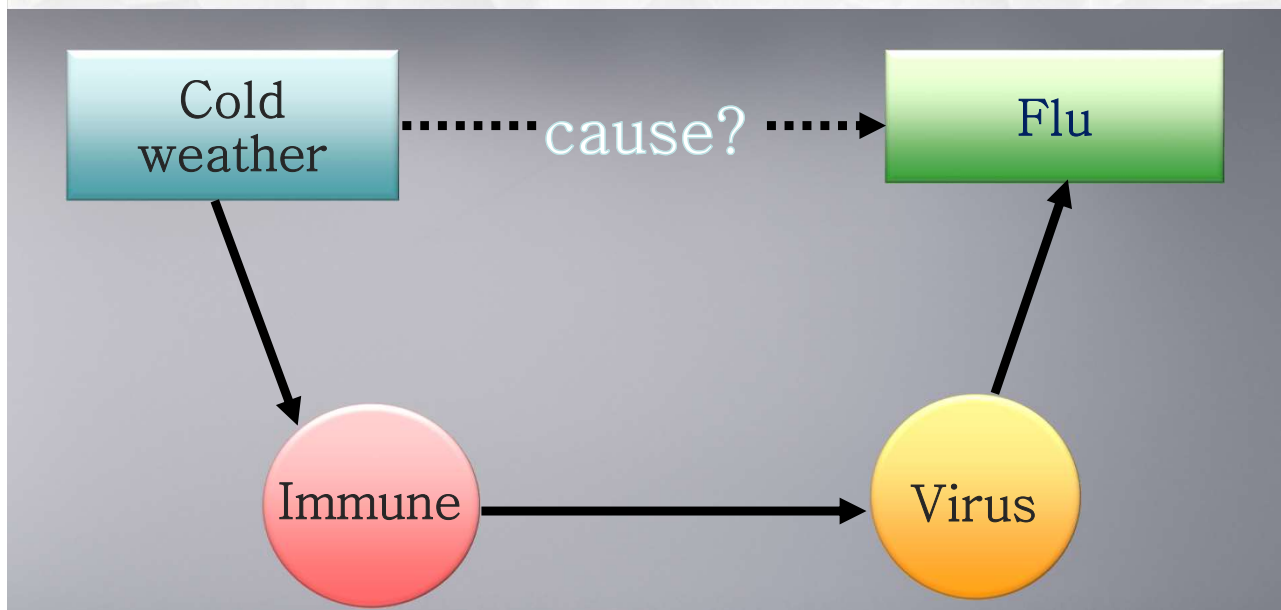
WEEK 2
Scientific foundation of
psychology
Unit 2: Physical sciences

Physical sciences model

Law of motion: $F=ma$



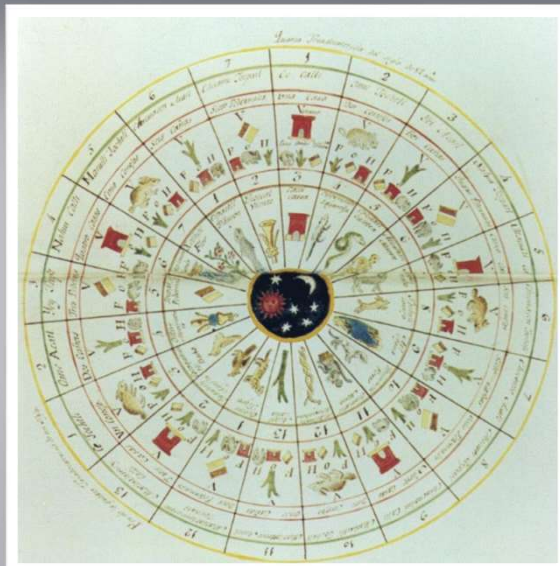
Common sense and science



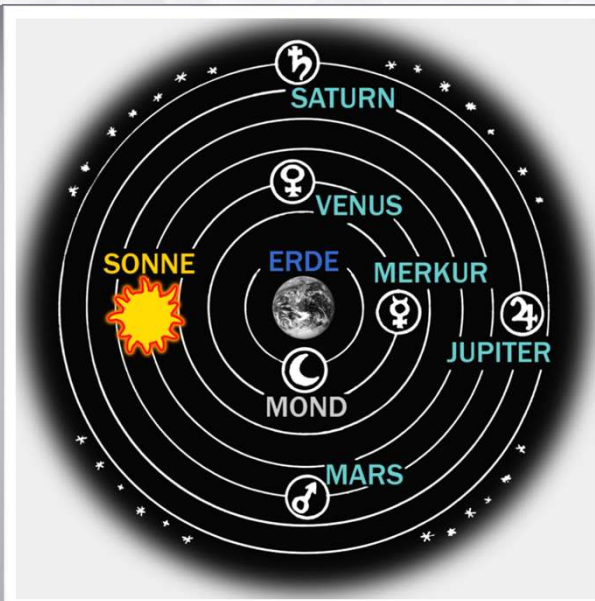
Council of Trent: Dec. 13, 1545



Lunar and solar calendar



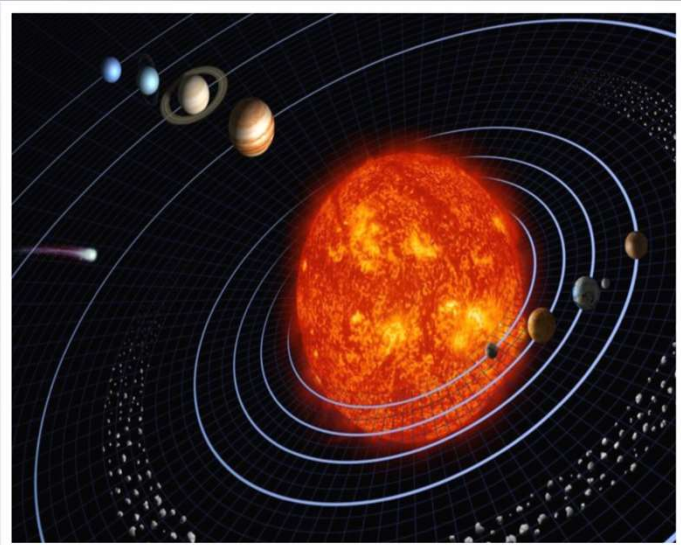
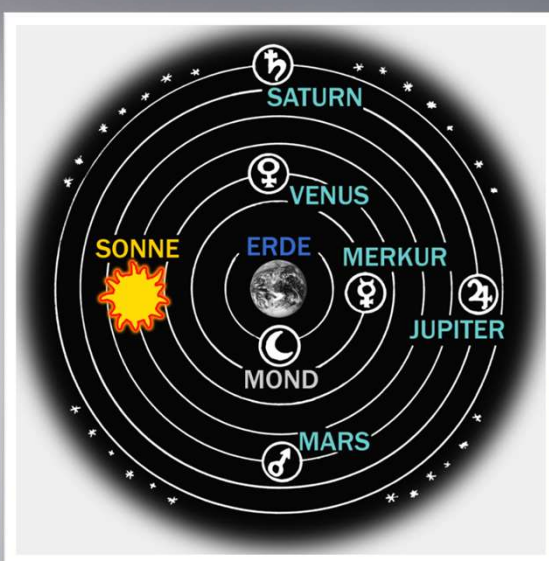
Aristotelian view of the universe



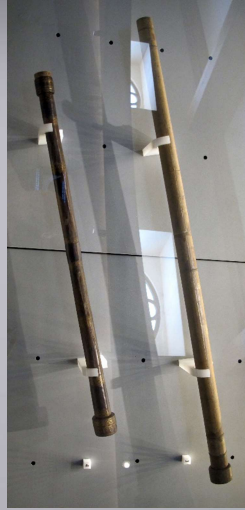
Eclipse



Copernicus (1473–1543)



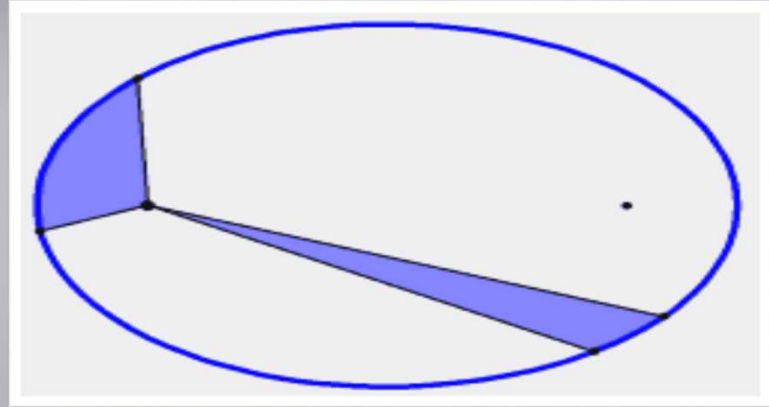
Galileo's observation



Tycho Brahe: 1546 – 1601



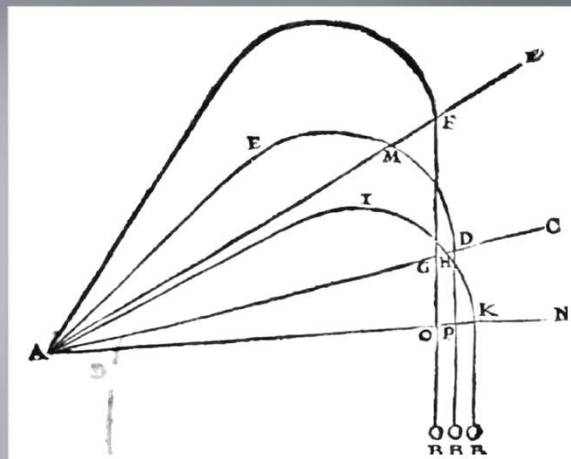
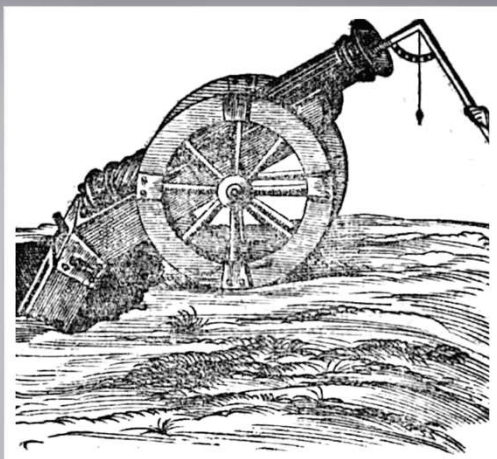
Johannes Kepler, 1571 – 1630



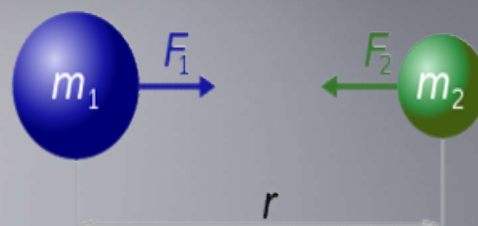
Kepler's Law of Planetary Motion

1. The orbit of every planet is an ellipse with the sun at one of the foci.
2. A line joining a planet and the sun sweeps out equal areas during equal intervals of time.
3. The squares of the orbital periods of planets are directly proportional to the cubes of the axes of the orbits.

Tartaglia: Trajectory of canon ball

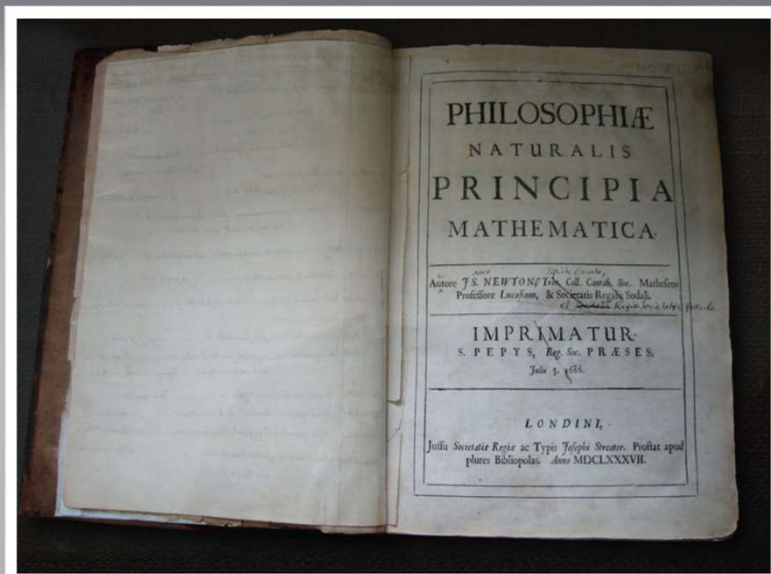


Isaac Newton: 1642 – 1726



$$F_1 = F_2 = G \frac{m_1 \times m_2}{r^2}$$

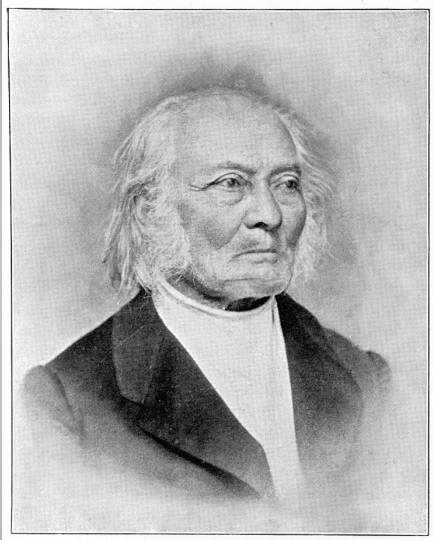
Principia Mathematica



Part II

Physical sciences and psychology

Ernst Heinrich Weber and perception



- ❖ **Weber-Fechner's law**
Just-noticeable difference
- ❖ If the background lighting is strong, then the amount of light needed to be noticed is stronger

Franciscus Donders (1869)



- ❖ Donders first used reaction time to measure cognitive processing.
- ❖ He found for simple recognition, such as dog, the reaction time was fast.

Franciscus Donders (1869)

- ❖ For more complex concepts, such as justice, the reaction time was longer.
- ❖ This measure became the basis of experimentation in cognitive psychology.

Classical conditioning: Ivan Pavlov

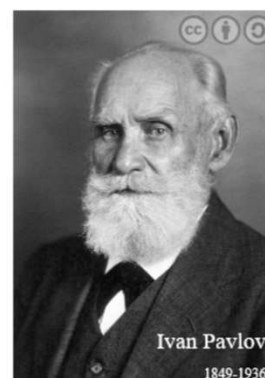
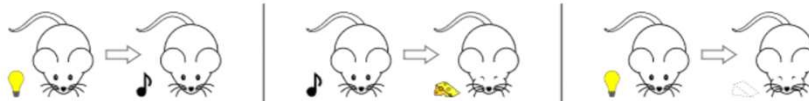
FORWARD CONDITIONING



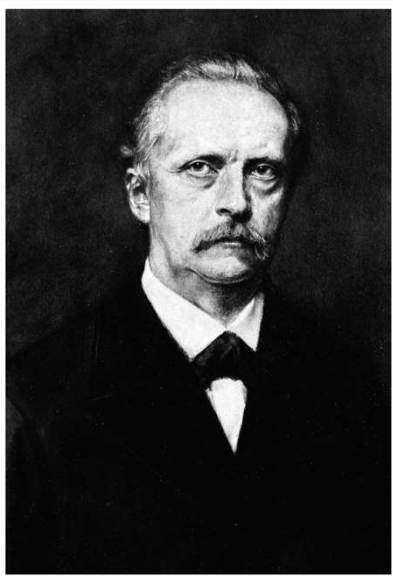
SIMULTANEOUS CONDITIONING



SECOND ORDER CONDITIONING

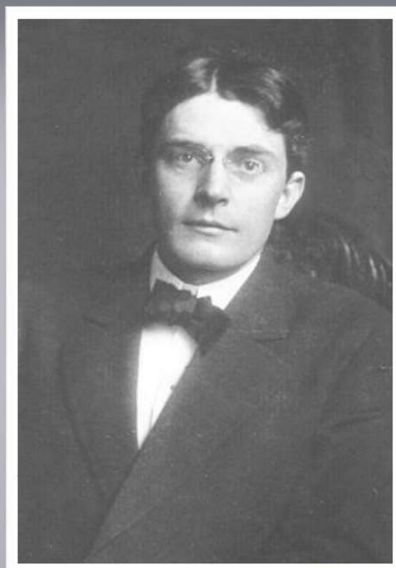


Hermann von Helmholtz (1821–1894)

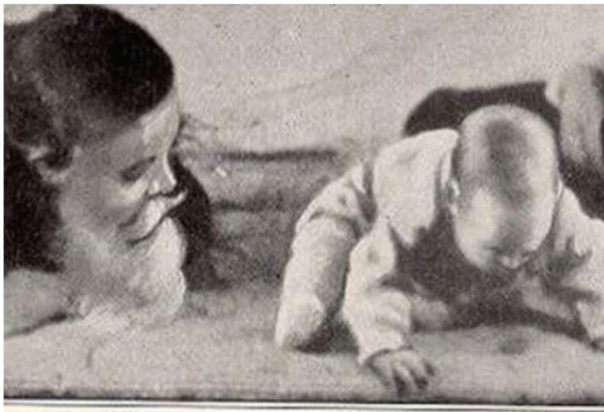


- ❖ He was a German physician and physicist.
- ❖ He was first to articulate the theory of vision and studied depth perception, color vision, motion perception and coined the term psychophysics.
- ❖ Wilhelm Wundt was the student of Helmholtz

Behaviorism: John B. Watson(1878 –1958)



Little Albert experiment



Now he fears even Santa Claus

- ❖ A 9-month old Albert was playing and a white mouse that was in the room.
- ❖ Albert played the mouse and was not afraid of it.

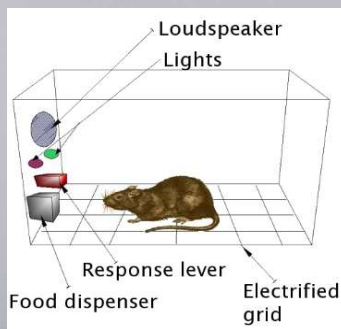
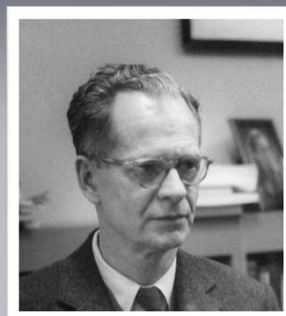
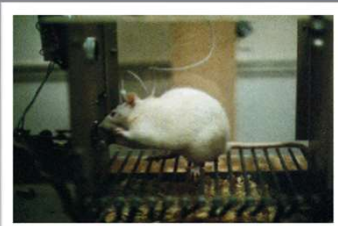
Little Albert experiment

- ❖ However, a loud sound of hammer hitting a pipe was made whenever Albert saw the mouse.
- ❖ After hearing the sound, Albert falls back and cries.
- ❖ This was done several times.
- ❖ Now, whenever Albert sees the mouse, he cries and crawls away even though there is no longer the loud sound.

Little Albert experiment

- ❖ This is known as classical conditioning and how phobia develops to a neutral stimulus.
- ❖ Now he is even afraid of anything with a white fur, such as a white rabbit and even Santa Claus's white beard.
- ❖ This is known as stimulus generalization.

Skinner's learning theory



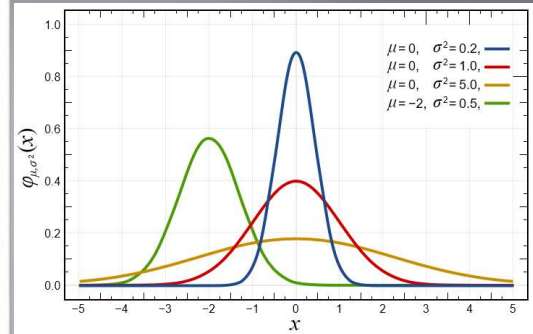
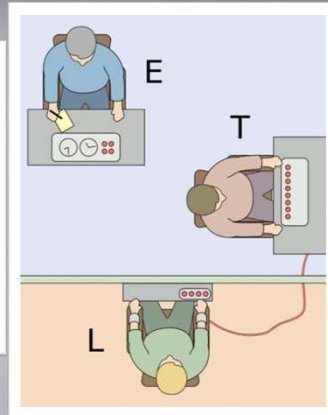
Animal
Behavior



Human
Behavior

Question:
Who provides the
reinforcement and
what is SR?

Psychology and people



Belief and behavior

Nietzsche: God is dead.

God: Nietzsche is dead.

Person A:
I believe in God



Goes to
church/mosque
Gives offering

Person B:
God does not exist



Does not go to
church/mosque
Does not give offering

Treatment and placebo

Experimental
drug

... Reduction ...▶

Depression
40%

Placebo:
Sugar pill

... Reduction ...▶

Depression
20%

Effectiveness of experimental drug:	20%
Effectiveness of placebo:	20%?

Part III

Subjective and objective reality

Physical determinism

1. Determinism

All observable phenomenon has an underlying cause and can be investigated objectively.

2. Elementism

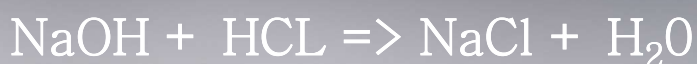
There are basic elementary behaviors that can use used to explain complex behaviors.

3. Homogeneity

People are basically the same.

Physical determinism

4. Complexity is based on simple behavior



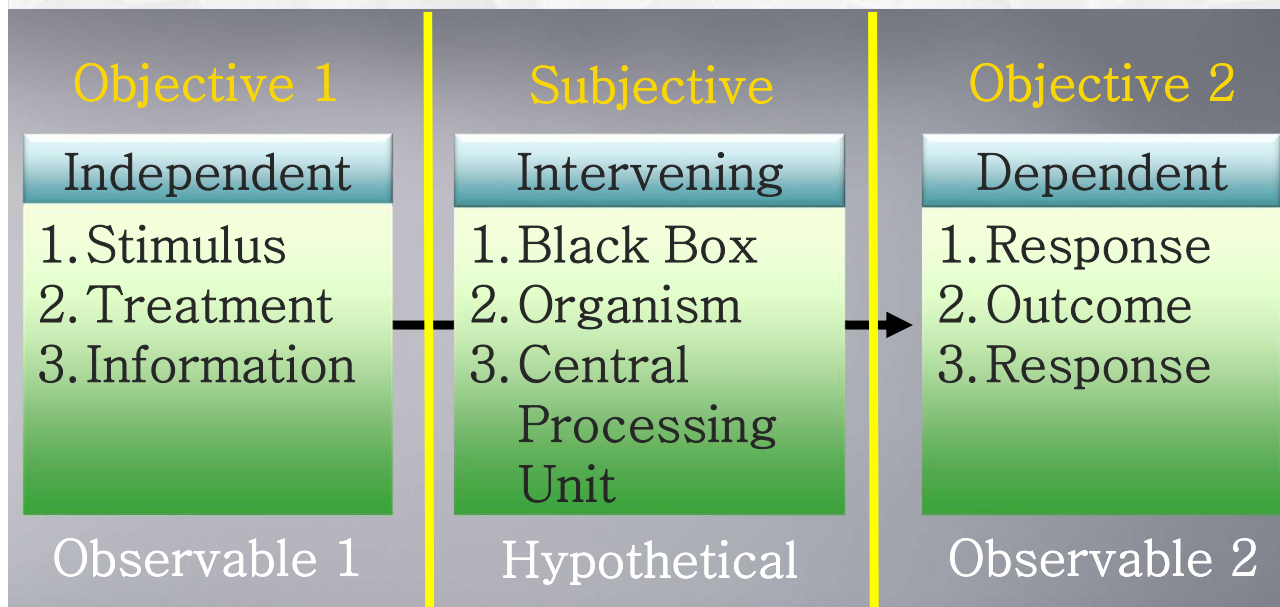
5. Interchangeability

Experiments can be conducted with rats, pigeons, and humans to discover universal laws of behavior.

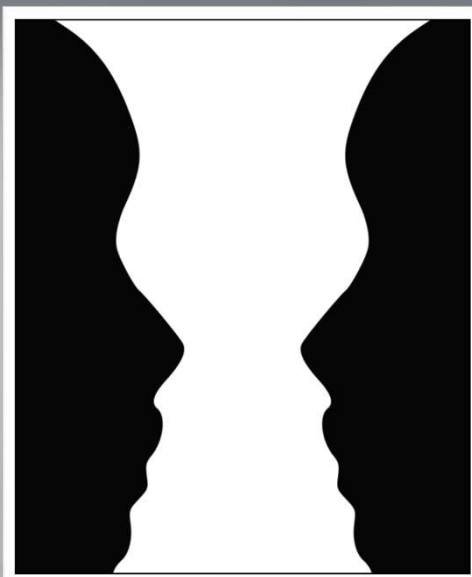
6. Generalization

Results found in laboratory settings can be generalized to the real world.

Traditional approach



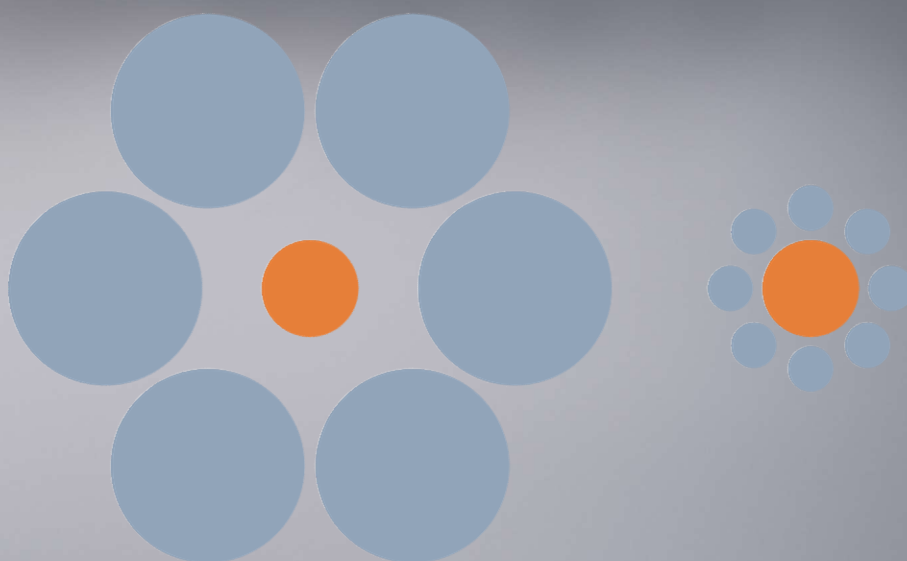
What do you see?



What do you see?



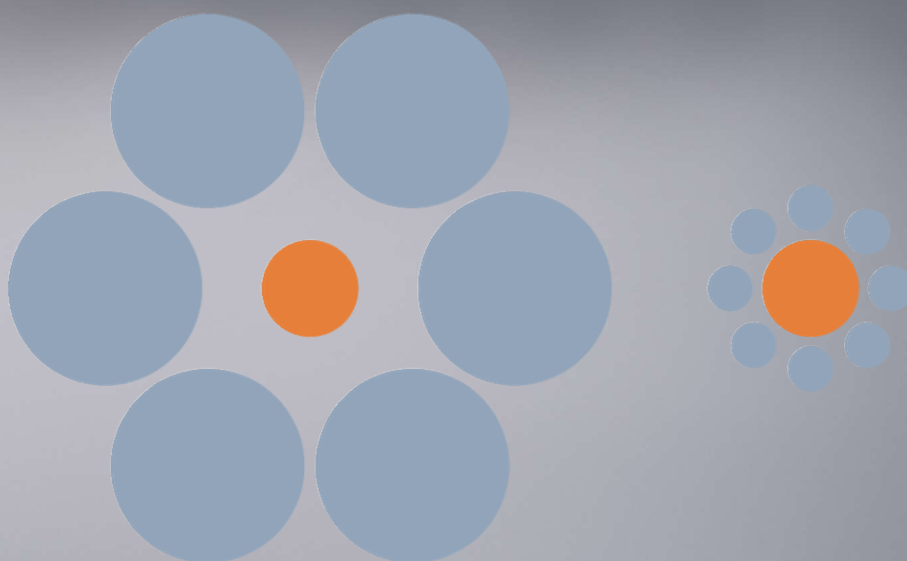
Which solid circle is bigger?



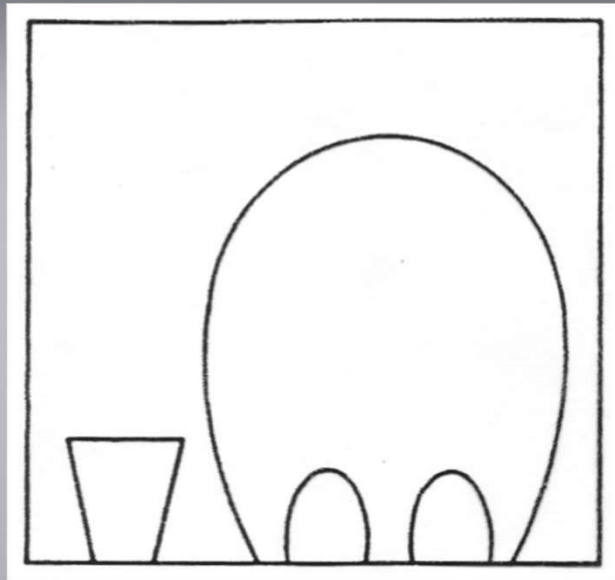
Which solid circle is bigger?



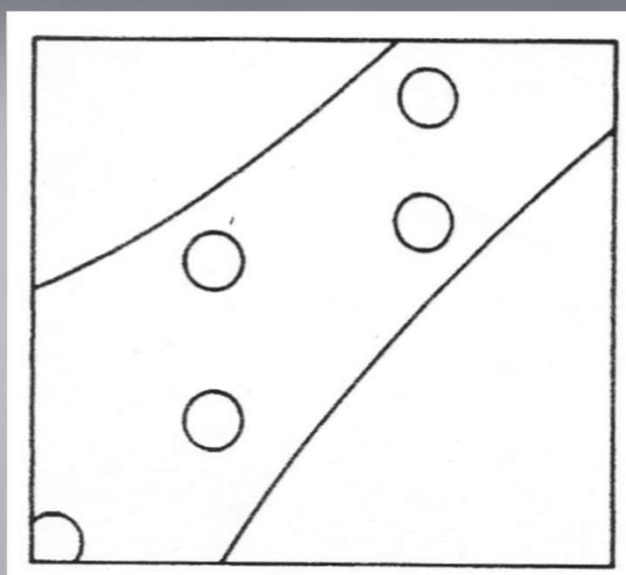
Which solid circle is bigger?



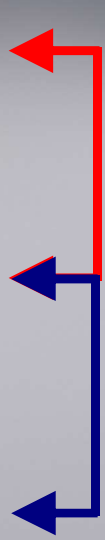
What do you see?



What do you see?



How do describe the cup?



Cup is half empty:

Pessimist



Fill the cup!

Creative
innovators

Cup is half full:

Optimist