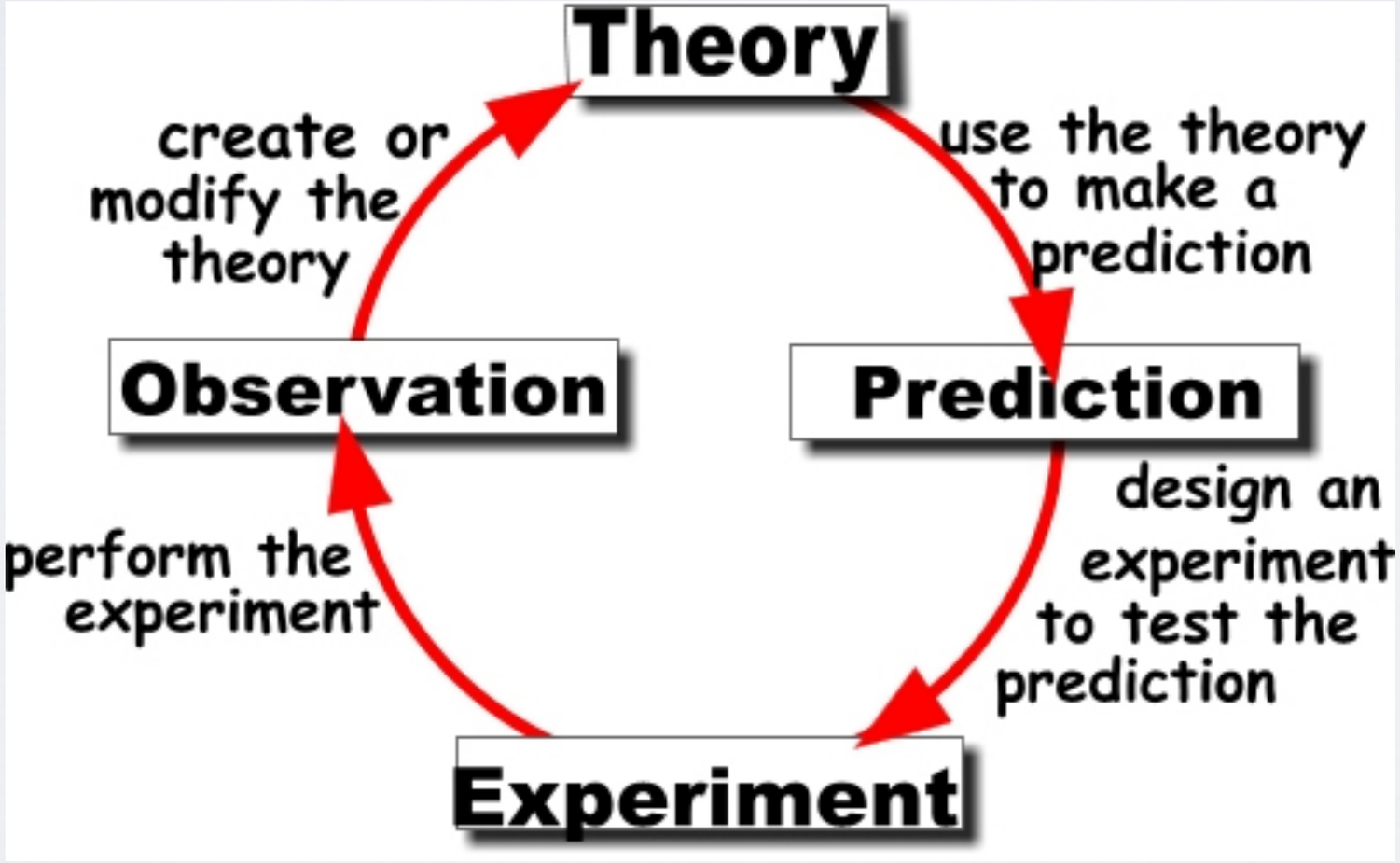
THEORIES OF SCIENTIFIC TRUTH

HZT4U1 - Mr. Wittmann - Unit 4 - Lecture 2



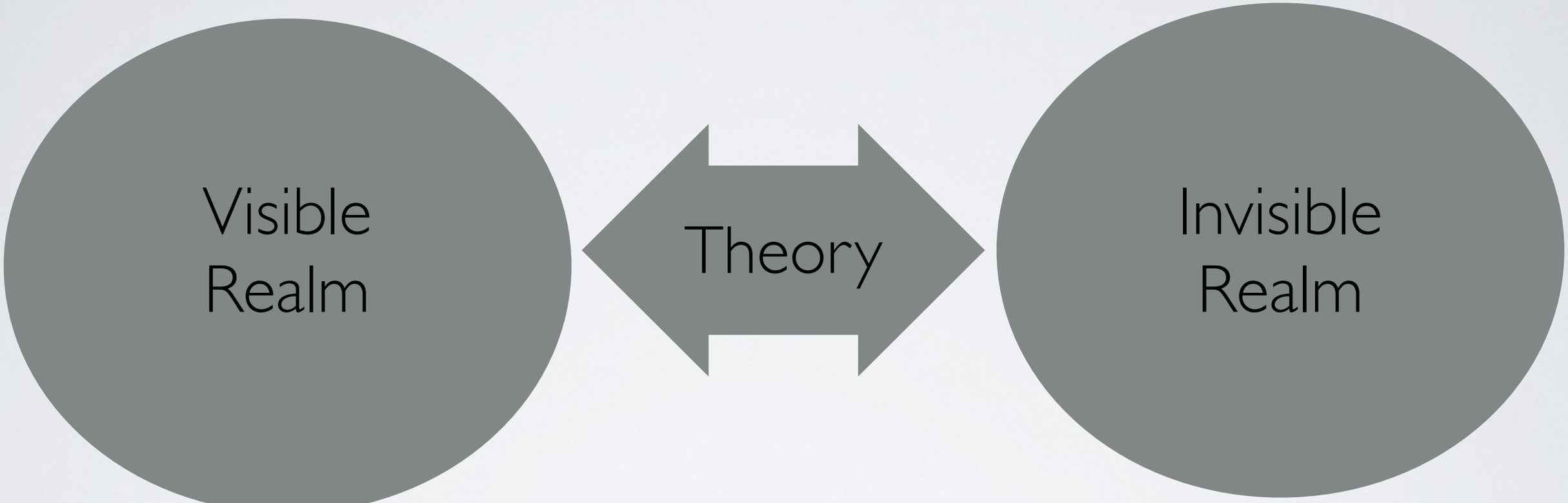
SCIENTIFIC METHOD

- Built up in the same way as any other types of knowledge.

1. sensorial observe things/phenomena
2. compare with similar observations
3. form generalizations (hypotheses)
4. test hypotheses
5. deduce conclusions
6. make connections to other scientific results
7. develop theories
8. form empirical laws

- Scientific theories hypothesize realms of interacting unobservable entities, which affect things in the observable realm, thus bridging the 2 realms.

SCIENTIFIC METHOD (CONTINUED)



THEORIES OF SCIENTIFIC TRUTH

1. Realism

2. Instrumentalism

3. Conceptual Relativism

4. Scientific Reductionism

REALISM

- Thomas Reid (1710-1796)
- Immanuel Kant (1724-1804)
- Related to Correspondence Theory of Truth
- Abstract concepts have a real existence and can be studied empirically.

- Physical world has a reality separate from that of the sense perception of the mind.
- These truths exist independent of our powers of verifying them or manifesting knowledge of them.
  - i.e. lighting because of electromagnetism

REALISM (CONTINUED)

- A theory is true if the entities, properties, and relationships that it describes, correspond to real entities, properties, and relationships in the world.

- Theories are discovered, not invented

- The aim of science is to provide accurate descriptions of the universe.

- Theories allow accurate predictions because they are true.

INSTRUMENTALISM

- John Dewey (1859-1952)
- Related to Pragmatic Theory of Truth
- Scientific theories and laws do not portray actual reality
- They are not to be interpreted as stating truths, or as claiming objective correctness.
- They are merely instruments for the prediction of statements, which can be tested by observation.
    - i.e. electromagnetism just a model, electrons don't actually behave that way

INSTRUMENTALISM (CONTINUED)

- A theory is acceptable if it lets us make accurate predictions about experiments and observations.

- Theories are invented, not discovered.

- The unobservable entities of the theory exist but are not literally true.

- But acting as if they are literally true let us make successful predictions.

CONCEPTUAL RELATIVISM

- Thomas Kuhn (1922-1996)
- Related to Coherence Theory of Truth
- A scientific theory is true if it coheres to the accepted conceptual framework.
- Cohering to the current beliefs, methods, theories and values of the scientific community.
  - i.e. electromagnetism fits with atomic theory

CONCEPTUAL RELATIVISM

(CONTINUED)

- There is no objective reality to which the theory can correspond.
- What we see in reality is based on what we believe.
  - i.e. words on a page are meaningless to an illiterate person.
- Communities of scientists accept research methods, programs, theories, and values that form a "conceptual framework" that is true by definition.
- New findings or beliefs are true if they fit in with the community's conceptual framework.
- Periodical conceptual framework revolutions.
  - i.e. Copernicus' model of the solar system.

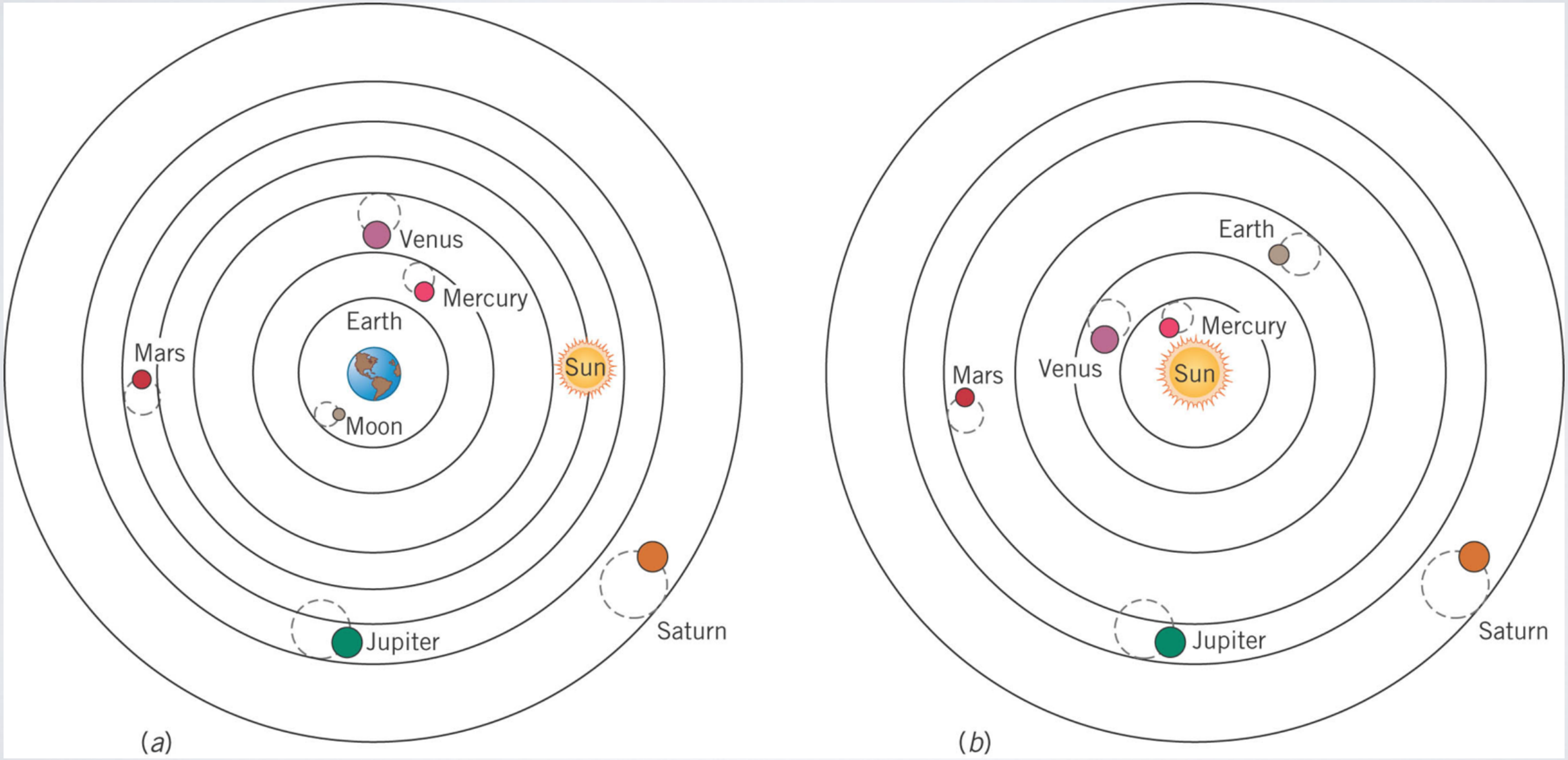
SCIENTIFIC REDUCTIONISM

- Peter Bøgh Andersen (1945-2010)
- Only scientific entities exist, not observable ordinary things and qualities which we experience.
- Secondary qualities (i.e. colour, smell, taste, sound, temperature) are created by the mind, and only the properties, arrangements and interactions of sub-atomic parts are true.
- The human brain is only an incredibly complex physical-chemical system.
- All human thought, emotion, perception, memory, communication, consciousness, behaviour and understanding are due to physical-chemical reactions (interaction of atoms).

FOR EXAMPLE...

Ptolemaic solar system model (c.100)

Copernican solar system model (c.1500)



WHY IS THE COPERNICAN MODEL TRUE?

- **Realist** - Copernicus' theory is true if it is meant to describe the way the universe really is.

- **Instrumentalist** - Copernicus' theory is true if it lets us make accurate predictions about experiments and observations, not because the earth actually revolves around the sun.

- **Conceptual Relativist** - Copernicus' theory is true if it fits in with the beliefs, methods, and other theories of contemporary astronomers, not because the earth actually revolves around the sun.

- **Reductionist** - Only the principles and forces found in Copernicus' theory are true, not the perpetual characteristics of the objects.

THE END