THEORIES OF SCIENTIFIC TRUTH

HZT4U1 - Mr. Wittmann - Unit 4 - Lecture 2

[Diagram showing the cycle of scientific inquiry: Theory -> Observation -> Experiment -> Prediction -> Theory]
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.
Invisible Realm

Visible Realm

Theory

Invisible Realm
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
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
• 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