

## Chapter 3

### Ways of Knowing - Methodology

- Epistemology is the study of the nature and limits of knowledge
- Methodology is the study of the system of values, beliefs, principles and rules that guide the analysis in any given discipline
- Epistemology and Methodology determine the nature of questions asked and the answers given

# Two Sets of Questions

- What do I know?
- How do I know what I think I know?
  
- What do I believe?
- Why do I believe what I believe?

# Terminology

- Facts, Information, Knowledge and Wisdom
  - Facts and Data are things that are said to be true or are known to have happened
  - Information is the recognition of patterns or correlations within a set of facts or data
  - Knowledge is the understanding of the causal relationships within patterns of facts or data
  - Wisdom implies a system of ethics and value judgment about the uses and abuses of knowledge

# More Terminology

- **Hypothesis**
  - A proposition set forth as a possible explanation for a specific relationship of variables in a set of facts or data
- **Theory**
  - A coherent set of general propositions used to explain a pattern or causal relationship in a set of facts
- **Law**
  - A principle based on predictable consequences of an action or choice
- **Model**
  - A simplification of the various relationships among relevant variables and purports to explain or predict

# Bronowski's Three Fundamental Ideas in Science

- Order
  - A recognition of order or patterns within a set of events or phenomena is fundamental to science
- Causes
  - A recognition that one event or fact is caused by or causes another event. Correlation and causation are not the same thing.
- Chance
  - Relationships between facts is not deterministic, probability or chance must be considered.

# Goals or Objectives of Science

- **Explanation**

- This is the ability to describe the causal relationships between related phenomena

- **Prediction**

- To characterize or describe future events on the basis of currently known information

Symmetry Thesis – Explanation and prediction are not symmetrical

- **Story Telling**

- Values and beliefs may be created and transmitted by the “stories” or theories we use to describe events

# Logic

- **Deductive reasoning**
  - Syllogistic or deductive reasoning is the process of reasoning from general principles or premises to conclusions about specific phenomena; reasoning from general principles to specific cases
- **Inductive reasoning**
  - Empirical or inductive reasoning is the process of inferring general information from observations of specific phenomena; reasoning from specific cases to general principles
- **Abductive reasoning – Hypothesis formation**

# Joel Mokyr's Taxonomy of Knowledge

- Propositional Knowledge ( $\Omega$ )
  - Public knowledge or "discovery, the unearthing of a fact or natural law that existed all along but was unknown.
  - Observation, classification and cataloguing of natural phenomena
  - Establishment of regularities, principles and natural laws
- Prescriptive Knowledge ( $\lambda$ )
  - Knowledge about how to do something; it is technique or instructional knowledge, it consists of "sets of executable instructions or recipes for how to manipulate nature."

## Karl Popper (1902-1994)

- Reaction against Logical Positivism
- Formalizes falsification as a method of science
  - Hypothesis about causation
  - Try to disprove hypothesis
  - If you cannot disprove hypothesis, it is accepted as "**probably true**"
  - Type I error – "true" hypothesis is rejected
  - Type II error – false hypothesis is not rejected

## Thomas Kuhn (1922-1996)

- Truth by consensus
- A paradigm is a set of scientific and metaphysical beliefs that make up a theoretical system that provides the questions and a set of tools to test, evaluate and revise the beliefs (concepts of exemplars, disciplinary matrix)
- Normal science is devoted asking questions consistent with the paradigm and resolving anomalies using the accepted tools
- As more and more anomalies occur, the paradigm comes in to question. If the anomalies cannot be resolved, a new paradigm emerges in the form of a "scientific revolution"

## Imre Lakatos (1922-1974)

- Divides a science into “Scientific Research Programmes” (SRP)
  - A hard core protective belt of ideas and beliefs which are not questioned
  - Positive heuristic which is the body of theories and tools used for analysis
  - Falsify the SRP; Broader than Popper falsifying a hypothesis, more narrow than Kuhn falsifying a paradigm
- Paul Feyerabend’s (1924-94) concerns about the ideology of science and its effects

## Milton Friedman (1912- )

- Positive economics – a description of “what is”
- Normative economics – a description of “what ought to be”
- Economic should be a set of substantive hypotheses (that can be tested)
- One criteria to judge theory is its predictive capability – “fruitfulness”
- Second criteria is the simplicity of the theory

## Deirdre McCloskey (1942 - )

- Economic Method is rhetoric
- Probe what we believe and why
- Art of discovering good reasons
- Rhetoric
  - Fact
  - Logic
  - Metaphor
  - Story

# Method

- No universal standard that is accepted
- Need to recognize that method is influenced by ideology and guides our analysis and beliefs
- Modern Methods
  - Modernism
  - Reductionism