

Research Methodology

source: Best and Kahn (2006) and Litosseliti (2010)

- Human beings are the unique product of their own creation and evolution.
- In contrast to other forms of animal life, their highly developed neural system has enabled them to develop sounds and symbols that make the communication possible.
- It is understandable that their greater curiosity, implemented by their control of symbols, would lead people to speculate about the operation of the universe, the great forces beyond their own control.
- Over many centuries people began to develop what seemed to be almost impossible.
- Attributing the forces of nature to the working of supernatural powers, they believed that the gods manipulated the sun, stars, wind, rain, and lightning at their whim.

- The appearance of the medicine led to the establishment of a system of religious authority passed on from one generation to another.
- The priest claimed special channels of communication with the gods, and the authority of the priesthood, became firmly rooted, retarding further search for truth for centuries.
- But gradually people began to see that the operations of the forces of nature were not as unpredictable as they had been led to believe.
- They began to observe an orderliness in the universe and certain cause-and-effect relationships.
- They also discovered that under certain conditions events could be predicted with reasonable accuracy.
- However, these explanations were often rejected if they seemed to conflict with the dogma of religious authority.
- Curious persons who raised questions were often punished and even put to death when they persisted in expressing doubts suggested by such unorthodox explanations of natural phenomena.

- This reliance on empirical evidence or personal experience challenged the sanction of vested authority and represented an important step in the direction of scientific inquiry.
- Such pragmatic observation, however, was largely unsystematic and further limited by the lack of an objective method.
- Observers were likely to overgeneralize on the basis of incomplete experience or evidence.
- They sometimes also ignored complex factors operating simultaneously and let their feelings and prejudices influence both their observations and their conclusions.
- It was only when people began to think systematically about thinking itself that the era of logic began.
- The first systematic approach to reasoning was the deductive method and this is attributed to Aristotle and the Greeks.
- The categorical syllogism(i.e. a deductive reasoning in which the conclusion is derived from two premises) was one model of thinking that prevailed among early philosophers .

- Syllogistic reasoning established a logical relationship between a *major premise*, a *minor premise*, and a *conclusion*.
- *A major premise is a self-evident assumption, previously established by metaphysical truth or dogma.*
- *A minor premise is a particular case related to the major premise.*
- Given the logical relationship of these premises, the conclusion is inescapable.
- A typical Aristotelian categorical syllogism follows:
- Major Premise: All men are mortal.
- Minor Premise: Socrates is a man.
- Conclusion: Socrates is mortal.
- This deductive method, moving from the general assumption to the specific application, made an important contribution to the development of modern problem solving methodology.
- But it was not fruitful in arriving at new truths. The acceptance of incomplete or false major premises that were based on old dogmas or unreliable authority could only lead to error.

- Centuries later Francis Bacon advocated direct observation of phenomena, arriving at generalizations through the evidence of many individual observations.
- This inductive process of moving from specific observations to the generalization helped the logic to be free from some of the hazards and limitations of deductive thinking.
- Bacon recognized the obstacle that the deductive process placed in the way of discovering new truth.
- It started with old dogmas that religious or intellectual authorities had already accepted and thus could be expected to arrive at some new truths.
- These impediments to the discovery of truth, which he termed "idols," were exposed in his *Novum Organum*, written in 1620.

- The method of inductive reasoning proposed by Bacon, a method new to the field of logic but widely used by the scientists of his time, was not hampered by false premises or by the inadequacies and ambiguities of verbal symbolism or even by the absence of supporting evidence.
- But the inductive method alone did not provide a completely satisfactory system for the solution of problems.
- Random collection of individual observations without a unifying concept or focus often obscured investigations and therefore rarely led to a generalization or theorization.
- Also, the same set of observations can lead to different conclusions and support different, even opposing, theories.
- Therefore, there was a need of the time to somehow blend the two of these approaches and thus bring something like a 'Buddha path'.
- And it was Charles Darwin in 19th century who tried to integrate the deductive method of Aristotle and the inductive method of Bacon in his method.

- During his early career his observations of animal life failed to lead to a satisfactory theory of man's development.
- The concept of the struggle for existence in Thomas Malthus's *Essay on Population* intrigued Darwin and suggested the assumption that natural selection explains the origin of different species of animals.
- This hypothesis provided a needed focus for his investigations. He proceeded to deduce specific consequences suggested by the hypothesis.
- The evidence he gathered confirmed the hypothesis that biological change in the process of natural selection, in which favorable variations were preserved and unfavorable ones destroyed, resulted in the formation of new species.
- The major premise of the older deductive method was gradually replaced by an assumption, or *hypothesis*, that was subsequently tested by the collection and logical analysis of data.
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- John Dewey (1938) suggested a pattern that is helpful in identifying the elements of a deductive-inductive process:
- *A Method of Science*
- 1. Identification and definition of the problem
- 2. Formulation of a hypothesis-an idea as to a probable solution to the problem, an intelligent guess or hunch
- 3. Collection, organization, and analysis of data
- 4. Formulation of conclusions
- 5. Verification, rejection, or modification of the hypothesis by the test of its consequences in a specific situation
- Although this pattern is a useful reconstruction of some methods of scientific inquiry, it is not to be considered the *only* scientific method.

There are many ways of applying logic and observation to problem solving.

The planning of a study may include a great deal of exploratory activity, which is frequently intuitive or speculative and at times a bit disorderly.

Although researchers must eventually identify a precise and significant problem, their objective for the object that is selected for study may initially be vague and poorly defined.

They may observe situations that seem to suggest certain possible cause-and-effect relationships and even gather some preliminary data to examine for possible relevancy to their vaguely conceived problem.

Thus, lots of research work begin with the inductive method.

This is why many research students rightly feel that the identification of the problem itself is one of the most difficult and most crucial steps of the research process.

- Sometimes, researchers are interested in complex problems, and a full investigation of such problem requires a series of studies.
- This approach is known as *programmatic research* and usually combines the inductive and deductive methods in a continuously alternating pattern.
- The researcher may begin with a number of observations from which a hypothesis is derived (inductive reasoning).
- Then the researcher proceeds deductively to determine the consequences that are to be expected if the hypothesis is true.
- After this , the data will be collected through the inductive method to verify, reject, or modify the hypothesis.
- After that, based on the findings of this study, the researcher goes on to formulate more hypotheses to further investigate the complex problem under study.
- Thus, the researcher is continually moving back and forth between the inductive method of observation and data collection and the deductive method of hypothesizing the anticipated consequences to events.

Inductive VS deductive

These two methods of reasoning have a very different "feel" to them when you're conducting research.

Inductive reasoning, by its very nature, is more open-ended and exploratory, especially at the beginning.

Deductive reasoning is more narrow in nature and is concerned with testing or confirming a predefined and determined hypotheses.

Even though a particular study may look like that it is purely deductive (e.g., an experiment designed to test the hypothesized effects of some treatment on some outcome), most social researches and researchers involve both inductive and deductive reasoning processes at some time in doing the research.

However, let us make a clear distinction here and see how these notions work in carrying out the research in social sciences.

Deductive reasoning works from the more general to the more specific.

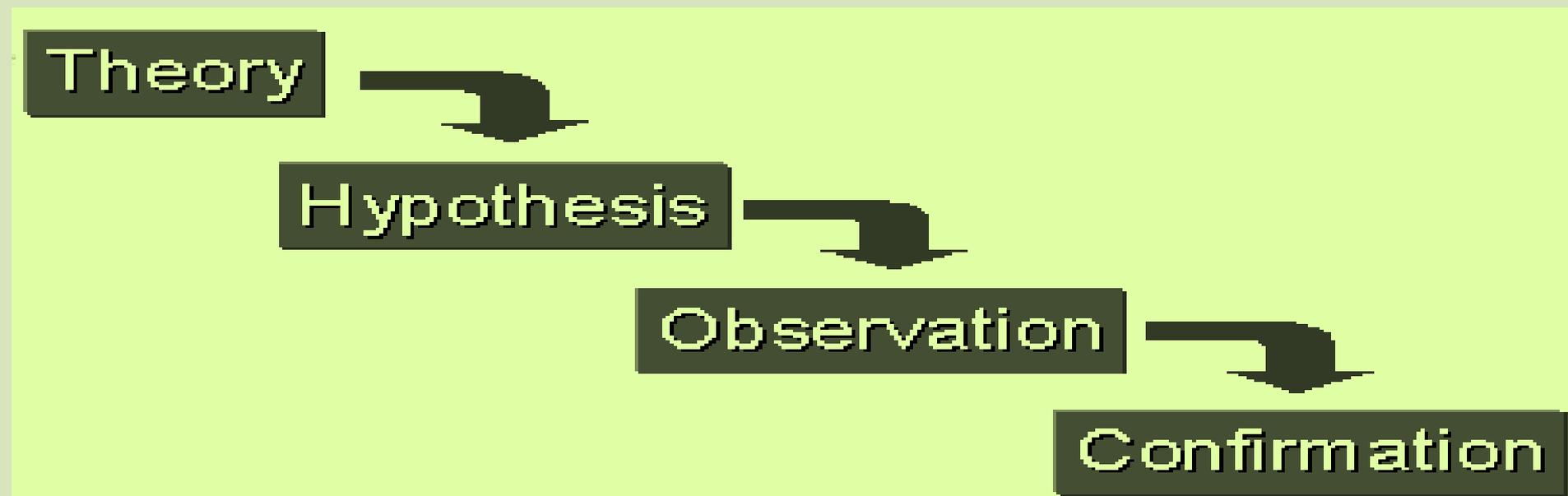
Sometimes this is informally called a "top-down" approach.

We might begin with thinking up a *theory* about our topic of interest.

We then narrow that down into more specific *hypotheses* that we can test.

We narrow down even further when we collect *observations* to address the hypotheses.

This ultimately leads us to be able to test the hypotheses with specific data -- a *confirmation* (or not) of our original theories.



Inductive reasoning works the other way round, i.e. moving from specific observations to broader generalizations and theories.

Informally, we sometimes call this a "bottom up" approach (please note that it's "bottom up" and *not* "bottoms up")

In inductive reasoning, we begin with specific observations and measures.

And then move over to detect patterns and regularities, formulate some tentative hypotheses that we can explore, and finally end up developing some general conclusions or theories.

