Thinking Like a Researcher

to be continued…

Thinking Like a Researcher

Research involves constantly moving back and forth from an empirical plane where observations are conducted to a theoretical plane where these observations are abstracted into generalizable laws and theories.

This is a skill that takes many years to develop, is not something that is taught in graduate or doctoral programs or acquired in industry training.

Thinking Like a Researcher (unit of analysis)

One of the first decisions is the unit of analysis of a scientific study.

The **unit of analysis** refers to the person, collective, or object that is the target of the investigation.

Typical unit of analysis include individuals, groups, organizations, countries, technologies, objects, and such.

Thinking Like a Researcher (Concepts, Constructs and Variables)

although research can be exploratory, descriptive, or explanatory, most scientific research tend to be of the explanatory type in that they search for potential explanations of observed natural or social phenomena.

Explanations require development of **concepts** or generalizable properties or characteristics associated with objects, events, or people.
A **construct** is an abstract concept that is specifically chosen (or "created") to explain a given phenomenon.
A **variable** is a measurable representation of an abstract construct.

Thinking Like a Researcher (Propositions and Hypotheses)

A **proposition** is a tentative and conjectural relationship between constructs.
An example of a proposition is: “An increase in student intelligence causes an increase in their academic achievement.”
This declarative statement does not have to be true, but must be empirically testable using data, so that we can judge whether it is true or false.

Since IQ scores and grade point average are operational measures of intelligence and academic achievement respectively, the above proposition can be specified in form of the **hypothesis**: “An increase in students’ IQ score causes an increase in their grade point average.”

Thinking Like a Researcher (Propositions and Hypotheses)

Propositions are specified in the theoretical plane, while **hypotheses** are specified in the empirical plane.
Hence, hypotheses are empirically testable using observed data, and may be rejected if not supported by empirical observations. The goal of hypothesis testing is to infer whether the corresponding proposition is valid.

Thinking Like a Researcher (Theory and Models)

A **theory** is a set of systematically interrelated constructs and propositions intended to explain and predict a phenomenon or behavior of interest. Essentially, a theory is a systemic collection of related theoretical propositions.
While propositions generally connect two or three constructs, theories represent a *system* of multiple constructs and propositions.

A **model** is a representation of all or part of a system that is constructed to study that system (e.g., how the system works or what triggers the system). While a theory tries to explain a phenomenon, a model tries to represent a phenomenon.

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