

# What Is Scientific Research?

POST 8000 – Foundations of Social Science Research for Public Policy

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## Goal for Today

*Discuss what we mean by “science” and how we can relate it to policy analyses.*

# What Is Science?

Science is a *method*, not a discipline.

- Informally: test assumptions against observable evidence in a systematic manner.
- Each step is made explicit.

Other components:

- Scientific method is ultimately value-neutral.
- It seeks generalizations, not to explain specific observations.

For shorthand, we call this the empirical implications of theoretical models (EITM) or hypothetico-deductivism.

*The method of the book, then, is to develop the deductive implications of the four basic axioms for a given, highly specific set of conditions; review evidence indicating whether or not these implications are empirically correct; and present new evidence as necessary and possible to resolve outstanding empirical questions (Zaller 1992, 51).*

# Hypothetico-Deductivism (H-D)

Kyburg (1988, 65) outlined the H-D model.

- A hypothesis  $H$  is set up for testing or examination.
- We deduce an observation sentence  $O$  from  $H$  and its necessary qualifiers, boundary conditions, etc.
- We test  $H$  with an experiment or examination and observe either  $O$  or  $\sim O$ .

If  $\sim O$ , then  $\sim H$ . If  $O$ , we fail to refute  $H$ .

# Hypothetico-Deductivism (H-D)

Replace  $H$  with theory  $T$  and we have the standard political science model (Hausman 1992, 304).

1. *Formulate* some hypothesis  $H$  from theory  $T$ .
2. *Deduce* prediction  $P$  from  $H$  with necessary qualifiers (e.g. "ceteris paribus").
3. *Test*  $P$ .
4. *Judge* whether  $H$  is confirmed or disconfirmed, contingent on  $P$  or  $\sim P$ .

# Empirical Implications of Theoretical Models (EITM)

EITM is shorthand for this approach, and a push across political science.

1. Start with theory, informed by case study, field work, or “puzzle”.
2. Outline model establishing causal linkages.
3. Stipulate deductions and hypotheses.
4. Outline measurement and research design to test deductions.
5. Collect and analyze data.

The results are inductively compared to the theory and its hypotheses.

## KKV (1994)

KKV fit well within this paradigm:

1. *The goal is inference.*
2. Procedures are public/transparent (more on this later in the semester).
3. The conclusions are uncertain.
4. *The content is the method.*

In many ways, KKV describe a “pre-statistical” (c.f. McKeown, 1999) approach to inference.



## Some Limitations, Discussion

1. What is a “theory?” How do you write one?
2. How do you evaluate a theory?
3. Must scientific research be statistical?
4. Are theories “tested with data?”

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H-D and EITM