

Introduction to Formal Modeling

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Outline

- The purpose of modeling
- Structure
- Relevance
- Controversy
- Elements of Logic

681 Fundamentals

- What is 681?
 - Literature reviews? NO
 - Skill transfer? YES
- Why is it important?
 - \exists real problems. Greater precision can yield social value.
- What we hope to accomplish.
 - Clarify the value and challenges of methodologically integrated research.
 - Help you conduct more effective research.

Philosophy

- Science contributes to society by simplifying complex phenomena.
 - Its value increases with the value of the simplification.
- Interesting topics are insufficient.
 - You must be able to lead people from where they are to a better conclusion.

Your research design problem

- Where are they?
 - Who is your target audience?
 - What factual premises/truth claims will they accept.
- Where do they want to be?
 - Which alternate conclusion will benefit them?
 - What burden of proof and standard of evidence do they impose?

Definitions

- Theory
- Formal theory
- Rationality
- Rational Choice Theory
- Game Theory
 - Cooperative
 - Non-Cooperative

The Basic Research Design Problem

- N problems = ∞ .
- For any problem, N theories = ∞ .
- For any theory, N models = ∞ .
- For any problem, the number of empirical specifications = ∞ .

What will you choose?

- All political scientists make assumptions about:
 - Players, Actions, Strategies, Information, Beliefs, Outcomes, Payoffs, and
 - Method of inference (e.g., “I know it when I see it,” path dependence, Nash Equilibrium, logit plus LLN).
- Some state their assumptions more precisely than others.
- Conclusions depend on assumptions.

Arguments

- The currency of scientific communication.
- The components of an argument are:
 - The Conclusion
 - The Premises
- Value comes from explaining as much as possible with as little as possible.

Introduction to Logic

- Premise
- Conclusion
- Logical Validity
 - Deductive
 - Inductive
 - Invalid
- Soundness

Paper/Presentation Format

- M. Motivation
- NH. Null Hypotheses
- P. Premises
 - KEY. What choices did they make?
 - Would you make the same ones?
- C. Conclusions