# Science, Scientific Discovery, and Statistics

## Seminar 5: Introduction to Research Design (Informal)

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# Today: Mini-lecture + two seminar tasks

**Big Questions:**

- What counts as science, what "laws" mean, and why ontology/epistemology matters
- How we think about scientific facts, propositions, and hypotheses
- What processes, complex and simple, govern the natural, social, and political worlds

**Activities:**

- **Activity 1:** Ontology and epistemology in political science
- **Activity 2:** Research design (inductive vs deductive) + observational statements

**Readings focus:**

- Chalmers: laws, regularities, causation, and why discussion of "laws" is philosophically tricky
- Cohen: why American vs British IPE diverge and why ontology & epistemology matter in IR

# Science as inquiry: Explanation, evidence, and laws

## A working idea

Science aims to build **warranted** explanations of the world: not just descriptions, but accounts of **why** patterns hold and **when** they break.

- A common picture: the world is governed by natural **laws** and science discovers them
- But: "law" comes from the social realm (rules can be obeyed/violated by people, institutions or states). What does it mean for nature to be orderly, containing objects?
  - Are "laws", rules, and natural or social order really "out there"?

# Ontology & epistemology as research choices

Explanation is not only "pattern finding" but **theory-laden** modeling of causal structure

## Key distinction

- **Ontology:** what exists; what the basic units are; how they relate
- **Epistemology:** what counts as knowledge; how claims are justified

- Ontology shapes what you treat as a "thing" (states? classes? norms? institutions?)
- Epistemology shapes what you treat as "good evidence" (measurement, interpretation, inference standards)
- In combination they determine **what questions are answerable** and **what counts as a good answer**

# From social ontology to scientific knowledge in IR & IPE

## Core concept

In IR/IPE, **what the social world is** (social ontology) constrains **how we can know it** (epistemology), and therefore which methods yield credible explanations.

### Social ontology in practice

- **Agents** (states, firms, groups) vs **structures** (markets, institutions, capitalism)
- **Events** vs **mechanisms**: war onset as a data point vs processes producing it

### Epistemic consequences

- If social phenomena are **theory-laden** (dependent on conceptual norms), all evidence is partly interpretive
- If unobservables matter (power, legitimacy), we must rely on **theory-guided measurement** where all statements are constructions derived from the conventions of the field of study itself

# Cohen: Why American and British IPE differ

**American school**

- IPE as subset of IR/public policy
- Aim: Explanation and problem-solving within existing structures; development of an architecture of formal models
- Epistemology: positivism/empiricism; hypothesis testing; cumulation

**British school**

- State as one actor among many; deals with broader social/ethical issues
- Aim: Judgement and critique - the progression of theory development and knowledge accumulation
- Epistemology: interpretive, historical, institutional; openly normative

## Why it matters for research design

Different "schools" can disagree on construction of methods: what exists, what matters, and what a good explanation looks like.

# Task 1: Ontology and Epistemology in political science

**Discuss (in groups):**

1. Are the concepts of ontology and epistemology useful to understand knowledge universally? Why or why not?
2. Are the concepts of ontology and epistemology useful to understand politics and international relations? Why or why not?
3. What can we know and not know about the political sphere?

**Output:** Be ready to share **one claim** your group agrees on, and **one point of disagreement or uncertainty**.

# From philosophy to method: What changes when assumptions change?

- If you think social reality is **lawlike regularities**: prioritize prediction + generalization
- If you think social reality is **mechanisms + context**: prioritize process, scope conditions, types of evidence
- If you think social reality is **interpretive/meaning-laden**: prioritize understanding, critique, and reflexive measurement of ideas/ideology

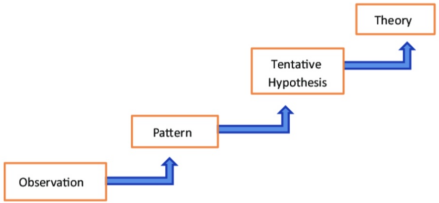
## Transition

Next: research design as a practical translation of these commitments into an inference strategy.

# Research Design: Induction and Deduction

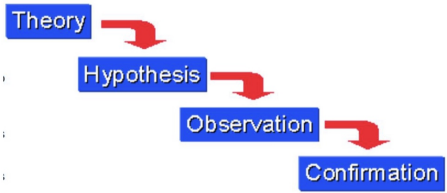
**Inductive reasoning**

- Begin by observing individual phenomenon
- After observing large samples, construct hypotheses about patterns
- Infer and test systematic patterns




**Deductive reasoning**

- Begin with general principles/logic
- Formulate hypotheses about particular phenomena
- Collect relevant data and test the theory



# Task 2: Research design (inductive/deductive) & observational statements

**Choose one question:**

- Is climate change associated with the onset of armed conflict?
- Does exposure to other ethnic groups moderate exclusionary perspectives?

**Discuss:**

- Could we answer this using **deductive** or **inductive** reasoning?
- What types of information would we need?
- Can this information be directly observed via the senses?
- If not, how can we create **observational statements**?
- Are these observational statements:
  - subjective or objective?
  - accurately measurable?

# End of Seminar 5

- Seminar takeaway: ideas about **laws, causation, and explanation** shape what we treat as evidence and how we interpret that evidence
- Activity takeaway: good research design makes your **ontology/epistemology explicit** and links them to an **inference strategy**

Questions?