

The Scientific Study of War

POSC 3610 – International Conflict

Steven V. Miller

Department of Political Science



Goal for Today

Discuss what we mean by “science” and how we can relate it to the study of war.

What Is Science?

It's easy to misuse the term "science", including shorthand for:

- Things that seem cool but we don't understand
- TED talks that are almost always bad
- An acquired repository of "facts"
- Technology
- An umbrella term for STEM stuff (i.e. "the hard sciences")
- Whatever it is that Neil Degrasse Tyson talks about.

Science is ultimately none of that.

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.

What Causes War?

Here is an example puzzle: war is costly and ex post inefficient. Why do states fight it?

- Intuition: wars happen because states cannot commit to pre-war solution.
- Further intuition: democracies, *can* credibly commit and thus avoid war.
- Deduction/hypothesis: if both sides in a dispute are a democracy, they will not fight a war.
- Research design: all dyadic (i.e. A vs. B) disputes.
 - Dependent variable: did dispute escalate to war (yes or no)
 - Independent variable: were both sides democratic (yes or no)
- Collect and analyze data: hello, regression...

Elements of Scientific Theories

At the risk of spoiling a methods class, some terms to clarify:

- *Dependent variable* (DV): something we want to explain
- *Independent variable*: something we believe explains variation in the DV.
- *Conceptual definition*: outlining what a term we use is.
 - Spoiler alert: *all* political science is conceptual (e.g. “democracy”, “war”, “allied”, “power”, “security”)
- *Operational definition*: an actual implementation of the conceptual definition

An Illustration of an Operational Definition

Democratic peace theorists argue “democracies” are more peaceful than other state types.

- Simple enough, but how do you measure it?

The Polity Project

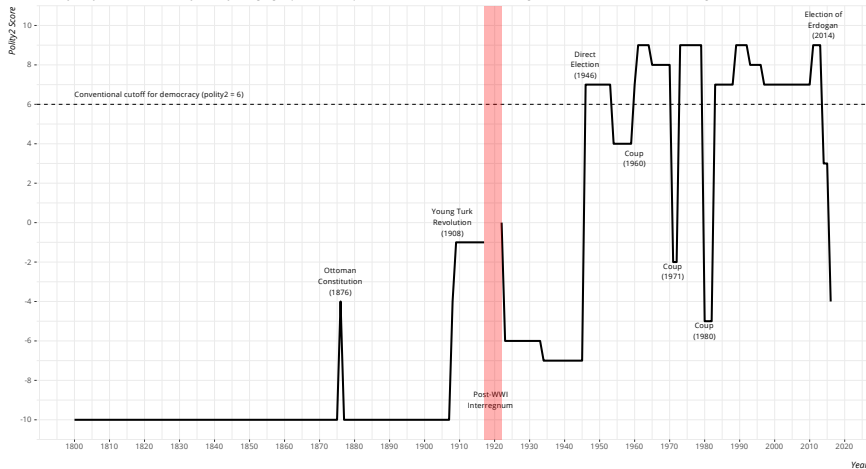
The Polity project is the longest-running data set on democracy, measuring “democracy” as:

- Competitiveness of executive recruitment
- Openness of executive recruitment
- Constraints on chief executive
- Competitiveness of political participation

This creates a 21-point scale [-10, 10] of “democracy” largely as measure of executive constraints.

A History of Turkish Democracy in the Polity Data, 1800-2016

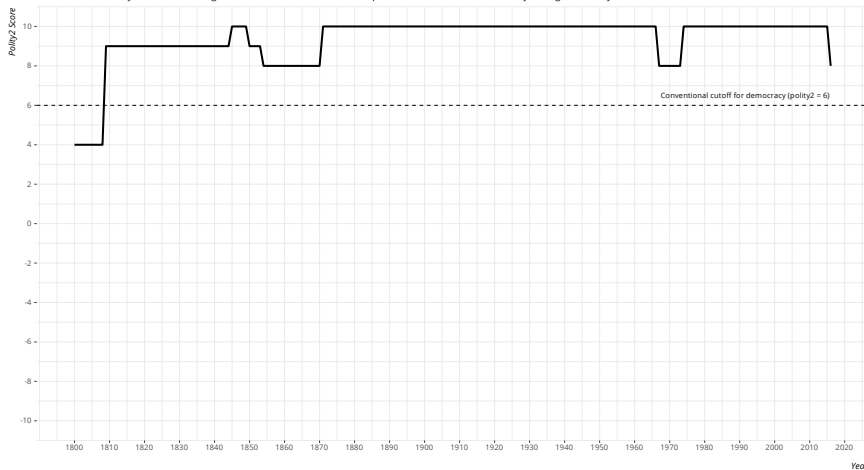
The trajectory of Turkish democracy is always fledgling, replete with coups, and is in a current state of clear regression to authoritarianism under Erdogan.



Data: Polity Project, Center for Systemic Peace (v. 2016)

A History of U.S. Democracy in the Polity Data, 1800-2016

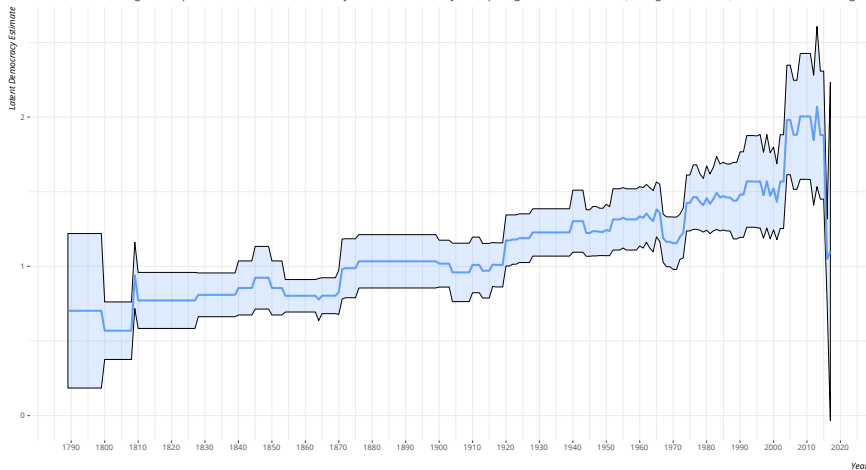
The U.S. as maximally democratic through the duration of the data belies important variation in U.S. democracy through its history.



Data: Polity Project, Center for Systemic Peace (v. 2016)

A History of American Democracy, 1789-2017

The estimates from the graded response model tell a more faithful story of American democracy that capture gradual enfranchisement, civil rights movements, and the current backsliding.



Data: QuickUDS (via Xavier Marquez, c.f. Pemstein et al. [2010])

An Illustration of an Operational Definition

Stam (1996) argues “military quality” explains why one side wins a war.

- Simple enough, but how do you measure it?

How about the overall size of the military?

Table 1: Largest Militaries (in Thousands) in the World (Data: CoW-NMC, 2012)

Country	Year	Military Personnel
China	2012	2285
United States	2012	1569
India	2012	1325
North Korea	2012	1190
Russia	2012	956
South Korea	2012	655
Pakistan	2012	642
Iran	2012	523
Turkey	2012	511
Vietnam	2012	482

Does this look right?

Stam's Argument

Body count doesn't get at "quality."

- If it did, we would've expected Iraq to hang w/ the U.S. much better than it did in 1990.

Operationalization of "military quality": military spending divided over military personnel.

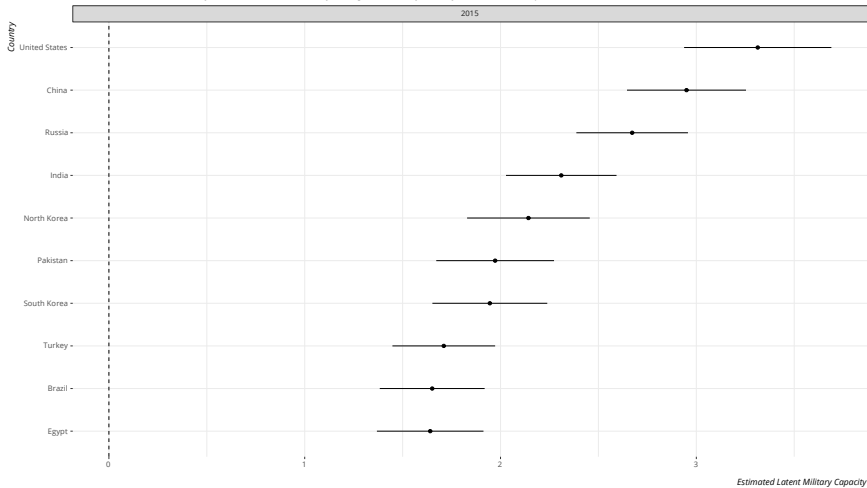
Table 2: Highest Troop Qualities in the World (Data: CoW-NMC, 2012)

Country	Year	Military Quality
Australia	2012	495947.4
United States	2012	417710.6
United Kingdom	2012	352149.4
Sweden	2012	301100.0
Norway	2012	297625.0
Kuwait	2012	297562.5
Netherlands	2012	280432.4
Canada	2012	279469.7
Luxembourg	2012	267000.0
Saudi Arabia	2012	242410.3

This isn't perfect. So how about this:

Steve's Toy Measure of Latent Military Capability

There's a fair bit of face validity here: the U.S. is discernibly stronger than every country in the world except China.



If You're Curious About What I Did...

It's an item response model of:

- size of defense budget
- size of population
- size of active personnel
- size of reserve personnel
- size of active army personnel
- size of active navy personnel
- size of active air force personnel
- size of active paramilitary/irregulars
- number of tanks, recon equipment, armored fighting vehicles, artillery
- number of subs, principal surface combatants, amphibious equipment
- number of combat-capable aircraft
- number of military satellites in space
- number of nukes (FAS)

Reliability and Validity

This highlights the issue of reliability and validity in measurements.

- *Reliability*: does measure consistently capture what we want it to capture?
- *Validity*: does measure “capture” the concept in question without picking up unintended characteristics?

Deduction and Induction

Science is fundamentally *deductive* rather than *inductive*.

- Major emphasis: nothing can be learned from a confirming instance.
- Requires the future to be exactly like the past.
- The logic is also circular: induction is used to justify induction.

This does lead to something dissatisfying about the scientific method.

- We can't prove our theories *true*.
- At the most, we say our findings are consistent with the theory.

Criteria for a Good Theory

How to evaluate theories:

- Logical consistency
- Accuracy of predictions

Another dissatisfying component here:

- “All models are wrong; some are useful.”

Conclusion

Science is a method that we'll use to study what causes war. Some caveats:

- We seek to generalize, not explain specific events.
- This will involve a lot of regression. Get comfortable with it.
- Predictions are “consistent” and not “true.”
- “All models are wrong; some are useful.”

For those new to the course:

- Go to `http://posc3610.svmiller.com`
 - Lecture slides there as well.
- Check Canvas too. Know where the Turnitin link is.

Table of Contents

Introduction

What Is Science?

H-D and EITM

Measurement Concerns

Evaluating a Theory

Conclusion