

A Note on Methods in Political Science¹

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Je cherche à comprendre

- Jacques Monod²

Nobel Laureate Sir Peter Medawar opens his chapter on “The Scientific Process” in his book *Advice to a Young Scientist* with the above quote. It sums up well the purpose of research, namely to enrich our understanding of the world we live in. But this begs the obvious question: What is *science*? In *What is this thing called Science*, A.F. Chlamers offers the following common sense view of science:

Scientific knowledge is proven knowledge. Scientific theories are derived in some rigorous way from the facts of experience acquired by observation and experiment. Science is based on what we can see and hear and touch, etc. Personal opinion or preferences and speculative imaginings have no place in science. Science is objective. Scientific knowledge is reliable knowledge because it is objectively proven knowledge (1).

Why Political Science?

Political science as an academic discipline did not really form till the late nineteenth century. Informed by a desire to give good advice to practical politicians, academic students of politics sought techniques that would grant their work objective credibility so that they would be immune to accusations of bias and partisanship. As the field developed the methods used became increasingly mathematical as political scientists made use of probability theory to aid their study of political behavior. This movement towards quantitative methods should be regarded as complementary to multiple qualitative methodologies, such as field research and interviews that do exist and are widely used.

What is a Theory?

The primary purpose of a theory is to provide an explanation of political phenomena. In other words, a theory describes a particular relationship, which results in an event. Simpler yet, it provides a reason for a behavior, an attitude or an event—it answers a “**why**” question.

Theories have two other functions: 1) they organize, systematize, and coordinate existing knowledge in a field, and 2) they can often predict an empirical generalization, *i.e.*, predict that a certain relationship will hold. Each theory offers a different view of politics or focuses our attention on a different set of political phenomena.

- An **explanation** is a statement that provides a reason for a phenomenon.
- **Generalizable** means that the explanation is applicable to many rather than a few cases.
- A **theory** is a statement or series of statements that organize, explain, and predict events.

In *Designing Social Inquiry*, Gary King, Robert Keohane, and Sidney Verba (henceforth, KKV) state that “A social science theory is a reasoned and precise speculation about the answer to a research question, including a statement about why the proposed answer is correct. Theories usually imply several

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² My best translation would be “I search for understanding.”

more specific descriptive or causal hypotheses. A theory must be consistent with prior evidence about a research question” (19).

Constructing Theory

To advance our understanding of political behavior, we propose explanations for a phenomenon and then produce evidence bearing on those explanations. In other words, we are interested in advancing and testing generalizations relating one phenomenon to another. In particular, we are interested in *causal* theories, that is, theories about phenomenon that cause other events. Accordingly, our theories take the form:

$$X \longrightarrow Y \quad [1]$$

Here, X is said to cause Y.

In this formulation, X is referred to as the **independent variable** and Y is called the **dependent variable**. In other terms, a dependent variable is caused by, or depends upon, the independent variable. X and Y are called ‘variables’ because they take different values (*i.e.*, vary) for different units of observation.

Consider a theory that states that academic success depends on diligence and hard work on the part of the student. The first step is to state this as a causal **hypothesis**. A hypothesis is a causal statement that links an independent and dependent variable. For example, the hypothesis might be:

H₀: As the number of hours a student studies increases, the grades of the student also improve.

OR

H₀: The more a student studies, the higher her grade in the class.

The second step is to identify the independent and dependent variable. Accordingly,

$$\text{Hard Work} \longrightarrow \text{Academic Success} \quad [2]$$

The third step is to **operationalize** or **measure** the independent and dependent variable. Most measures in political science tend to be numerical or quantified. This does not mean that we must quantify everything we study but as Sir Peter Medawar expressed, “Quantification is not necessary for a science, but it certainly makes it easier to be a scientist.”

Regardless of whether we choose to use quantitative or qualitative evidence, we must choose our measures to capture the **concepts** that are central to our theory. For instance, we might measure hard work by the number of hours studied and academic success by the grade received in the class.³

$$\text{Hours Studied} \longrightarrow \text{Grade Received} \quad [3]$$

This causal hypothesis is easily **testable**. Using the method of observation, we can collect data (taking care to avoid selection bias in one’s data collection) and see if the posited relationship holds in the real world. Using observed data to test hypotheses is known as **empiricism**

Testing Hypotheses

It is important to formulate testable hypotheses. As KKV put it, “vastly more is learned from theories that *are* wrong than from theories that are stated so broadly that they could not be wrong even in

³ Consider an alternative measure whereby hard work was measured by the number of dates one went on during the academic semester. What’s wrong with this latter measure?

principle. We need to be able to give a direct answer to the question: What evidence would convince us that we are wrong? If there is no answer to this question, then we do not have a theory” (19).

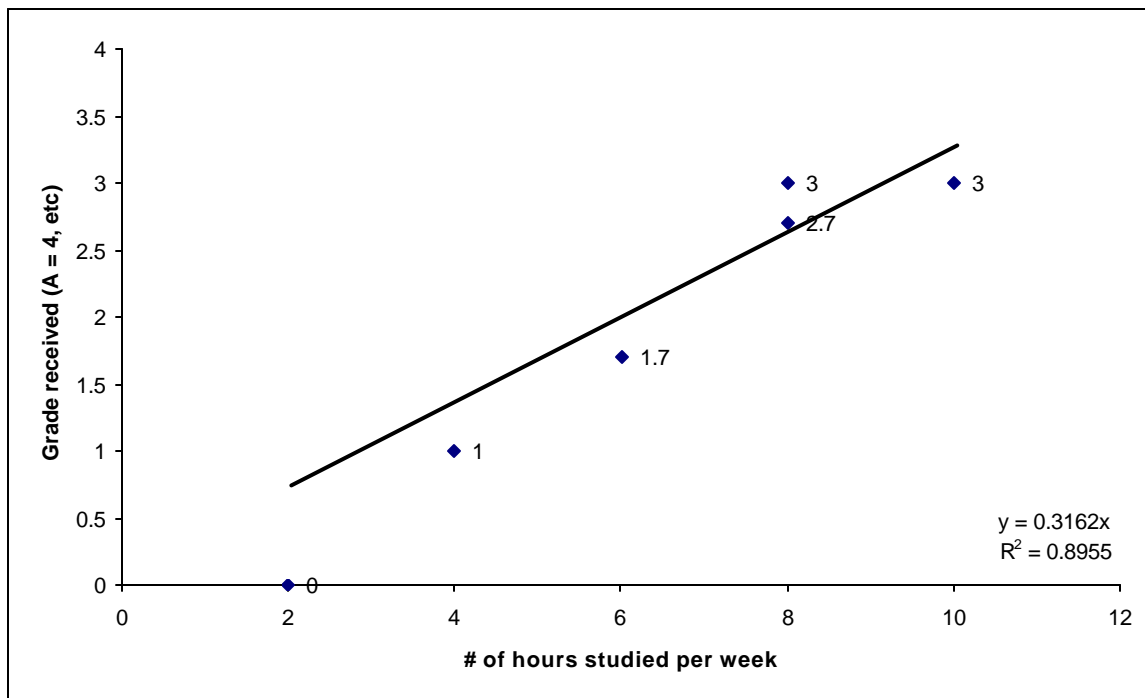
We then collect data. For our purposes, we would need to collect information on the amount different students studied and the grades they received. We then can test to see if the relationship we hypothesized exists. Consider the following fictional class:

Name of Student	# of hours studied a week	Grade Received
Riaz	8	B
Jonathan	6	C+
Keith	4	D
Thomas	2	E
Kelly	8	B-
Sarah	10	B

Notice first that the **unit of observation** here is the individual student for whom data was collected. The unit of analysis depends on one’s questions. In world and comparative politics, our units of analysis are typically nation-states. In studies of political behavior, we typically observe individual human beings. In comparative and world politics, the unit of analysis is most often a nation-state.

Second, observe that each variable takes a unique value for each unit of analysis. That is, the values your variable takes *varies* across the sample of observations you are studying. (This, if you recall, is why we call them variables in the first place.)

Finally, we use various methods to see if the proposed relationship actually holds. We could graph the data, find the correlation between the variables, or choose another statistical technique.



Above, I've graphed the data we collected on our fictional class relating the amount of work they put in to the grade they received where an A is worth 4 points, A- is 3.7, B+ is 3.3, and so on. There is obviously a strong correlation between the two variables. But while this data analysis should give us reason to be joyous for it appears to confirm our hypothesis, we are not done yet. Read on!

Correlation is not Causation

Correlation simply means that there is a relationship between two variables. However, it does not specify the nature of the relationship. Correlations posit either the absence of or presence of a connection between the two variables.

Causation is a stronger claim about the relationship. Specifically, causation implies that one variable makes (causes) the other to occur. This is the more difficult claim to establish since we cannot control for all the other variables that might influence the relationship. (And remember that we are interested in *causal* hypotheses).

In our running example, for instance, it appears from our graphical analysis that students who studied more got higher grades. This suggests that there exists a *correlation* between how much one studies and the grade one gets. But we have not established the *causation*. How do we know that the people who got higher grades did so because they studied more? Maybe it was that they were "smarter" or had "bribed" a corrupt, starving professor. The truth is that most of our tests are for correlation and not causation. Bear this in mind as you read articles that make claims about causation. And think of what sort of evidence you would want to confirm a causal statement.

Largely, experimental data is best for evaluating causal hypotheses. After all the purpose of an experiment is to isolate the effect of a treatment (phenomenon) on randomly assigned control and treatment groups. Since it is virtually impossible to construct such experiments in world politics, we are forced to rely on quasi-experiments. The most common standard for causality therefore is one of temporal ordering, *i.e.*, did our 'cause' precede its alleged 'effect'? Of course, this is still a weak test of causality but short of extremely arduous statistical techniques it's the best we have.

Conclusion

There is debate in the field of political science as to what method is best. Should we rely like physicists and economists on quantitative data? Or should we acknowledge that human beings are unpredictable and idiosyncratic and as such cannot be studied scientifically as if they were atoms? Maybe the best method is qualitative in nature; we should interview people and observe them to find out what makes them tick.

This debate will not be resolved any time soon and there is no clear answer. Perhaps the best advice to a young scientist is to use multiple methods whenever possible, and to choose always the method most suited to the particular question one is asking. Just as a carpenter does not use a sledgehammer to drive in a framing nail, social scientists must not use inappropriate methods for their purposes either.

"From symbols and shadows to the truth."

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