

Notes on Research Design

The Importance of Research Design

After getting predictions from a model, we need to test them. Research design stipulates how we plan to test the predictions.

Like models, research design is a place for careful thought and ample creativity! We want to design studies that give high-quality data and accurate analysis. Paying attention to research design is one way to make sure we have the best possible comparison between our speculations and reality. In particular, research design can help or hinder our ability to establish causal relationships.

Research design in the social science is hard. For almost every question we really care about, establishing causality is difficult. Coming up with a good research design is challenging partly because political scientists cannot always use random assignment.

Random Assignment

Assigning individuals particular values of the independent variable is a straightforward way to establish causal relationships. By randomly assigning the independent variable (which is sometimes called the treatment), the researcher breaks correlations between the independent variable and other possible causes of the outcome. Random assignment is *extremely* powerful.

Why is random assignment so useful? As an example, consider the question of education and voter turnout. Imagine we have 500 recent high school graduates and we want to know whether greater educational attainment makes them more likely to vote in the 2020 elections. We could address the fundamental problem of causal inference by randomly splitting the sample into two groups, one of which is assigned to go to college while the others receive no more schooling. Random assignment makes the group with no schooling a comparable counterfactual, so we can see the effect of education on voting.

But this example points to a problem with random assignment.

The Fundamental Problem of Social Science Research Design

As great as random assignment can be, it is hard to use it in political science. Many political science questions are interesting and worth studying because they affect people's well-being. People will not accept random assignment of interventions or treatments they could benefit from. Because people bear the consequences of the changes political scientists think are interesting, random assignment can be practically and morally inconceivable.

In our education example, how many people would accept randomly being told they couldn't continue their education? Education has many benefits (and costs), so random assignment is not possible. Even if political scientists could assign education randomly, they almost certainly should not.

Many questions are subject to this problem. For example, political science researchers cannot randomly assign countries to be democracies or dictatorships to understand how political regimes impact economic growth. To study the consequences of conflict, researchers cannot randomly assign wars. Physics, chemistry and other physical sciences face fewer constraints on random assignment. So what can a social scientist do?

Creative Research Designs

Addressing research design problems requires careful thought and creativity. Some political science problems permit random assignment. For example, some researchers on public opinion will randomly assign different survey questions to see how subtle changes in question wording change public opinion. Other researchers look at political behavior in laboratory situations.

But when random assignment is impossible, that does not mean researchers should throw up their hands and go home. Important and interesting questions merit the best answer we can imagine.

There are many other research designs.

1. Natural Experiments: These rely on the assumption of as-if random assignment.
2. Analysis of Observational Data: No random assignment, so the goal is to account for systematic differences between observations.
 - Within-subject comparisons: Time-series analysis.
 - Between-subject comparisons: Cross-sectional data.
 - Between and within: Panel Data (Time-Series and Cross-Sectional)
3. Case Studies: Careful analysis of historical sources and primary materials.

When one strategy cannot provide a clear answer, using multiple methods or strategies often helps. Researchers can combine evidence from multiple sources to get a holistic picture. They can also use one method to check the assumptions behind the other.