

INTRODUCTION TO POLITICAL SCIENCE RESEARCH METHODS



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Introduction to Political Science Research Methods

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Preface

Introduction to Political Science Research Methods is a first-of-its-kind open education resource.

With chapter contributions from Dr. Charlotte Lee at Berkeley City College, Kau Vue at Fresno City College, Dr. Dino Bozonelos at Victor Valley College, Dr. Masahiro Omae at San Diego City College, Dr. Steven Cauchon at Imperial Valley College, and myself, the purpose of our open education resource is to provide students interested in or majoring in political science a solid introduction into the research methods of the discipline.

This textbook aligns with the California Community College's C-ID Course Descriptor for Introduction to Political Science Research Methods in content and objectives. Additionally, support was provided by the Academic Senate for California Community College's Open Educational Resources Initiative.

I want to share my personal experience and motivation for helping write this textbook. When I was a community college student, from 2003-2005, there was no introduction to political science research methods course, let alone a textbook. Without such an introduction, I wasn't aware of the community of students, scholars, researchers, and practitioners of political science.

I struggled in my courses at the 4-year university when I was assigned a peer-review journal article, asked to interpret empirical analyses, or write a literature review for a research paper. I graduated and spent 5 years working in the California State Capitol and U.S. House of Representatives in Washington, D.C. In 2012, I returned to earn my Ph.D. in political science. Fair to say, the struggle returned.

I believe students should have the opportunity to introduce themselves to the research methods of our discipline in their first year or second year of post-secondary education. Thus, the purpose of our textbook is to afford students the opportunity to better prepare themselves for upper division political science courses and to seriously consider earning a Masters or Ph.D. in the discipline.

My sincerest hope is that this open education resource, which is free to students and faculty and available under the Creative Commons – Attribution – Noncommercial (CC BY-NC) license, serves as a spark which welcomes the next generation into the discipline

Josh Franco,

Ph.D. June 2020

CHAPTER OVERVIEW

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- 1.2: The Social Network of Political Science
- 1.3: Organization of the Book
- 1.4: Analyzing Journal Articles
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1.1: Welcome

Learning Objectives

By the end of this section, you will be able to:

- Understand that you are welcomed to become a part of this increasingly diverse disciplinary community

Welcome to political science: the scientific study of who gets what, when, where, how, and why. But political science is more than the study of political behaviors, processes, and institutions. Political science is a scholarly community of students, teachers, researchers, and practitioners who deeply care about promoting the generation, dissemination, and application of knowledge to improve our understanding of politics and solve public problems. And you are warmly welcomed to learn more about this increasing diverse and lively community that resides all over the planet.

Political science is a relatively new scholarly community, with the national American Political Science Association (APSA) having been established at the turn of last century in 1903. Over the last 116 years, the discipline has dramatically evolved. From early efforts to establish the discipline as a bulwark for inspiring a democratically minded public, to pioneering innovations in political institutions and processes, the community has maintained a constant effort to understand, and in ways shape, politics. And in its formative years, the discipline sought to differentiate itself from the fields of history and economics. As the first generation of political scientists were trained, the roots of political science as a “borrowing” discipline were established.

For the students of today, what does it mean for political science to be a “borrowing” (Dogan 1996) discipline? It means that while political science has core tenets, theories, and ways of analyzing the political world, it also does its best to utilize and leverage knowledge from a range of other fields: history, economics, psychology, sociology, statistics, anthropology, computer science, mathematics, cognitive science, and even biology. Additionally, these fields can borrow from political science as well. For example, there is an entire field of political economics that compares market-based systems with government-run systems. Therefore, students with a diversity of intellectual interests can explore them through the borrowing framework core to political science.

The evolution of political science is driven by teachers and researchers who hold a commitment to professing and studying politics. But it is important to highlight, that current teachers and researchers started as students, just like you, who were eager to learn more about their government, to understand different political systems, and to explore the world beyond their borders. With each new generation of political science students, educators, and researchers in colleges and universities, new voices begin to shape the discipline in expected and unexpected ways.

This book, Introduction to Political Science Research Methods (IPSRM), is an Open Education Resource (OER) written by community college faculty and financially supported by the Academic Senate for California Community Colleges (ASCCC). The purpose of this book is three-fold: introduce college students to research methods of political science; provide a no-cost textbook for adoption by faculty and use by students; and invite faculty and students to contribute to the improvement of the book with their own contribution.

Students are the future of any academic discipline and scholarly community. In many ways, how students of political science are educated now will shape the discipline for generations to come. Thus, a no-cost textbook that introduces students to the research methods in political science comes an important time in the discipline’s history. As advanced democracies are strained by right-wing populist movements promoting austerity (Erel 2018), a rise in inequality that manifests itself in students struggling with food and housing insecurity (Brotton and Goldrick-Rab 2018), and a Big Data revolution upending industries and displacing workers (Frank, Roehrig, and Pring 2017; Peters 2017), there is a clear need for all political science students to have access to learning about the methods used by our discipline to create new knowledge in the field. It is important to empower current students and future researchers with the tools to creatively grapple with the trends and challenges facing societies and governments.

Faculty, both teachers and researchers, have the dual task: welcoming students to the discipline and imparting knowledge of political behaviors, processes, and institutions to create a publicly spirited and scholarly minded and civically engaged public. While most students in colleges and universities will only take one course in political science, largely to fulfill a social science or national government requirement, there will be a fraction who choose to continue their study of political science because something

sparked their interest. This spark is, we hope, turns into a gleaming shine that motivates students to shape their political institutions and processes at the subnational, national, and global level. As faculty, our dual task is one we embrace. And what this textbook provides is an introduction to research methods, a growing part of the core of our discipline.

Lastly, as this is an Open Education Resource, you, whether student or teacher or researcher, are wholeheartedly welcomed and invited to contribute to its improvement. Whether you find a grammatical error, feel that a chapter section needs clarification, we overlook underrepresented communities or voices in the examples we use, or that we are missing an entire topic, you are welcomed to contribute. As a Creative Commons with Attribution and Non-Commercial (CCBY-NC) license, you can expand our this textbook and make it your own.

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1.2: The Social Network of Political Science

Learning Objectives

By the end of this section, you will be able to:

- Remember that political science is a scholarly community of students, teachers, researchers, and practitioners
- Recognize that community members can be a part of different subfields

Political science is a discipline of students, teachers, researchers, and practitioners. But instead of thinking of political science as an academic discipline, we can think of it as a community, or better yet, a social network of individuals that associate it groups. The relationships within groups of students, teachers, researchers, and practitioners typically consumes our time and attention. For example, if you are a student, you may have disagreed with a classmate said during an in-class discussion. You may have wanted to respond, but the class ended, so you needed to wait for the next class to offer your perspective. Another example comes from a doctoral-level graduate student who is presenting their research for the first time at an academic conference. A graduate student is typically nervous about this experience because it is one of the first times they are interacting with faculty beyond their university. This example is slightly different because it demonstrates the interaction between groups.

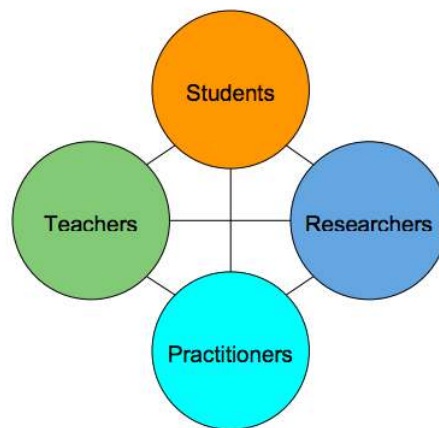


Figure 1.2.1: Visualization of the social network of political science

The social network of political science is dynamic and the interactions between groups help shape the discipline in meaningful ways. For example, the American Political Science Association’s “Political Science Now” blog featured a blog post titled “APSA Announces the New Editorial Team for the American Political Science Review”. The American Political Science Review, also known as APSR, is a flagship journal for the discipline. This means that many political science researchers seek to submit and have their articles accepted for publication in the journal. What is notable about the new Editorial Team is that it’s all women: the first time in the Association’s 100+ year history for this to occur. To many, this represents a sea change in the discipline to not just ensure description representation, but also substantive representation. Now, this sea change is only possible because the political science community is increasingly diverse and interacting regularly.

In addition to the social network of political science, there is also sub-disciplinary networks of students, teachers, researchers, and practitioners that engage in the acquisition, creation, and dissemination of knowledge. At the core of this sub-disciplinary networks are the subfields of political science: American Government and Politics; Comparative Politics; International Relations; Political Theory; Political methodology; Public policy; and Political science education.

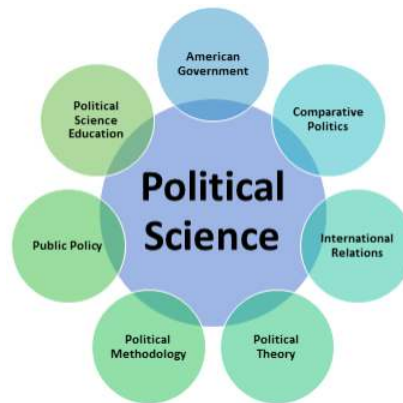


Figure 1.2.2: Visualization of the subfields of political science

Each subfield is populated by students, teachers, researchers, and practitioners. For example, you may be a 2nd-year political science student at a community college. For your fall semester, you are enrolled in Introduction to International Relations and Introduction to Political Science Research Methods. This means you would be a student in two of the seven subfields for the term. And your professors are teachers within those subfields. You may discover that your professor of Introduction to Political Science Research Methods also conducts Political Science Education research, so that would also make them a researcher in another subfield. Individuals can be a part of different subfields in different roles, and you as a student, are beginning to discover the communities of individuals that make up these subfields. Consider another example: You decide to write a paper in your international relations class about the number of indigenous people who have served as UN representatives for countries around the world. To complete this paper, you will explore scholarship in international relations, comparative politics, and perhaps even U.S. government. Thus, as a budding political scientist, you traverse the sub-fields as well.

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1.3: Organization of the Book

Learning Objectives

By the end of this section, you will be able to:

- Remember the organization of the book and chapters
- Understand that your feedback can help improve the experience for future students

This textbook, Introduction to Political Science Research Methods (IPSRM), is an Open Education Resource (OER) and consists of the following 10 chapters. A team of six political scientists at six different community colleges in California co-authored this Open Education Resource.

Each chapter is structured to include the following seven elements: Chapter Outline, Chapter Sections, Key Terms/Glossary, Summary of each Chapter Section, Review Questions, Critical Thinking Questions, and Suggestions for Further Study.

The Chapter Outline provides a list of the chapter's sections. You can click on the name of the chapter section to move directly to that section. This outline is important because it quickly and concisely provides you an overview of the chapter and a clear sense of its contents.

The Chapter Sections can be considered the body of the chapter because they collectively include most of the substantive content. While each chapter author has endeavored to write Chapter Sections as stand-alone parts, there will naturally be a flow and integration of the chapters.

Key Terms/Glossary serves as a repository of definitions of key terms used throughout the chapter sections. The key terms are listed in alphabetical order. In some instances, key terms will be linked to external content, such as Dictionary.com or Wikipedia, for students and faculty to explore the term further. Additionally, key terms are linked within chapter sections, meaning you can click on the key term and be directed to Key Terms/Glossary section.

Summary of the chapter provides a one paragraph synopsis of each section of the chapter. The goal is to distill each chapter section into a bite-sized chunk that can be quickly referenced. Each synopsis highlights a major concept of the section and serves as a reference. These should not be viewed as replacements for reading a specific chapter section.

Review Questions include at least 5 questions that could serve as a pop quiz, clicker questions, student self-check, or as part of a question bank used for a summative assessment, such as a traditional midterm or final. In future iterations of the textbook, we plan on creating a Learning Management System Course Shell that would convert these questions in both a Question Bank and Quiz. Similarly, Critical Thinking Questions include at least 3 questions that can serve as a short or long essay prompt for an in-class or at-home assessment.

Finally, Suggestions for Further Study includes links to websites, journal articles, and books related to the chapter topic. The goal is to build a robust repository of resources that can be explored by students and faculty. While we take effort to list OER or other open access content, there will be resources that are currently not freely available. As the textbook expands, this section will grow as well.

It is recommended that the chapters are followed for most coherent use. We recognize, and encourage, some faculty will want to assign specific chapters to complement an existing textbook adoption. We expect that after the textbook is adopted and utilized, feedback from faculty and students to help us refine the content of each chapter, and the ordering of the materials.

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1.4: Analyzing Journal Articles

Learning Goals

By the end of this section, you will be able to:

- Understand the process of analyzing journal articles
- Analyze a published peer-reviewed journal article

One way to understand research is by "standing on the shoulders of those who came before" -- by understanding and building upon the research questions, data, and analysis generated by others in the discipline. A good starting point is knowing where to read and explore peer-reviewed scholarship in the discipline. Every discipline, whether political science, anthropology, criminal justice, nursing, economics, biology, engineering, and so on, is based on knowledge debated, disseminated, and created in journal articles.

Journal articles are peer-reviewed publications that help scholars communicate ideas, theories, empirical analyses, and conclusions. Journal articles are contained in journals that are typically owned by publishing companies. For example, the University of Cambridge, located in the United Kingdom, owns and operates Cambridge University Press. This press partners with the American Political Science Association (APSA) to publish the following journals: American Political Science Review, Perspectives on Politics, and PS: Political Science and Politics. Additionally, APSA also partners with Taylor and Francis to publish the Journal of Political Science Education (JPSE). The key difference between the 4 journals is that one, JPSE, is published by Taylor and Francis, while the other 3 journals are published by Cambridge University Press.

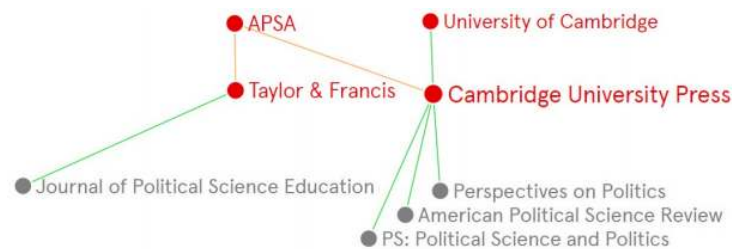


Figure 1.4.1: Visualization of network of APSA, publishers, and journals

The ability to critically read journal articles is a skill that is developed with practice. This skill is especially useful when you are a university student. If you are contemplating attending graduate school to earn a Masters, professional, or Doctoral degree, then analyzing journal articles is an essential skill.

Peer-review is the process by which a scholar submits a manuscript to a journal editor. The editor decides whether to forward the manuscript to 2-4 other scholars for their review or not. When an editor decides not to forward a manuscript, this is called a "desk rejection". These 2-3 reviewers will read the manuscript, comment on it, and suggest whether the manuscript should be accepted for publication, revised and resubmitted for consideration, or rejected. Manuscripts that are accepted for publication in a peer-reviewed journal are Journal Articles.

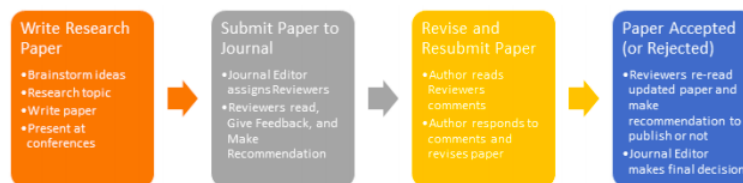


Figure 1.4.2: Visualization of the peer-review process

Journal Article Analysis consists of reading journal articles and analyzing them. You are responsible for identifying twelve parts of a journal article: title, main point, question, puzzle, debate, theory, hypotheses, research design, empirical analysis and methods, policy implications, and contribution to the discipline, and future research. Journal Articles vary in their organization and inclusion of these twelve parts. Increasingly, many articles explicitly describe all or most of these parts; however, other articles may not state a part, or may omit it entirely. There is a diversity of article authors, writing styles, and approaches to the discipline, this outline and subsequent elaboration is just one of a multiple of frameworks for analyzing political science research.

Journal Articles, especially in the field of political science, typically have twelve parts.

1. The Title of an article appears on the first page of the article. The Title is brief, typically no more than 5-10 words, and identifies for the reader the subject of the article.
2. The Main Point of an article is typically found in the Abstract. An Abstract is a summary of the article, which is located on the first page, after the Title. The main point may be in the Introduction of the article.
3. The Question of an article is typically found in the Abstract. The question may be in the Introduction of the article as well.
4. The Puzzle is a missing piece of knowledge that the article seeks to fulfill.
5. The Debate is how scholars currently argue the subject of the article. Debates have at least two sides, and the two sides we are most familiar with are “pro” and “con”. However, debates can be more complex.
6. The Theory is how the author thinks something works. For example, we may have a theory about how campaigns influence voters. Theories consists of constants, variables, and the relationships between variables.
7. The Hypotheses are derived from the Theory. A hypothesis is the expectation that one variable affects another variable in a specific way.
8. The Research Design is how the author compares the effect of the explanatory variable (X) on the outcome variable (O) in a group (G) or set of groups.
9. The Empirical Analysis is the use of quantitative or qualitative evidence to explore whether the hypothesized relationship between two variables does indeed occur in the world.
10. The Policy Implications are how the findings of the article should influence the behavior of individuals, groups, organizations, or governments.
11. The Contribution to the Discipline is how the article helps fill the missing Puzzle piece
12. Future Research offers suggestions for future research that build on the findings from the article.

With these twelve parts listed, let’s explore each of them in greater detail. The Title of an article appears on the first page of the article. The Title is brief, typically no more than 5-10 words, and identifies for the reader the subject of the article. Titles can be informative, as they may include the primary independent variable, primary dependent variable, or question of the article.

The Main Point of an article is typically found in the Abstract. An Abstract is a summary of the article, which is located on the first page, after the Title. The main point may be in the Introduction of the article. Main points, while presented at the beginning of an article, are largely derived after the political scientist has completed their research. So, keep in mind that political scientists don’t regularly start with main points, typically, but rather the main point is a result of their research process.

The Question of an article is typically found in the Abstract. The question may be in the Introduction of the article, as well. An article can have more than one question. So, do not be surprised if you find more than one question. Keeping a list of questions is a useful way to eventually identify the primary question of the article, while also recognizing related secondary questions.

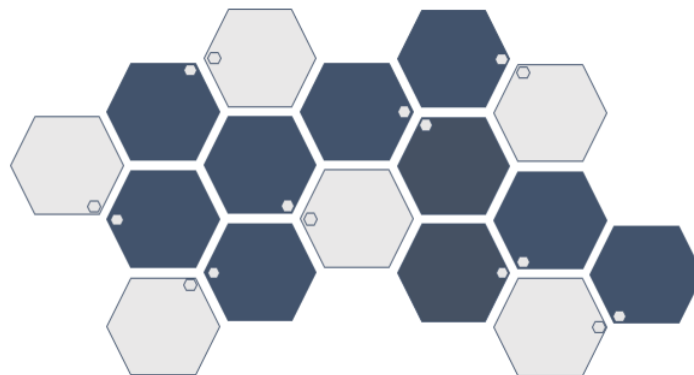


Figure 1.4.3: Visualization of puzzle

The Puzzle is a missing piece of knowledge that the article seeks to fulfill. Puzzles are what political scientists try to solve. To solve a puzzle, a political scientist needs to have a sense of what the whole puzzle looks like. In other words, when you see the puzzle box and the image you are trying to recreate, that’s a sense of the whole puzzle. Second, a political scientist needs to know how the current pieces fit together. Imagine that the puzzle was partially complete, so we would closely examine how the pieces that make

up the partial puzzle are put together. Lastly, a political scientist decides which pieces they want to add to the partially complete portion of the puzzle. In other words, they need to decide which pieces they want to pick up and then try to place them.

The Debate is how scholars currently argue the subject of the article. Debates have at least two sides, and the two sides we are most familiar with are “pro” and “con”. However, debates can be more complex. Debates in political science can be normative or positive debates. Normative debates focus on “what should be” while positive debates focus on “what is.” Normative debates are typical in the practice of politics. For example, in the U.S. House of Representatives, members will debate policy issues using a range of philosophical and logical arguments. On the other hand, most debates in political science are positive.

Positive debates can exist on a conceptual, operational, or measurement level. Conceptual debates are where political scientists argue about a broad concept, like democracy or representation or power. Operational debates focus on taking broad concepts, like democracy, and arguing how they are represented in the real world. For example, many scholars would agree that the United States is conceptually a democracy. However, some scholars would argue and operationalize the United States as a representative democracy. Finally, measurement debates focus on how an operationalized concept is measured. For example, how do we measure a representative democracy? Are individuals elected to serve in national legislatures through winner-take-all a representative democracy? Or are individuals elected to serve in national legislatures through proportional representation a representative democracy?

The Theory is how the author thinks something works. For example, we may have a theory about how campaigns influence voters. Theories consist of constants, variables, and the relationships between variables. Theory is used by political scientists to clearly explain their logic of the constants, variables, and relationships between variables. Constants are objects that do not change. A reason for stating constants is that the world is complex, therefore it is important to simplify it by “holding things constant.” In other words, stating constants lets us focus on the variables and their relationship.

Variables are objects that do change. Variables are typically classified into three categories: independent variable, mediating variable, and dependent variable. Independent variables are the objects that “cause” something to happen. Mediating variables are objects that “help cause” something to happen. And dependent variables are objects that are the “effect” of the “cause” and/or “helping cause.” For example, your interpretation of a political actor, such as the President, may be caused by an action the President took. But your view of the action is mediated by your partisan affiliation.

The Hypotheses are derived from the Theory. A hypothesis is the expectation that one variable effect another variable in a specific way. Above, I described a theory about how the action of a political actors effects your interpretation of the political actors, given your partisan affiliation. Now, we could generate several hypotheses from this theory. Hypothesis 1 is that if the President takes no action, then you will have no interpretation of the President. Hypothesis 2 is that if the President acts, then you will have a positive view of the President if you have the same partisan affiliation as the President. Hypothesis 3 is that if the President acts, then you will have a negative view of the President if you have a different partisan affiliation as the President.

The Research Design is how the author compares the effect of the explanatory variable (X) on the outcome variable (O) in a group (G) or set of groups. Some political scientists use notation to denote research design. Below are 4 common examples, and 2 complex examples:

- Example 1: G O. This is a single group, observation only.
- Example 2: G X O. This is a single group, treatment then observation.
- Example 3: G O X O. This is a single group, observation before treatment, the treatment, then observation after treatment
- Example 4: G X O and G _ O. This is a two-group design. Group 1 receives treatment, then is observed. Group 2 does not receive the treatment, then observed.
- Example 5: G O X O and G O _ O. This is a two-group design. Group 1 and Group 2 are observed, then Group 1 receives the treatment while Group 2 does not receive the treatment. Finally, both Groups are observed again.
- Example 6: G O X O _ O and G O _ O X O. This is a two-group design, known as a switching replications design. Group 1 and Group 2 are observed, then Group 1 receives the treatment, while Group 2 does not receive the treatment. Then both Groups are observed. Next, Group 1 does not re-receive the treatment, and Group 2 receives the treatment for the first time. Then both groups are observed again.

The Empirical Analysis is the use of quantitative or qualitative evidence to explore whether the hypothesized relationship between two variables does indeed occur in the world. Empirical analysis can feature quantitative, qualitative, or both types of evidence.

Quantitative data is numerical and often, but not always, organized via tools such as spreadsheets. Political scientists using quantitative evidence conduct statistical analysis using statistical models to examine the data contained in their spreadsheet. Qualitative evidence is typically individual or collection of text, images, and audio in a paper or electronic document. Political scientists using qualitative evidence conduct content analysis or interpretation using theoretical or non-theoretical framework. Qualitative and quantitative evidence can be analyzed in the context of a theoretical framework but also to uncover descriptive trends. For example, quantitative evidence can be visualized into a scatter plot to help the researcher observe trends in the data. Likewise, qualitative evidence, such as Congressional Record Statements, can be organized into categories by researcher to see if there is a noticeable pattern.

The Policy Implications are how the findings of the article should influence the behavior of individuals, groups, organizations, or governments. Policy implications are typically stated by the political scientist towards the end of an article. What the researcher is doing is predicting how their article, and its findings, would influence the behavior of individuals, groups, organizations, or governments.

The Contribution to the Discipline is how the article helps fill the missing Puzzle piece. Contribution to the Discipline is a statement of how the political scientists' research helps add a puzzle piece that was missing from our current world of knowledge.

Finally, Future Research is how the article offer suggestions for future research that build on the findings from the article. Future research are suggestions for what another political scientist can do to help build on this new knowledge that has been uncovered.

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1.5: Research Paper Project Management

Learning Goals

By the end of this section, you will be able to:

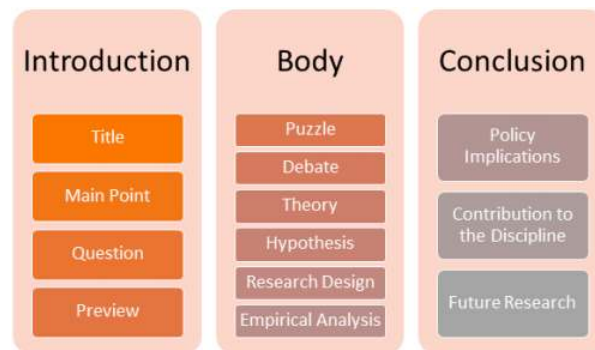
- Remember the process of writing a research paper plan
- Create a research paper plan

A goal of an Introduction to Political Science Research Methods course is to prepare you to write a well-developed research paper that you could reasonably consider submitting to a journal for peer review. This may sound ambitious, since writing a publication-quality research paper is typically reserved for faculty who already hold a doctoral degree or advanced graduate students. However, the idea that a first or second-year student is not capable is a tradition in need of change. Students, especially those enrolled at community colleges, have a wealth of lived experiences and unique perspectives that, in many ways, are not permeating throughout the current ranks of graduate students and faculty.

Writing a research paper should be viewed like managing a project that consists of workflows. Workflows serve as a template for how you can take a large project (such as writing a Research Paper) and disaggregate it into specific, measurable, attainable, relevant, and timely tasks. This is called “project management” because you are taking a “big” project, organizing it into “smaller” projects, sequencing the smaller projects, completing the smaller projects, and then bringing all the smaller projects together to demonstrate completion of the “big” project. In the real-world, this is a valuable ability and skill to have.

We have all project managed; we just never call it that. For example, have you had a plan a birthday party? Or maybe organize a family dinner? Or maybe write a research paper in high school? The party, dinner, and researcher paper are all examples of projects. And you managed these projects from beginning to end. The result of your efforts was a “great time” or “delicious dinner” or “excellent work”. In other words, don’t underestimate your ability to successfully manage a complex project.

The process of writing a political science research paper closely follows the process of analyzing a journal article. A research paper consists of an introduction, body, and conclusion. The introduction contains the title, the main point, question, and preview of the body. The body includes the puzzle, debate, theory, hypothesis, research design, and empirical analysis. Finally, the conclusion contains policy implications, contribution to the discipline, and future research.



1.5.1: Visualization of research paper parts

A crucial difference between analyzing a journal article and writing a research paper is a literature review. When analyzing a journal article, you don’t search for a literature review. Rather, you look for the outputs of a literature review process: puzzle, debate, and theory. A literature review is your reading and analysis of anywhere from 10 to 100 journal articles and books related to your research paper topic. This sounds like a lot, and it is. But don’t be exasperated by the number of articles or books you must read, simply recognize that you need to absorb existing knowledge to contribute new knowledge.

A literature review can serve as an obstacle for the first-time writer of a political science research paper. The reason that such an obstacle is just the sheer amount of reading that one needs to engage in in order to understand a topic. Now, we may have difficulty in reading because we have a learning disability or deficit disorder. Or, reading can be challenging because we don’t have access to

the articles and books that help make up our understanding of a topic. The key is not to get caught up in what we cannot do what we have trouble doing, but rather to focus on what we can accomplish.

How can we conduct a literature review? First, we want to select a topic that we are interested in. Now there's a range of things in the world that we can explore. And because the world is complicated, there is a lot that we can explore. But some straightforward advice is to research something you care about. What is something from your personal experiences, or what you observed in your family and community, or what you think society is grappling with, that you care about? The answer to this question is what you should research.

After we selected a topic, we should search for more information by visiting our library, talking with a librarian, meeting with our professor, and visiting reputable information sources online.

The campus library serves as a repository of information and knowledge. Librarians are trained professionals who understand the science of information: what it is, how it's organized, and how we give it meaning. So, you can meet with the librarian and ask for their help to navigate in person and online resources related to your topic. What a librarian may ask you, in addition to your topic, is what your research question?

You may be asking what's the difference between a question and a research question? Frankly, one question has the adjective "research" in front of it. A question generally with the word: who, what, when, where, why, and how. On the other hand, a research question typically starts with why. A why question suggest that there are two things, also known as variables, that interact in a way that is perplexing and intriguing to you. For example, why do some politicians tweet profusely, and other politicians don't even have a Twitter account? A secondary question is: what causes a politician to utilize social media? Now the answers to these questions require some research that something that you can do.

With your topic and research question in hand, you will be directed to books, journal articles, and current event publications to learn more about your topic. Sifting through the mountains of information that exist today is a skill. Honing this skill is a lifelong process because the information environment is constantly changing. For your purposes in writing a research paper, you should consult with your professor about what are reputable books, journals, and new sources. In political science, university presses, the journals of national and regional associations, and major news outlets all serve as reputable sources.

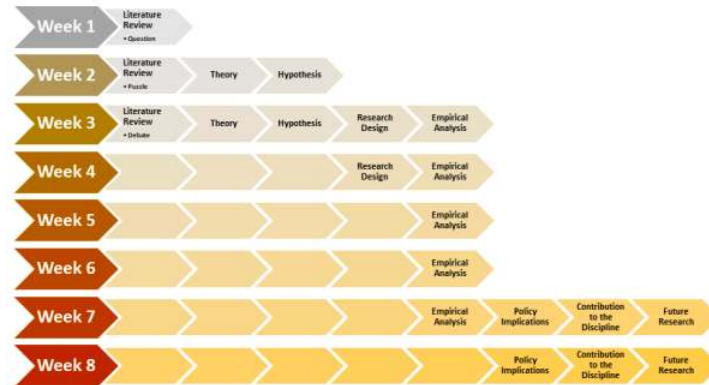
A go-to source for finding academic articles and books on a topic is Google Scholar. Unlike Google search engine, which provides results from all over the World Wide Web, Google Scholar is a search engine that limits results to academic articles and books. By narrowing the results that are provided, Google scholar helps you cut through the noise that exist on the Internet. For example, in my web browser I type in <https://scholar.google.com/>. In the search box, I type "politics and twitter" and below the following results appear:



1.5.2: Output of Google Scholar search of "politics and twitter"

In this example, we see that there are over 1.2 million results. How do you decide on the 10, 20, or 100 articles and books to read? One way to shorten your reading list is to see how many times something has been cited. In the example above, we see that the article titled "What the hashtag?" has been cited 460 times. If an article or book is cited in the hundreds, or thousands, of times, then you should at its your reading list because it means that a lot of people are focused on the topic, or the findings, or the argument that that object represents.

Writing a political science research paper is a generally nonlinear process. This means that you can go from conducting a Literature Review, and jump to Policy Implications, and then update your Empirical Analysis to account for some new information you read. Thus, the suggestion below is not meant to be “the” process, but rather one of many creative processes that adapt to your way of thinking, working, and being successful. However, while recognizing your creativity, it is important to give order to the process. When you are taking a 10-week or 16-week long course, you need to take a big project and break it up into smaller projects. Below is an example of how you segment a research paper into its constituent parts over an 8-week period.



1.5.3: Proposed 8-week timeline for preparing your research paper

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1.6: Key Terms/Glossary

- **Journal article:** a peer-reviewed research paper that was typically written by researchers who hold advanced degrees
 - **Journal:** a collection of peer-review journal articles that is produced by a publishing company
 - **Literature review:** a process of collecting, reading, and synthesizing journal articles, books, and other scholarly materials related to your research topic
 - **Peer-review:** a process by which a research paper is evaluated by a journal editor and researchers in the field who issue a judgment about whether the paper should be accepted for publication, rejected for publication, or revised and resubmitted for consideration.
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1.7: Summary

Summary of Section 1.1: Welcome

This section welcomes you, the student, to the discipline of political science. The American Political Science Association (APSA) is introduced. The purpose of this textbook is discussed. This textbook is an Open Education Resource (OER) and licensed CC-BY-NC. This license allows the content to be reused, remixed, and adapted, if attribution is provided, and it is for noncommercial purposes.

Summary of Section 1.2: The Social Network of Political Science

The social network of political science consists of students, teachers, researchers, and practitioners. Individuals interest within and between these groups to help create the political science community. Additionally, the seven subfields of political science are declared: American Government and Politics; Comparative Politics; International Relations; Political Theory; Political Methodology; Public Policy; and Political Science Education. Summary of Section

1.3: Organization of this Book:

This section outlines the chapters of the book and their authors. Additionally, the structure of each chapter is outlined and described. We invite faculty and students to provide feedback to help us improve future editions of the book.

Summary of Section 1.4: Analyzing Journal Articles

Analyzing journal articles is a core skill that every political science student needs to master. Our goal is to introduce this process in the 1st or 2nd year of a student's collegiate experience, to better prepare them for upper-division courses and later graduate level coursework. One model for analyzing journal articles is described in brief and detail.

Summary of Section 1.5: Research Paper Project Management

Research paper project management helps you take a large project (writing a research paper) and segmenting into smaller, more manageable tasks. This section describes a key process to writing a research paper: conducting a Literature Review. A literature review consists of reading 10-100 journal articles and books to help you get a clearer sense of your topic so you can answer your research question.

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1.8: Review Questions

1. What does APSA stand for?
 - a. American Political Science Association
 - b. American Politics Studying Association
 - c. American Politics and Science Association
2. Which of the following is NOT a subfield of political science?
 - a. American government
 - b. Comparative Politics
 - c. International Relations
 - d. Political Theory
 - e. Logic
3. Which of the following is NOT one of the twelve parts of analyzing a journal article?
 - a. Theory
 - b. Hypotheses
 - c. Research Design
 - d. Empirical Analysis
 - e. Narrative
4. A journal article is not peer-reviewed. True or false?
 - a. True
 - b. False
5. Which of the following best defines a literature review?
 - a. a process of collecting, reading, and synthesizing journal articles, books, and other scholarly materials related to your research topic
 - b. A process of quoting journal articles, but not books
 - c. A process of citing books, but not journal articles
 - d. a process of collecting, reading, and synthesizing journal articles, books, and other scholarly materials

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1.9: Suggestions for Further Study

Websites

- Alwan, Ahmed. 2017a. “LibGuides: Literature Review How To: Home,” June. <https://libguides.csun.edu/literature-review>.
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- Machi, Lawrence A., and Brenda T. McEvoy. 2012. The Literature Review: Six Steps to Success. Second edition. Corwin.
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CHAPTER OVERVIEW

2: History and Development of the Empirical Study of Politics

- 2.1: Brief History of Empirical Study of Politics
- 2.2: The Institutional Wave
- 2.3: The Behavioral Wave
- 2.4: Currents- Qualitative versus Quantitative
- 2.5: Currents- Politics- Normative and Positive Views
- 2.6: Emerging Wave- Experimental Political Science
- 2.7: Emerging Wave- Big Data and Machine Learning
- 2.8: Key Terms/Glossary
- 2.9: Summary
- 2.10: Review Questions
- 2.11: Critical Thinking Questions
- 2.12: Suggestions for Further Study

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2.1: Brief History of Empirical Study of Politics

Learning Objectives

By the end of this section, you will be able to:

- Remember a brief history of the empirical study of politics
- Understand how each iteration of the study of politics influenced the following iteration

What is empirical study? Empirical study is research that seeks patterns and explanations for general phenomena and specific cases (Powner 2014). For political science this means attempts to explain various political phenomena, which could include understanding the behavior of voters, or the foreign policy of a country. In the discipline of political science, we often say that the empirical study of politics traces its roots to what is called the behavioral revolution of the post-World War II era (more on that in Section 2.3).

It is not that empirical analysis did not occur at all before WWII, but that most of this inquiry often centered on the study of institutions, often accompanied with praise, or with criticism for these institutions. The institutions that were studied were of great importance: parliamentary democracy (Mill 1910), military formation and strategy (von Clausewitz 1956), or of the political-economic systems within countries (Smith 1937; Marx and Engels 1967). Their writings and thoughts on how these institutions structure political, economic, and social interaction, are still with us today and influence our understandings in both normative and positivist political science (North 1991).

However, the major shift to studying the behavior of individuals themselves, and a commensurate increase in the methods, has indelibly changed the field. Foremost, scholars could become more “objective”, or less normative, in their study of human behavior. The goal was no longer to provide evidence with moral arguments. Instead, this new political science would, as Shively (2017) stated, be “concerned with ascertaining the facts needed to solve political problems.” Through the introduction of formal theory, political scientists use facts as their empirical foundation, or assumptions, and develop social theories that are generalizable to other areas of study.

This new approach inevitably led to the importation of research methods from other disciplines, such as economics and psychology. This set off an explosion of research into methodology and their application to political questions, such as voting behavior and party formation. Discussions on tradeoffs, alliances, and rationality were brought over from economics. In contrast, discourse on media cues, opinion formation, the effect of societal prejudices, such as racial attitudes, were brought in from sociology and psychology. Institutions were no longer the focus.

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2.2: The Institutional Wave

Learning Objectives

By the end of this section, you will be able to:

- Understand the importance of institutions in political science
- Compare old institutionalism to neoinstitutionalism

Why do you need to know about this?

Given the discussion above there have been two major waves in political science methodology. The traditional methodological wave of research is that of institutionalism. Institutionalism involves the study of institutions within a society. Indeed, Peters (2019) explains that political science emerged from the study of history due to its almost exclusive focus on institutions. There was a desire by philosophers to understand the governing mechanisms of society and private life.

Thus, political science became the study of how the government works, the study of laws and the process of lawmaking. It also included normative discussions on how these institutions should be structured and what best practices should be incorporated within the machinery of government.

North (1991) defines institutions as, “the humanly devised constraints that structure political, economic, and social interaction”. In other words, institutions often reflect the bargains made between actors in each society that determine how the rules of society should look like. A good example is the Electoral College, an institution that most students grapple with understanding. To best understand the Electoral College, one must accept that it was a compromise at the Constitutional Convention. The smaller states, such as New Jersey, proposed that the President be selected by the state legislators. They feared that a direct popular vote, which was favored by New York & Virginia, would always be dominated by larger, more populous states. The Framers of the Constitution compromised and came up with an institution that tried to solve this impasse - Electors. The Electors would be chosen by the state legislatures, giving the smaller states what they wanted. Whereas the total number of electors each state would be given would in large part be dependent on the state’s population, thereby giving the larger states more Electors, and thus satisfying their desire more influence.

At first, Electors were able to vote their conscience. Today, Electors must vote for the candidate that their state citizens have voted for. In the end, what has developed is an institution where citizens vote directly at the state level for a presidential candidate in November. Then in December, the Electors gather in Washington, D.C. to tell each other how each of their states voted. In today’s wired world, where election results are reported in near time, the process of having an Electoral College (college means in Latin - a collection of individuals, or to gather) is rather archaic. However, institutions are built to last as they represent the compromises made in a society, compromises that sometimes are hard fought. In sum, institutions are about perseverance. Rhodes et al (2008) referred to institutions as “dried cement” where “cement can be uprooted when it has dried, but the effort to do so is substantial”.

The Electoral College is a good example of why political scientists study institutions. Institutions live on, sometimes even past their expiration date. In other words, once institutions are developed, deviation is uncommon and thus the actions and decisions made by institutional leaders can be predictable. In addition, David (1994) discusses that institutions do not just spontaneously appear. They are often the codification of preexisting socially established “convention”, or the use of social norms for negotiations within a society. Thus, the high costs associated with the formalization of social norms can help explain why institutions are longstanding.

Yet even though the importance of institutions is evident, the institutional wave in the political science has ebbed and flowed over the discipline. As mentioned, institutionalism had its heyday before the behavioral wave crashed onto the shores of the discipline in the 1950s. Peters (2019) refers to this as “old” institutionalism, which is often considered atheoretical. By this we mean that traditional institutionalism was not as interested in developing theories. Theories in political science are defined as “some general, internally consistent statements that could explain phenomena in a variety of settings” (Guy Peters 2019). A benefit of the behavioral revolution was the shift in thinking towards theory development. The study of micro-level political behavior allowed for such inferential statements to be made regarding individual behavior.

The behavioral wave almost washed out institutionalism in political science. However, the tendency in behavioralism to reduce all collective behavior to individual behavior left many researchers unfulfilled. Clearly, institutions must influence people’s behavior.

Not every action could be scaled down to individual desires or wants. If society remains organized, there will be rules, norms and expectations of behavior. These structures exist in every society and will prevent individuals from pursuing any activity that they want. We can say that their behavior has been bounded, or that their decision-making process has been conditioned. The desire to bring institutions back into the discussion on politics has been referred to as neoinstitutionalism.

Neoinstitutionalism has its roots in the 1980s and as a wave in political science has been gaining force. The desire to explain the role of a country's formal and informal institutions, such as the military, voting regulations, criminal legal codes has inevitably led scholars to study the state. Now, when students think of state, they think of the state of California, or the state of Nevada. And if you do, you would be partially right. In political science, when we say state we mean the centralized authority in a given area, also referred to as sovereignty (O'Neil 2017). The more common word we use today to describe this centralized authority is *country*.

Yet even if you look at the name of the country this book is published in - the United States of America (USA) - you will notice the word state. Each state, such as Texas, is effectively a centralized authority in each area, with its own police forces, laws, and social programs. Thus, the USA is really a union of independent countries that have come together to form a larger political union. And indeed, much of the discussion at the Constitutional Convention was how much power each state would retain vis-a-vis the newly created federal government. Then, neoinstitutionalism is about 'bringing the state back in' when discussing politics and political behavior.

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2.3: The Behavioral Wave

Learning Objectives

By the end of this section, you will be able to:

- Recall what behavioralism is
- Explain the impacts behavioralism has on current students and scholars

The second wave in political science, which started in earnest after World War II, is the behavioral wave. Behavioral political science, or behavioralism, is the study of political behavior and emphasizes the use of surveys and statistics. As opposed to the institutional wave, which focused on the nature, structure, processes, and outcomes of institutions, the behavioral wave is centered on individuals, groups, and the general public and demanded the use of the scientific method.

The godfather of behavioral political science was Charles Merriam, a professor at the University of Chicago from 1900 to 1940 (“Guide to the Charles E. Merriam Papers 1893-1957” n.d.; Dahl 1961). During his four-decade career, Professor Merriam established a political science program which trained a generation of behavioral political scientists, such as V.O. Key and Gabriel Almond. In doing so, these graduate students left the University of Chicago for positions at colleges and universities around the country, thereby helping spread this new wave in political science known as the “Chicago School”.

Heaney and Hanesen (2006, 595), in describing the Chicago School, write: “The building of the Chicago School reveals that the evolution of political science is about more than the advent of ideas. It is also about how ideas are taken up by scholars on a faculty, taught to students in a curriculum, and supported in their development by an infrastructure for inquiry. The efforts of Charles Merriam gave a vision of a new science of politics a material life at the University of Chicago.” With this in mind, it’s helpful to acknowledge that we, as students of the discipline and budding political scientists, have a role to play when it comes to shaping the norms, conventions, and trends in the field. In this case, Professor Merriam had a vision for what political science ought to be.

How does the Chicago School affect students, like you, today? There are at least three ways that the Chicago School influences the study of political science today. First, when you’re reading journal articles or books, you’ll typically find the inclusion of data and statistical analyses. Data and statistical analyses represent, in some fashion, the idea of rigorous science. Before the behavioral wave, most research of politics focused on first-hand accounts, written constitutions and laws, and the nature of government and its relationship to the people. However, after the behavioral wave, researcher politics began to explore political actors and phenomenon in more detailed ways.

For example, institutional political scientists would have been interested in how government should operate. Behavioral political scientists would have been interested in how the government is operating. Now there’s a slight distinction that I want to bring to your attention between these two sentences. It’s the use of the word “should” versus the word “is”. When you ask what “should be”, as explained in a later section, you bring in your assumptions, your values, and your prescriptions for the way government should work. But, when you ask, “what is”, you’re still making assumptions, but you are expected to leave your values and your prescriptions out of your analysis. This is one way the Chicago school influences us today because it pushes us to leave our personal biases at the door.

The second way the Chicago School influences political science today is that students at the undergraduate and graduate level are expected to have some quantitative analysis training. For example, for those who are declared political science majors, you’re aware that there is likely a statistics requirement to earn your degree. You may be asking “why do I have to take statistics in order to get a degree in political science?” Well, in some ways, you can thank the Chicago School for this because they drove the use of statistics and political analysis and they argued that it was an essential component of how to do the science of politics. Another way of putting this is, if you were a student of politics at the turn of the 20th century, you would have studied the classics like Socrates, Plato, and Aristotle, reading constitutions and laws and congressional testimonies and reports, and elaborating on how democracy should work. But, at the turn of the 21st century, statistics and mathematical models are standard tools that all students are expected to be acquainted with.

Finally, the third way the Chicago School shapes political science today is that there is an underlying concern that political science cannot simply be and end unto itself. Political science should inform the behaviors of individuals, groups, elected and appointed

officials, and governments and countries here at home and around the world. In other words, the Chicago School didn't overtake the discipline to the point where we no longer value questions of what should be. While this may have never been the intention of Charles Merriam and his students, the effect for some time was to push away from the normative view of what should be. But with any good change in the discipline, there will always be pushback from those who feel that there is a single way to conduct the work within the discipline.

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2.4: Currents- Qualitative versus Quantitative

Learning Objectives

By the end of this section, you will be able to:

- Understand the difference between qualitative and quantitative methods
- Recount the discourse surrounding the two methodological currents
- Review mixed-methods research

Along with the two major waves of institutionalism and behavioralism, there are two major currents in political science: the qualitative methodological current and the quantitative methodological current. Just like their ocean counterparts, these methodological currents help determine how political scientists attempt to understand the world. And just like ocean currents help to regulate and stabilize global climate patterns, quantitative and qualitative methods help regulate and stabilize the scientific inquiry. Methods are simply the steps taken by social scientists during their research. They are the techniques used to collect, construct, and consider data. By using replicable methods, or research steps that can be duplicated by other scholars, this allows political scientists to use the scientific method in their inquiries (this is discussed more in Chapter Three: The Scientific Method)

Qualitative methods are defined by Flick (2018) as “research interested in analyzing the subjective meaning or the social production of issues, events, or practices by collecting nonstandardized data and analyzing texts and images rather than numbers and statistics”. What this means is that researchers try to solve puzzles in political science without using some type of mathematical analysis or using a simple mathematical measurement, such as coding of text and/or images. **Quantitative** methods are defined by Flick (2018) as “research interested in frequencies and distributions of issues, events, or practices by collecting standardized data and using numbers and statistics for analyzing them”. What this means is that political scientists solve puzzles using mathematical analysis or mathematical measurement.

Shively (2017) more elegantly states that quantitative research is attentive to, “numerical measures of things...to make *mathematical* statements about them. Whereas qualitative research is “less concerned with measuring things numerically and tends to make verbal statements about them.” Baglione (2018) more simply states that it comes down to the use of numbers versus the use of words as the evidence used to draw conclusions. The obvious differences between the two currents has led to a potential divide in the field of political science - those who use qualitative methods, specialize in them, and prefer these approaches, such as ethnological research, case study (or small-n), or archival work (Chapter Seven); and those who use quantitative methods and develop and implement mathematical and statistical techniques, such as analyzes of datasets and formal modeling (Chapter Eight).

As expected, the behavioral revolution created a wedge among political scientists. Qualitative research scholars often scoffed at the opaqueness of mathematical techniques made ever more complex by quantitative methodologists. They also bemoaned the lack of applicability of some of these developments, often calling the papers, “math for math’s sake”. In response quantitative scholars viewed traditional qualitative techniques, such as archival work as antiquated, or newer techniques, such as interpretivism, as non-inferential, and thus of less use.

The clash of currents between qualitative and quantitative methodology reached its peak in the 1990s, when the book *Designing Social Inquiry: Scientific Inference in Qualitative Research (DSI)* came out in 1994. Written by Gary King, Robert O. Keohane, and Sidney Verba (1994), *DSI* suggests that qualitative research would improve if they adopted some of the tools used by quantitative scholars. These tools include better defining the research problem, identifying which theories to draw hypotheses from, case selection, testing and retesting to further clarify the theory. As expected quite a few qualitative scholars did not appreciate what they viewed as a talking down to by notable scholars in the discipline. Though this was not the intent of *DSI*, as its goal was to shrink the divide between the two currents. Nevertheless, this was not how it was received.

The major countercurrent to *DSI* was the book edited by Henry E. Brady and David Collier (2004), *Rethinking Social Inquiry: Diverse Tools, Shared Standards (RSI)*. In *RSI*, Brady and Collier appreciate the effort by King, Keohane, and Verba (1994) to bridge the divide between the two methodological currents. However, they are concerned that *DSI* overemphasizes the importance of quantitative tools when designing qualitative research agendas. Charles Ragin (2004), one of the contributors to the volume,

contends that the key goal of qualitative research - inference, is not much different from the goal of qualitative research - making sense of cases.

Both sets of scholars have the same objective, albeit with different means of getting there. Additionally, contributing authors, such as Gerardo Munck (2004), detailed qualitative tools for each step of the research process, focusing on case selection, measurement and data collections and assessing causation.

A more critical countercurrent to *DSI* was the Perestroika movement in political science, where qualitative scholars critiqued the dominance of quantitative methodology in the discipline, including the elected leadership of the American Political Science Association (APSA). Calling themselves an intellectual rebellion, the authors in their book *Perestroika*, push for a pluralistic future of political science, where all methods are respected and treated fairly. Shapiro (2005) comments that political science has become too method-driven, and instead should be more problem-driven. And that if method selection drives the analysis, then it leads to what he calls the “self-serving construction of problems”. Finally, the study of normative politics, and the importance of narratives and discourse to contextualize the study of politics has substantive value. Sacrificing substance at the altar of mathematics and statistics, Sanders (2005) argues is shortsighted.

Has the clash of currents subsided? Not really. Qualitative scholars contend that the flagship journal *American Political Science Review* (APSR) is still “hostile to qualitative concerns in the discipline” (McGovern 2010). However, a newer current within the discipline has developed to respond to the concerns of these scholars: the Qualitative and Multi-Method Research section of APSA. The goals of this research section are to further discussion within quantitative methodology and investigate how the various branches of methodology interact. Also referring to the latter goal as mixed-methods research, Creswell and Clark (2017) describe it as research involving both quantitative and qualitative data.

Quantitative data consists of closed-ended information. This can include interval or ratio scale data (more on this in Chapter Eight), often asked in surveys. Whereas qualitative data includes open-ended information that is often gathered through interviews or observation. Mixed-methods research is simply the mixture of close-ended and open-ended techniques to triangulate the right conclusions. Are mixed methods the future methodological current of political science? It is premature to suggest that this is the case. Graduate students are still likely to specialize in a methodological current. However, what is sure is that the current of quantitative methodological supremacy has receded enough to allow other currents to reach the shore.

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2.5: Currents- Politics- Normative and Positive Views

Learning Objectives

By the end of this section, you will be able to:

- Remember the difference between normative view and positive view of politics
- Understand politics from both views

The history and development of the empirical study of politics can be rooted in the debate between “what should be” versus “what is”. When individuals, including political scientists, ask “what should be?” they are asking a normative question. On the other hand, when individuals ask, “what is?” they are asking a positive question.

For example, a national government expends resources. These resources can be expended domestically or internationally. Domestic spending includes constructing infrastructure, like roads and bridges, and paying for public employees to work, like engineers and construction workers who design and build infrastructure. International spending includes foreign aid to governmental or non-governmental entities. When individuals, including political scientists, ask “what should be?” they are asking a normative question. On the other hand, when individuals ask, “what is?” they are asking a positive question. For example, who is paying membership dues to an international organization, providing aid to foreign governments, or supporting non-profit organizations working in foreign countries?

Now, let’s assume a national government spends 100% of its resources domestically. From a positive view, “what is” is that the government is spending all its resources domestically and none of its resources overseas. A positive view could expand by staying how much is spent on infrastructure versus salaries, say 75% for infrastructure and 25% for salaries. However, a positive view would not argue that 100% should not be spent on domestic priorities, or that the split in allocating between infrastructure versus salaries should be different.

On the other hand, a normative view, “what should be”, would argue that less than 100% should be spent on domestic priorities, while a percentage greater than 0% should be spent on foreign priorities. Now, let’s assume that the government changes its expenditures so that its 90% domestic and 10% foreign. With 10% allocated to overseas efforts, a normative view would argue that some portion of the 10% should go towards membership dues while the remainder should go to providing aid to foreign governments.

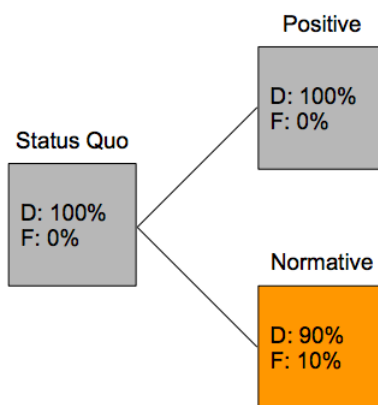


Figure 2.5.1: Visual comparison of positive view and normative view

Why differentiate between positive and normative perspectives? When reading a journal article, book, or news article, we generally expect there to be a focus on what is and not on what should be. On the other hand, when we read a newspaper editorial or watch a television program, we would expect to see and hear opinions and speculations. Our ability to discern between fact and opinion is essential to engaging in political science. Politics, by its nature, is strewn with opinions from individuals, organizations, and leaders. However, an opinion shouldn’t stand for fact and should not replace an objective reality. Therefore, the ability to acknowledge, identify, and categorize information helps us build our understanding of the world around us.

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2.6: Emerging Wave- Experimental Political Science

Learning Objectives

By the end of this section, you will be able to:

- Comprehend the role of experiments in political science
- Understand the reluctance of political scientists to embrace experimentation

An emerging wave of methodology in the discipline is that of experimental political science. The value of this method has increased in the past few decades as true experimentation can establish causality, or to definitively say that variable X causes variable Y. This is also referred to a causal relationship, or a causal mechanism. In other methods of political science, such as a quantitative analysis of data sets, research generally leads only to correlational relationships, which are much weaker than causal relationships. In correlational relationships, one can only show that there is a relationship between two or more variables. And just because a relationship exists between variables does not mean that additional relationships exist between the variables that could provide alternative explanations. Hatcher (2013) accepts that there may be an “observed correlation that differs from the research hypothesis”.

Out of the desire to provide stronger evidence for cause and effect, political scientists have begun using experimental methods. **Experiments** are understood by McDermott (2002) to “refer primarily to laboratory studies in which investigators retain control over the recruitment, assignment to random conditions, treatment, and measurement of subjects”. McDermott points out that experiments diminish the effect of bias as it focuses on standardization in the research process. Thus, by having exact procedures, measures, and analyses, researchers can manipulate a variable of interest, repeat the experiment among many subjects, providing for strong internal validity. The standardization of the techniques allows for the replication of the experiment by other scholars, and thus provides for a measure of external validity (more on this below). This then allowed the researchers to draw causal inferences.

Experimental political science has become popular in political psychology and in understanding voter behavior. It has not yet caught on in the overall discipline. Even though experimentalism is part of the behavioral wave, there is a concern regarding the overall external validity and the ability to generalize beyond the studied population. While manipulation of a variable may show a statistical effect in an experiment with students, will it have the same effect with the larger population? McDermott (2002) posits that political scientists are being too critical and failing to understand that experimentalists do not make larger claims about human behavior from limited study. They understand that external validity is made over time, with quite a bit of replication. In addition, experiments are intended to test theories and build hypotheses, not generate broader conclusions.

Additionally, a peer-review journal, the Journal of Experimental Political Science (JEPS), was founded in 2014 to help foster additional interest and research using experimental and quasiexperimental methods. The editors of JEPS explain (Mann et. al) that they define “experimental methods broadly: research featuring random or quasi-random assignment of subjects to different treatments in an effort to isolate causal relationships in the sphere of politics. JEPS embraces all of the different types of experiments carried out as part of political science research, including survey experiments, laboratory experiments, field experiments, lab experiments in the field, natural and neurological experiments.”

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2.7: Emerging Wave- Big Data and Machine Learning

Learning Objectives

By the end of this section, you will be able to:

- Define big data and machine learning
- Explaining how big data and machine learning are being used in political science

Political science is a dynamic discipline because it is willing to borrow from other disciplines to improve its study of political actors, institutions, and processes. There are a couple of emerging waves that are changing the nature of scientific inquiry and of political science. Two waves that we want to highlight here are big data and machine learning.

The human mind is not capable of sifting, sorting, and analyzing these growing datasets, but computers are. It is useful to note that up until the late 1980s and early 1990s, researchers had to calculate descriptive statistics and linear regressions by hand and with calculators. But over the last 20 years, technology has become widely available and access to software has increased. With both the hardware and software in the hands of more political scientists, we increase the range of exploration and knowledge generation that comes with analyzing political phenomena.

Big data is defined as the mountain of information, in the form of petabytes and exabytes, that is being stored on computers and servers around the world. As computers proliferate, and our use of them for personal, organizational, corporate, and governmental use grows exponentially, the amount of information we are generating as a human society is exploding by leaps and bounds every single day. And there are concerns about what this means for society (Brady 2019). With growing mountains of data, some questions arise: How can we study it? How can we uncover patterns in the data? How can we derive new meanings and understandings from these data?

Big Data is “big” because the amount of space it takes on a computer hard drive, but the techniques to analyze “Big Data” are available in computer programs political scientists have used for years to statistically analyze large data sets. SPSS, Stata, R, and Python are all staples of statistical data analysis software in the discipline.

But, within the last decade, two major changes are revolutionizing the study of everything, from politics and economics to biology and chemistry. First, we have seen significant advances in computer hardware technology. Specifically, the advances in graphic processing units also known as GPUs have fundamentally changed our ability to analyze mountains of data. The short of the long is that computer processing units or CPUs have shrunk in size but have grown in computational power. Why do you think you can hold a computer in the palm of your hand? GPUs, working independently and in conjunction with CPUs, have tremendous computational power.

Second, computer scientists have been developing new programming languages, mechanisms for programming collaboration, and pushing the boundaries of artificial intelligence. This is where our second wave of machine learning starts to emerge. As computer science has pushed the boundaries of software, given the advancements in CPUs and GPUs, it is pushing the boundaries of what software can do with respect to inputting, analyzing, and learning from data in the world around us. **Machine learning** is the ability of a computer program to start with an initial model data, analyze actual data, learn from this analysis, and automatically update that initial model to incorporate the findings from its analysis. Now, this doesn’t just happen once in the computer software is done, this cycle can happen iteratively thereby allowing the software to uncover categories, patterns, and meanings.

What does this all mean for political science? Honestly, we don’t have an answer to that question. What we do know is that the next generation of political scientists will be leading efforts to utilize big data and machine learning to explain political behaviors, institutions, and processes. It’s an exciting time to be entering the field and the experiences you have, the questions that intrigue you, and the research will conduct will help build our knowledge of politics.

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2.8: Key Terms/Glossary

- **Behavioralism:** is the study of political behavior and emphasizes the use of surveys and statistics
 - **Big data:** the mountain of information, in the form of petabytes and exabytes, that is being stored on computers and servers around the world
 - **Chicago School:** started by Dr. Charles Merriam, a professor at the University of Chicago from 1900 to 1940, that focused on the study of political behavior using surveys and statistics
 - **Empiricism:** is research that seeks patterns and explanations for general phenomena and specific cases
 - **Experiments:** laboratory studies in which researchers recruit subjects, randomly assign subjects to a treatment or control condition, and then determine the effect of the treatment on the subjects
 - **Institutionalism:** the study of political institutions
 - **Machine learning:** the ability of a computer program to start with an initial model data, analyze actual data, learn from this analysis, and automatically update that initial model to incorporate the findings from its analysis
 - **Mixed Methods:** the use of both quantitative and qualitative methods of analysis
 - **Normative view:** the view of what should or ought to be, accounting for personal bias and opinion
 - **Positive view:** the view of what is, regardless of personal bias or opinion
 - **Qualitative:** typically, the use of interviews, archival research, and ethnographies to understand politics
 - **Quantitative:** generally, the use of mathematical models and statistics to measure a relationship between two variables
-

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2.9: Summary

Summary of Section 2.1: Brief History of Empirical Study of Politics

Empiricism is research that seeks patterns and explanations for general phenomena and specific cases. Empirical political science has its roots in the study of institutions. However, it took off methodologically with the behavioral wave in the 1950s. This was a shift to the study of human behavior, such as voting patterns.

Summary of Section 2.2: The Institutional Wave

The traditional wave of methodology in political science is institutionalism, or the study of institutions in a society. Institutions often reflect the bargains made between actors in each society that determine how the rules of society should look like, which is why they are difficult to reform, replace, or dismantle. Institutionalism ebbed during the heyday of the behavioral revolution. However, the desire to bring institutions back has led to the development of neoinstitutionalism, with a focus on the role of the state in society and the economy.

Summary of Section 2.3: The Behavioral Wave

Behavioralism is the study of political behavior and emphasizes the use of surveys and statistics. Charles Merriam at the University of Chicago had an outsized influence on behavioralism. The “Chicago School” has strongly influenced political science, through its emphasis on quantitative methodology, often at the expense of normative questions. Many incoming scholars are expected to understand statistical techniques for use in their research. In response, some scholars are looking to bring back the normative discussion.

Summary of Section 2.4: Currents: Qualitative versus Quantitative

There are two major currents in political science: the qualitative methodological and quantitative methodological currents. Methods are simply the steps taken by social scientists during their research. They are the techniques used to collect, construct, and consider data. Qualitative methods solve puzzles in political science without using some type of mathematical analysis. Whereas, quantitative methods prefer the use of mathematical analysis or measurement. The behavioral revolution created a wedge among political scientists, which has led to a strong back and forth discourse on the value of qualitative methodology in political science. More recent scholars using multi-method approaches, combining qualitative and quantitative techniques.

Summary of Section 2.5: Currents: Politics: Normative and Positive Views

The normative view of political science explores what should be, while the positive view explains what is. These views are important to recognize, since both have their supporters and detractors. As a student of political science, it is useful to be able to identify both views. And it is up to you when, how, and why you use one view, or another, or even both, to explore, explain and analyze political actors, behaviors, institutions, and processes.

Summary of Section 2.6: Emerging Wave: Experimental Political Science

Experimental political science is growing in the discipline. It centers on the researcher using random assignment in laboratory settings or quasi-random assignment in other settings, to explore precise cause-and-effect relationships between a treatment and outcome of interest.

Summary of Section 2.7: Emerging Wave: Big Data and Machine Learning

The emerging waves of Big Data and machine learning are just beginning to influence political science. Big Data is the growing mountain of data being generated by political actors and institutions. And machine learning is the increasingly sophisticated way of sifting, sorting, and identifying patterns in these mountains of data.

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2.10: Review Questions

1. Which of the following definitions best describes institutionalism?
 - a. Institutionalism involves the study of institutions within a society
 - b. Institutionalism involves the study of behavior of political actors within institutions
 - c. Institutionalism involves the study of the interaction between political institutions
2. Which of the following definitions best describes behavioralism?
 - a. Behavioral political science is the study of political behavior and emphasizes the use of surveys and statistics
 - b. Behavioral political science is the study of political behavior and emphasizes behavior within institutions
 - c. Behavioral political science is the study of political behavior
3. Which of the following views is institutionalism most associated with?
 - a. Normative
 - b. Positive
 - c. Negative
 - d. Neutral
4. It is useful to note that up until the late 1970s and early 1980s, researchers had to calculate descriptive statistics and linear regressions by hand and with calculators.
 - a. True
 - b. False
5. Machine learning is the ability of a computer program to start with an initial model data, analyze actual data, learn from this analysis, and automatically update that initial model to incorporate the findings from its analysis
 - a. True
 - b. False

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2.11: Critical Thinking Questions

1. Why is knowing part of the history of political science important for students and scholars today?
 2. Compare and contrast normative view versus positive view.
 3. How are the institutional wave with the behavioral wave in political science the same? How are they different? Which wave do you find most appealing? Why?
-

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2.12: Suggestions for Further Study

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CHAPTER OVERVIEW

3: The Scientific Method

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- [3.2: Whats is the Scientific Method?](#)
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3.1: Philosophy of Science

Learning Objectives

By the end of this section, you will be able to:

- Remember what is the “philosophy of science”
- Understand how paradigms rise and fall

Before exploring the scientific method in detail, it is important to recognize the concept of science itself. Science is the systematic study of the world around and beyond us. Part of engaging in political science research is to acknowledge the underlying concepts of politics and science being brought together in a coherent field of study for students at colleges and universities throughout the world. In this chapter, we explore: the philosophy of science; three models of the scientific method; and three applications of these scientific method models.

Philosophy of Science

Before conducting research in any field, including political science, it's important to step back to recognize that the field is trying to contribute to our human understanding of the world around us. Whenever we question what we are doing, how we are doing it, and why we are doing it, then we are engaging in the process of philosophizing. The philosophy of science (Wikipedia contributors 2019) is the exploration of science by asking at least three questions: What are the foundations of science? What are the methods of science? And what are the implications of science? Among the mountain of contributors to the philosophy of science, we want to recognize Karl Popper and Thomas Kuhn.

Karl Popper (Thornton 2019) is known for the concept of falsification. Falsification is the principle that any theory, or explanation of how the world works, can always be proven false and that a theory can never be proven true. This idea is important in political science for two reasons. First, it allows political scientists and students to engage in a continuous debate about the research, the findings, and the conclusions. This means the debate will always continue. And while some debates may be settled, falsification means that new research can unsettle it, thereby sparking a new wave of research, findings, and conclusions. Second, falsification in political science prevents its community members from closing off possibilities for future research. This is important because it essentially requires scientists and students to keep an open mind about the possibility of new information changing their understanding of politics. As we strive to continually understand the political world, we need to be open to new information.

Thomas Kuhn (Bird 2018) is known for the concept of paradigm shift. A paradigm is the current way of thinking, doing, and understanding. A shift occurs when the current ways undergo a significant change, thereby changing how we think, do, and understand. Paradigm shifts are a part of any discipline, including political science. In political science, paradigms serve as a stable framework in which to think about politics, do research of politics, and understand politics. This stability is undergirded by faculty who teach and train an understanding of politics. And while stability contributes to the process of accumulating knowledge, it doesn't mean it's the right way or only way. Sometimes paradigms shift, thereby uncovering new ways to think about, do research, and understand politics. One way paradigms shift is by having new, unconventional, and non-traditional students become political scientists who will ask different questions, challenge existing research, and produce new research.

The philosophy of science helps us recognize that we are exploring the foundations, methods, and implications of science. Our exploration helps us uncover ideas and meanings that contribute to our personal understanding of science. And beyond our individualized knowledge, we can begin to contribute to our collective understanding by asking questions, challenging existing methods, and articulating new impacts of science on people, communities, and societies more generally.

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3.2: Whats is the Scientific Method?

Learning Objectives

By the end of this section, you will be able to:

- Remember the stages of the scientific method

The scientific method is a process used by individuals, particularly scientists, to analyze some aspect of the world. We offer three models of the scientific method that start from simple to complex. The reason for presenting three models is to demonstrate how we can start with a core concept and extend it.

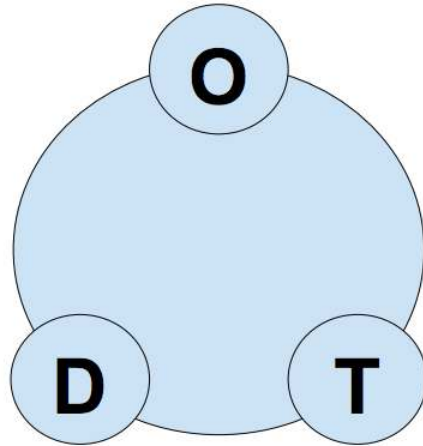


Figure 3.2.1: Visualization of a simple model of scientific method

Model 1: Observation-Theory-Data: Our first model focuses on the core components of the scientific method: observation, theory, and data. The scientific method first begins with observations of the world around us, a response to stimuli. Stimuli are objects that attract our attention. For example, as we walk towards the beach from the parking lot, we may see a lot of beachgoers eagerly staring into the ocean. The behavior of the crowd is a stimulus because it draws our attention. Our response to this stimulus is to consider why the beachgoers are acting this way. Thus, our observations may lead to questions. Are there surfers in the water? Did someone spot a school of dolphins or a shark? Is someone in need of help or is the Coast Guard conducting a rescue operation? In order to understand the stimulus or our response, we must make connections between two variables.

The connections that we make form the foundation of a theory, or the answer to our questions. In other words, a theory is an explanation of the relationship we observed between two variables. For example, we may observe a tweet about foreign policy from the President of the United States. Shortly after, we may see an increase in the stock prices of aerospace companies. So, we form a theory about presidential statements and the economy, connecting these two variables with one another. With our theory in mind, we can proceed to explore it by collecting data. Continuing with our example, we may collect data of presidential tweets and stock market prices for the first two years of the presidency to see what the relationship is between these two variables.

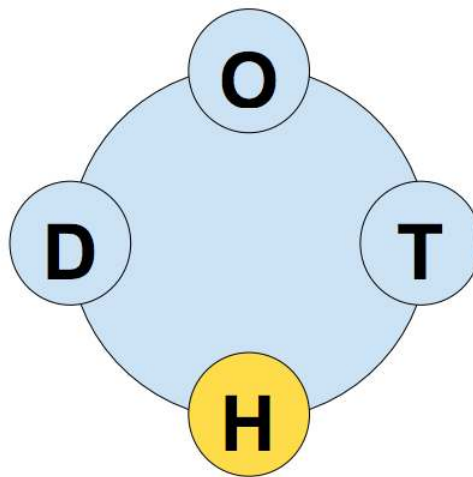


Figure 3.2.2: Visualization of an intermediate model of scientific method

Model 2: Observation-Theory-Hypothesis-Data: Our second model builds on the previous model by adding a hypothesis. A hypothesis is a statement that asserts the direction of the relationship between two variables. Hypothesis follows theory because a theory proposes that there *is* a relationship between two variables, while a hypothesis states *what* the relationship is. For example, we may observe that voters seem supportive of a challenger to the incumbent president. So, why are voters eagerly supporting a would-be president instead of the actual president? It could be that voters feel the country is not going in the right direction, so they believe a change in presidential leadership will put the country in the right direction. Thus, we have a theory of presidential leadership and voter behavior. A hypothesis that follows from the theory could be: if incumbent presidential leadership is erratic, then voters are more likely to vote for the challenger in the upcoming presidential election. To examine this hypothesis, we would collect data on the erraticism of the incumbent president and data on the votes cast in the election.

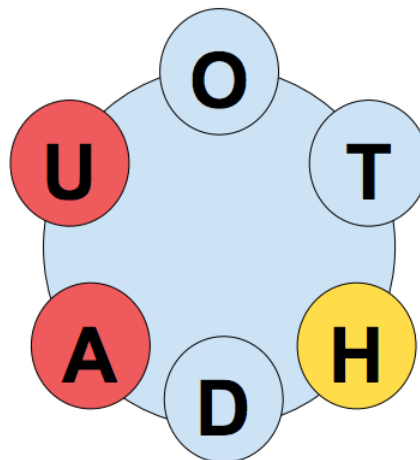


Figure 3.2.3: Visualization of a complex model of scientific method

Model 3: Observation-Theory-Hypothesis-Data-Analysis-Update: Our third model continues to build on the previous models by adding analysis and update. Analysis is an examination of the collected data. We can analyze data using methods that are appropriate for the data collected. Two principal methods of data analysis are qualitative and quantitative. Qualitative data analysis is explored in Chapter 7 and quantitative data analysis is examined in Chapter 8.

The process consists of six stages: observe, articulate theory, propose hypotheses, collect data, analyze data with respect to hypotheses, and revise theory based on findings.

Observe is the first stage of the scientific method. By observing individuals, organizations, and institutions interacting in the real world, we begin to learn about the nature of their interests and the degree of their interaction. For example, say it is the holiday season, and I observe how my partisan identification differs from my parents. I could discuss this observation with my parents but avoid the conversation because it may ruffle some feathers at the holiday dinner table. So instead, I ask myself “Why?”

By asking myself “Why?”, this leads to the second stage of the scientific method: articulate a theory. Recall that a theory is an explanation of how one variable has a relationship with another variable. Using my observation from above, I have one variable: partisan identification. Now, what is the other variable that can help us articulate a theory? Here, there can be a multitude of reasons, but I could theorize that partisan identification is a function of technology use. So, I have articulated a theory that technology use has a relationship with partisan identification.

After the articulation of the theory, the next step in this process is to develop a hypothesis. Again, I theorized a relationship between technology use and partisan identification. A potential hypothesis derived from this theory is that an increased use of technology is likely to affect what political party individuals identify with.

The next step in this process will be to find identify and collect the appropriate data I will need to help me test my hypothesis. One way to do this might be to interview people about their use of technology, how often they use it. For the second variable, I would ask a question about what party they identify with. Another way to collect the data I need is to find already existing datasets that have collected this information. After collecting this information, I can then analyze the data to see if there is an empirical relationship that exists between technology use and partisan identification.

After analyzing the data, multiple outcomes can be possible. I might find that partisan identification is linked to the use of technology, and I would be able to conclude that the evidence does support my theory. On the other hand, it is also possible that I do not find a relationship between the two variables and the evidence does not support my theory. This next step would then require me to update my theory or my hypothesis, leading me to restart the cycle again.

There are multiple stages to the scientific model. Individuals form questions and answers to those questions by first observing the world around them. Derived from the answer is the hypothesis, which will then allow individuals to test their theory. Providing evidence of the theory may require collecting data and analyzing the data. While there are multiple stages, it is possible that not all researchers will partake in each stage; thus, the presentation of multiple models of the scientific method from the simple to more complex.

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3.3: Applying the Scientific Method to Political Phenomena

Learning Objectives

By the end of this section, you will be able to:

- Apply the scientific method to open access journal articles

Applying the scientific method to political phenomena is what you, as a student in a political science research methods, will be doing in the course. Political scientists, especially those who conduct research, utilize the scientific method. Not all political scientists use all aspects of the scientific method all of the time. Many times, a political scientist is focused on the “observation” stage of the process. This means a researcher is trying to learn more by directly observing, participating and observing, or indirectly observing through others. Other times, a political scientist is focused on the “analysis” stage. This means a researcher is focused on refining the tools used to empirically analyze political phenomena.

Let’s explore how we can map the stages of the complex model of the scientific method to three open access journal articles. The purpose of this mapping is to demonstrate how the research political scientists publish relates to the scientific method.

Journal Article #1

The first article we will map is titled “Do Inheritance Customs Affect Political and Social Inequality?” (Hager and Hilbig 2019) by Anselm Hager and Hanno Hilbig in the *American Journal of Political Science*. Remember that our third model of the scientific method includes six stages: Observation, Theory, Hypothesis, Data, Analysis, and Update. Every peer-reviewed journal article has a Title and Abstract. An abstract is a summary of the article’s contents. Below is the title and abstract.

Do Inheritance Customs Affect Political and Social Inequality?

Abstract

Why are some societies more unequal than others? The French revolutionaries believed unequal inheritances among siblings to be responsible for the strict hierarchies of the ancient régime. To achieve equality, the revolutionaries therefore enforced equal inheritance rights. Their goal was to empower women and to disenfranchise the noble class. But do equal inheritances succeed in leveling the societal playing field? We study Germany—a country with pronounced local-level variation in inheritance customs—and find that municipalities that historically equally apportioned wealth, to this day, elect more women into political councils and have fewer aristocrats in the social elite. Using historic data, we point to two mechanisms: wealth equality and pro-egalitarian preferences. In a final step, we also show that, counterintuitively, equitable inheritance customs positively predict income inequality. We interpret this finding to mean that equitable inheritances level the playing field by rewarding talent, not status.

The title is presented as a question: Do Inheritance Customs Affect Political and Social Inequality? Titles as questions are informative because they typically include some aspect of the observation, theory, or hypothesis. In this case, we can see elements of a theory and hypothesis. For example, a theory of inheritance customs and social inequality could be declared from the title. And the hypothesis can be whether or not such customs influence inequality. So, we have mapped 2 of the 6 stages of the scientific method using just the title.

Moving to the abstract, we are searching for the 4 other stages: observation, data, analysis, and update. In search for observation, we know that they have a theory of inheritance customs and social inequality, but what entity or groups are they observing? In this case, the abstract asks: “Why are some societies more unequal than others?” In a general sense, the authors are observing societies. If we read further, we find the following sentence: “We study Germany—a country with pronounced local-level variation in inheritance customs—and find that municipalities that historically equally apportioned wealth, to this day, elect more women into political councils and have fewer aristocrats in the social elite.” So while the authors are generally interested in societies, they specifically focus on municipalities in Germany.

With observation set, there are three more stages to identify. In the abstract, there is a sentence that clearly mentions data: “Using historic data, we point to two mechanisms: wealth equality and pro-egalitarian preferences”. While we don’t have specifics of the historic data, we can learn more about it later in the article. Finally, in reading the remainder of the abstract, nothing appears clearly as the analysis or update. Therefore, at this point, we would need to read through the article to identify these last two components.

Journal Article #2

The second article we will map is titled “When Diversity Works: The Effects of Coalition Composition on the Success of Lobbying Coalitions” (Junk 2019) by Wiebke Marie Junk which was also published in the *American Journal of Political Science*. Unlike the prior article, I have numbered each sentence by including square brackets [] with a number inside. This will help us read through the abstract more carefully.

When Diversity Works: The Effects of Coalition Composition on the Success of Lobbying Coalitions

Abstract

[1] Lobbyists frequently join forces to influence policy, yet the success of active lobbying coalitions remains a blind spot in the literature. [2] This article is the first to test how and when characteristics of active coalitions increase their lobbying success. [3] Based on pluralist theory, one can expect diverse coalitions, uniting different societal interests, to signal broad support to policy makers. [4] Yet, their responsiveness to this signal (i.e., signaling benefits) and contribution incentives within the coalition (i.e., cooperation costs) are likely to vary with issue salience. [5] This theory is tested on a unique data set comprising 50 issues in five European countries. [6] Results reveal a strong moderating effect of salience on the relationship between coalition diversity and success: On less salient issues, homogenous coalitions are more likely to succeed, whereas the effect reverses with higher salience, where diverse coalitions are more successful. [7] These findings have implications for understanding political responsiveness and potential policy capture.

Recall that our third model of the scientific method includes six stages: Observation, Theory, Hypothesis, Data, Analysis, and Update, so we are searching for representations of these in the title and abstract. The title provides us the basis for a theory. We could reword the title to state a theory of coalition composition and lobbying success. It is not atypical of titles to provide the basis for a theory. The first three sentences of the abstract reveals that the author is observing lobbyists, coalitions, and policy makers. These objects are interacting to create a political phenomenon that the researcher is interested in exploring.

The third sentence “Based on pluralist theory, one can expect diverse coalitions, uniting different societal interests, to signal broad support to policy makers” can be considered a hypothesis. For example, we can restate this sentence: if coalitions are more diverse, then they serve as a clearer signal to policy makers. Sentence four relates to the hypothesis because it introduces the concept of issue salience and the author returns to it in sentence six. Sentence five reads: “This theory is tested on a unique data set comprising 50 issues in five European countries.” The word “data” so this is a clear statement of the data that is used.

In reading sentence six, the author states “Results reveal a strong moderating effect of salience on the relationship between coalition diversity and success.” Issue salience is how widespread an issue is known. If an issue is very salient, that means a lot of people are aware of it. If an issue is not salient, that means that few people are aware of it. We will return to this in a moment. The author started with a theory of coalition composition and lobbying success. However, after analyzing their data, they find that issue salience “moderates” the effect of coalition composition on lobbying success. Therefore, we should update our theory. Unfortunately, the author does not list what kind of analysis they conduct with the data, so we would need to read the article to find these details.

Journal Article #3

The third article we will map is titled “[Evaluating the Conflict-Reducing Effect of UN Peacekeeping Operations](#)” by Havard Hegre, Lisa Hultman, and Havard Mokleiv Nygard published in the *Journal of Politics*.

Evaluating the Conflict-Reducing Effect of UN Peacekeeping Operations

Abstract

[1] Several studies show a beneficial effect of peacekeeping operations (PKOs). [2] However, by looking at individual effect pathways (intensity, duration, recurrence, diffusion) in isolation, they underestimate the peacekeeping impact of PKOs. [3] We propose a novel method of evaluating the combined impact across all pathways based on a statistical model of the efficacy of UN PKOs in preventing the onset, escalation, continuation, and recurrence of internal armed conflict. [4] We run a set of simulations based on the statistical estimates to assess the impact of alternative UN policies for the 2001–13 period. [5] If the UN had invested US\$200 billion in PKOs with strong mandates, major armed conflict would have been reduced by up to two-thirds relative to a

scenario without PKOs and 150,000 lives would have been saved over the 13-year period compared to a no-PKO scenario. [6] UN peacekeeping is clearly a cost-effective way of increasing global security

Let's read through the title and abstract, line by line, and see what each line provides us in terms of the six stages of the scientific method. The title provides us parts of observation since it specifically mentions United Nations (UN) peacekeeping and conflicts. Additionally, the title offers information that could be reworded as: a theory of peacekeeping operations and conflict. Sentence 1 states how prior research, worded as "several studies", shows a positive influence of, worded as "beneficial effect", peacekeeping operations.

Sentence 2 states that looking just at intensity, or duration, or recurrence, or diffusion by themselves overlooks their combined effect on conflict. For example, have you tried to carry a bag of groceries with just one finger? Even though you struggled, you still carried the bag from your car to your home. So, you could argue that your finger has all the strength needed to lug the bag. Now, have you carried a bag of groceries using all five fingers? Most likely but wouldn't say you carried the bag with five fingers, rather, you would declare that you are carrying it with your hand. Therefore, what the authors are arguing is that we need to see the effect of the hand, not just each individual finger. With respect to the scientific method, this sentence is not clear, but seems like it would fit under analysis.

Sentence 3 declares that the authors have a "novel method of evaluating the combined impact across all pathways based on a statistical model". This is clearly analysis because you use a "statistical model" to conduct analysis of data. Additionally, sentence 4 describes how the authors use "simulations based on the statistical estimates to assess the impact of alternative UN policies for the 2001–13 period." While simulations are a bit advanced (Carsey and Harden 2015), but they relate to analysis as well.

Sentences 5 and 6 describe how alternative policy choices by the United Nations could have resulted in less conflict and less lives lost. This most closely relates to update, since Hegre, et. al. suggest that more peacekeeping operations can reduce the impacts of conflicts. After reading through the abstract, the hypothesis and data are not clear, so we would need to read through the article to uncover this information.

Summary of Mapping Journal Article Abstract Content onto Scientific Method stages

Journal Article	Hager and Hilbig 2019	Junk 2019	Hegre, et. al. 2019
Observation	Society and inequality in society	Lobbyists, coalitions, policy makers	United Nations, conflicts
Theory	Equal inheritance rights and societal equality	Coalition composition and lobbying success	Peacekeeping operations and conflict
Hypothesis	"But do equal inheritances succeed in leveling the societal playing field?"	"Based on pluralist theory, one can expect diverse coalitions, uniting different societal interests, to signal broad support to policy makers."	-NIA-
Data	Country-specific: Germany	50 issues in five European countries	-NIA-
Analysis	-NIA-	-NIA-	Statistical models and simulations
Update	-NIA-	Theory of coalition composition, issue salience, and lobbying success	More peacekeeping operations reduces the impacts of conflicts

NIA = Not In Abstract

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3.4: Key Terms/Glossary

- Abstract: An abstract is a summary of the article's contents. Below is the title and abstract.
 - Falsification: the principle that any theory, or explanation of how the world works, can always be proven false and that a theory can never be proven true
 - Hypothesis: a statement derived from theory, providing the direction of the relationship between two variables
 - Paradigm: current way of thinking, doing, and understanding
 - Philosophy of science: exploration of the foundations, methods, and implications of science
 - Scientific method: systematic process of discovering new knowledge
 - Theory: a statement, derived from observations, that declares a relationship between at least two variables
-

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3.5: Summary

Summary of Section 3.1: Philosophy of Science

The philosophy of science is the exploration of science by asking at least three questions: What are the foundations of science? What are the methods of science? And what are the implications of science? Karl Popper is a notable figure for his contribution of the concept of falsification, while Thomas Kuhn is well known for his concept of paradigm shifts.

Summary of Section 3.2: What is the Scientific Method?

The scientific method is explained using three models, from simple to complex. Common to all three are the initial steps, observation and theory making. Observations of the world around us lead to inquiry about the phenomena we see and to propose theories about how we think the world works. Derived from the theory is a hypothesis that will allow us to test the theory. Evidence in support of the theory may be found by collecting and analyzing the data.

Summary of Section 3.3: Applying the Scientific Method to Political Phenomena

Open access journal article abstracts are mapped to see how political scientists utilize the scientific method in their research. Not all political scientists will utilize each stage of the scientific method due to the nature of their research question. In the three articles mapped in this section, all participate in the observation of phenomena and theory making; however only Hager and Hilbig 2019 and Junk 2019 participate in data collection; whereas Junk 2019 and Hegre et. al. 2019 both update their theories.

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3.6: Review Questions

1. Which philosopher of science is most associated with the concept of falsification?
 - a. Karl Popper
 - b. Thomas Kuhn
 - c. Richard McKelvey
 - d. Kenneth Arrow
2. Paradigm shifts can occur due to
 - a. production of new research
 - b. challenging existing research
 - c. continuing to ask the same question
 - d. exploring the same answers
3. Which of the following is NOT a part of the scientific method?
 - a. Argument
 - b. Observation
 - c. Theory
 - d. Hypothesis
 - e. Data
 - f. Analysis
 - g. Update
4. Common to the scientific method models are each of the following except:
 - a. Argument
 - b. Observation
 - c. Theory
 - d. Hypothesis
 - e. Data
 - f. Analysis
 - g. Update
5. Engaging in the scientific method, requires that researchers must participate in every stage.
 - a. True
 - b. False

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3.7: Critical Thinking Questions

1. Suppose you hear on the news that a candidate's personality has implications for why people are voting for the candidate. When you ask your friends and family about their opinions about the candidate, none of them seem to mention personality as a factor in their vote. The news and your friends and family seem to be contradicting each other. Utilizing the scientific method, how might you go about investigating this?
 2. Utilizing the three articles mapped in the chapter as examples, create a similar map of an article you find interesting. You can find open access articles at <https://www.cambridge.org/core/journals/american-political-science-review/open-access> or [onlinelibrary.wiley.com/action/doSearch?AllField=open+source&ConceptID=58 &startPage=&accessStatusFilter=on](https://onlinelibrary.wiley.com/action/doSearch?AllField=open+source&ConceptID=58&startPage=&accessStatusFilter=on)
 3. Write down observations you have made about the world. What questions do you have? What do you think are answers to the questions?
-

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3.8: Suggestions for Further Reading/Study

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CHAPTER OVERVIEW

4: Theories, Hypotheses, Variables, and Units

- 4.1: Correlation and Causation
- 4.2: Theory Construction
- 4.3: Generating Hypotheses from Theories
- 4.4: Exploring Variables
- 4.5: Units of Observation and Units of Analysis
- 4.6: Casual Modeling
- 4.7: Key Terms/Glossary
- 4.8: Critical Thinking Problems
- 4.9: Review Questions
- 4.10: Critical Thinking Questions
- 4.11: Critical Thinking Questions

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4.1: Correlation and Causation

Learning Objectives

By the end of this section, you will be able to:

- Remember the definition of theory
- Understand how a theory is generated
- Apply a model theory
- Analyze increasingly complex theories
- Evaluate statements to determine if they are theories or not
- Create a theory

Before diving into theories, hypotheses, variables, and units, it's important to highlight two broader concepts: correlation and causation. **Correlation** can be defined as a “process of establishing a relationship or connection between two or more measures” (“Correlation - Google Search” n.d.). For example, imagine a car is waiting at a road intersection. When the traffic light turns green, we observe the car move forward. It can be argued that there is a correlation between the color displayed on the traffic light and the movement of the vehicle. The traffic light–car example is relatively clear, but the question is: does the traffic light color cause the car to move? This question brings forward the concept of causation. **Causation** can be defined “as the action of causing or producing” (“Definition of Causation | Dictionary.com” n.d.). While the movement of the car corresponds to the color of the traffic light, what causes the movement of the traffic light is the driver pressing down on the accelerator pedal. Doing so, fuel is released into the engine which powers the turning of the wheels.

Why is correlation and causation important to political science? Correlation is important because it lets us establish connections between political ideas, actors, institutions, and processes. When we observe the world, our mind is primed to make connections between things. Doing so helps us give meaning to the world and develop our understanding of it.

For example, let's explore the relationship between demographics and congressional representation. Below is a map of the United States. Each state is shaded in a color of sky-blue which denote the percentage of women who reside in each state. Using the legend in the bottom left corner of the map, we see that the lightest shade of sky-blue represents 47.9% to 50% of a state's population is woman. The darkest shade means that women account for 51.5% to 52.6% of a state's population. In other words, lighter shades mean a lower percentage of women and darker shades mean a higher percentage of women.

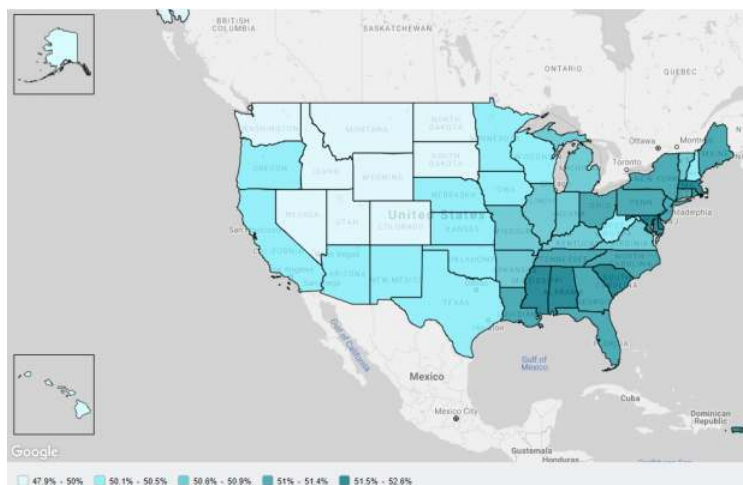


Figure 4.1.1: Map of percent of women by U.S. state. Source: U.S. Census Bureau.

The next map of the United States displays information about the representation of women in the 116th Congress. In reviewing the map, we see variation in the number of women who represent different states. For example, we see that California has 20 women representing it in Congress. While this map doesn't differentiate between the Senate and the House of Representatives, we know that California has two female senators and eighteen Congresswomen. You will notice that the following states have no female

representation: Idaho, Montana, North Dakota, South Dakota, Utah, Arkansas, Louisiana, Kentucky, South Carolina, Vermont, Rhode Island, and Maryland.



Figure 4.1.2: Map of Women in Congress by U.S. state. Source: U.S. House of Representatives.

Seeing these two maps lets us establish a connection between the two concepts represented by the maps. The question we ask ourselves is does there appear to be a correlation between the percent of women living in a state and the number of women representing that state and Congress? In reviewing both maps, it would be fair to suggest that there does appear to be a correlation between the two. For example, we see that Idaho, Montana, and the Dakotas have 50% or fewer women living in these states. Then when we look at the congressional map, we see that those states have no females representing them in Congress. Therefore, we have some evidence to suggest that there is a relationship.

In political science, we are interested in exploring this relationship further. A question we can ask ourselves is: as the percentage of women increases in a state, do we see an increase in the number of women in Congress? And using the language of causation, we could ask: do greater numbers of women cause an increase in the number of women representatives? The figure below is a visualization of a correlation between our two concepts. As we will explore later in this chapter, this is an example of what we call a causal model.



Figure 4.1.3: Correlation between concepts

There is a commonly repeated adage that correlation does not equal causation. In political science, we take this adage to heart because it is important to be critical of what we perceive to be connections between two concepts and not making the inferential leap that one is caused by the other. Unlike our peers in the natural sciences, we study individuals, institutions, and processes that are inherently complex and intertwined. We, like most others, can be susceptible to presuming that there is a causal relationship between objects we are observing. Therefore, it is important to take to heart that correlation is a prerequisite to causation, but there are other conditions that need to be satisfied for us to make the inference of causality.

Four Conditions of Causality

There are four conditions of causality: logical time ordering, correlation, mechanism, and nonspuriousness. Logical time ordering refers to the idea that one variable needs to precede another variable in time for the first variable to influence the second variable. For example, throughout the world, people are protesting their governments. In some countries, governments respond with the metaphorical yawn. However, in other countries, the governments may respond with repressive tactics. The question is do the protest precede the government response? On its face, the answer is yes because why would the government respond to silence?

The second condition of causality is correlation. As we explored above, correlation is a connection between two variables. Correlation is a prerequisite to establishing a causal relationship because if two variables do not move together, then it is difficult to suggest that one influences the other. Maintaining our example of public protest and government response, we often see that when people protest, the government pays attention. This is due to mainstream media coverage and social media activity of the protest. Since governments typically have responsibility for maintaining peace and security, anytime there are activities that may disrupt peace, the government will likely pay attention to what the media is covering and decide whether to respond.

Our third condition of causality is mechanism. A causal mechanism is an explanation for how one variable influences the other. Explanations can vary from relatively straightforward to exhaustively complex. There is utility in employing both types of explanations to describe the influence of one variable on the next variable. The reason is it may be straightforward to some while the government responds to protesters. However, underlying this interaction, there may be other actors, decisions, and actions that may shape engagement between the government and protesters. For example, the Arab Spring starting in 2010 provides a contemporary example where people throughout countries in the Middle East publicly protested for changes in their political leadership and government systems. How did these protesters come together? Some researchers point to social media, like Facebook and Twitter, which helped people collectively organize their protesting efforts. Thus, we have a mechanism that shows how protest formed, and how that initiated reaction from governments.

The final condition of causality is non-spuriousness. Non-spuriousness means that another variable is not having an influence. With our example of protest and government response, we must be careful to consider that other factors may influence this relationship. What else could influence a government's response to a protest within its country? A government may be hesitant to respond with lethal force if it knows it's being observed by an international media. An international media outlet serves as a third-party observer to the activities within a country. As the media records through video and first-hand accounts, they can begin to share that information with the rest of the world. A government that uses lethal weapons on people who are peacefully protesting could result in an outcry from the international community. Thus, are protests the only thing that is influencing the government's response? Or is there a spurious factor, such as the international media outlet, that having the government question how it should respond?

As you can see, from a running example of public protest and government action, establishing a causal relationship between two variables is difficult. The difficulty doesn't mean we don't work through these four conditions, both using reason and evidence, rather it represents a rigorous way to determine a causal relationship.

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4.2: Theory Constrution

Learning Objectives

By the end of this section, you will be able to:

- Remember the definition of theory
- Understand how a theory is generated
- Apply a model theory
- Analyze increasingly complex theories
- Evaluate statements to determine if they are theories or not
- Create a theory

Remembering the Definition of Theory

In its simplest form, a theory is an explanation of how the world works. Now, there are many ways in which the world works: natural, physical, chemical, biological, social, political, historical and the list can go on. For example, political scientists are interested in how elected officials behave during campaigns (Warren 2008). One theory is that elected officials are more responsive to voters during campaigns. A reason an elected official is more likely to spend time in their communities, host town halls, and meet with stakeholders during campaigns is because they want to demonstrate how they are proactively serving their constituents.

In addition to suggesting how some aspect of the world works, theories also lead us to explore possibilities. For example, what happens if an elected official spends less time or more time with their constituents during campaigns? One could argue that by spending less time with constituents during the campaign, an elected official is less likely to earn their support. On the other hand, if an elected official spends more time with constituents, support for their campaigns will increase.

In constructing a theory, we are engaging in a process of observing the world and proposing how the world works.

A theory is a set of assumptions about constants, variables, and the relationship between variables. In other words, a theory is a statement about the relationship between two objects with all other objects held constant. In a complex world with a multitude of objects surrounding us, it can be difficult to focus on just two objects. Thus, for a theory to be useful, we need to be able to focus on at least two objects and the relationship between those objects. So, how can we focus on just two objects and their relationship? To help us focus, we can hold all other objects constant. Constant means that all other objects, except for the two objects we are interested in, are held still.

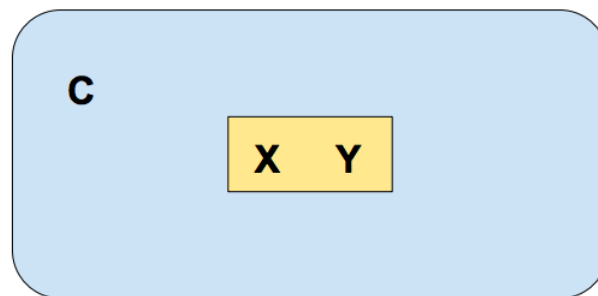


Figure 4.2.1: Visualization of a theory

The letter X and the letter Y represent the two objects of interest, while the yellow box symbolizes that a relationship exists between the two objects. The reason a theory needs to have at least two objects is because a theory is an explanation of how one object relates to another object. If we are just focused on one object, then we do not have a theory. Rather, we are observing an object for its own sake.

Understanding How a Theory is Generated

A theory can be generated in three ways. First, a theory can be generated without reference to any existing theory. This is very rare since a theory requires two objects. These two objects exist because theories have attempted to explain the objects. Second, a

theory can be an extension to an existing theory. Given the multitude of theories that already exist, it is common for someone to rely on and extend an existing theory. Third, a theory can be the contradiction of an existing theory. While it is common to build on an existing theory, it can be just as common to use contradiction to generate a theory.

Applying a Model Theory

A model theory is a statement that two objects, X and Y, exists and that a relationship exists between X and Y. With this model theory, how can we apply it to topics or subjects we are interested in? Let's consider three examples.

First, we may be interested in the relationship between political actors in a democracy. The two political actors we are interested in is the government and the media. We could argue that the media is represented by object X while the government represented by object Y. A theory should explain why and how there is a relationship between the media and the government. Additionally, the theory should assume that other political actors are held constant, so we can focus on the relationship between the media and the government.

Our next example is the relationship between information and voters in a representative democracy. In this example, information is represented by X while voters are represented by Y. Why would a voter have a relationship with information? One reason this relationship would exist is because voters use information to make decisions on how to vote. Another reason is that information is sent to voters from candidates and campaigns in order to influence a voter's decision.

Analyzing Increasingly Complex Theories

The core of any theory is the relationship between a minimum of two objects of interest. However, theories can be more complex by having additional variables that can serve different roles in a theory. For example, imagine we have a theory that states a relationship between three variables: X, Y, and Z. The relationship between these three objects could be described in a multitude of ways, but let's focus on three potential relationships: X and Y, Y and Z, and X and Z.

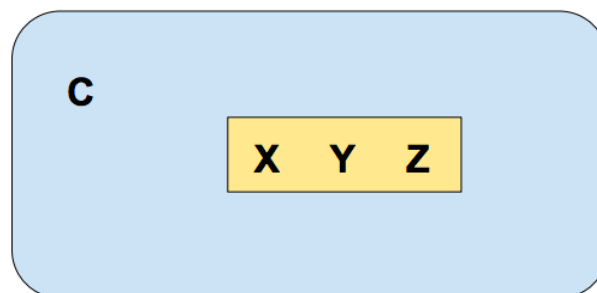


Figure 4.2.2: Visualization of a complex theory

Creating a Theory

Theories are statements of relationships between two concepts. There are three characteristics of theories that we should seek to achieve when proposing a theory. First, a theory should be general, meaning that it can include a variety of operationalizations and geographic contexts. Let's compare a specific theory to a general theory. A specific theory may be focused on how voters in a midwestern U.S. state decide to support a presidential candidate. A researcher would then propose hypotheses, collect evidence, analyze the data, and make some findings. The knowledge generated from this process would be useful for future researchers want to better understand the Midwestern voter, to political campaigns that try to reach these voters, and to news outlets that want to provide background information to a new story at the written. The question is: How can this theory be extended beyond the voter living in the Midwest of the United States?

To answer this question, we need to propose a more general theory. A general theory can explore how voters respond to national-level candidates. A researcher would again propose hypotheses, collect evidence, analyze the data, and generate some results. Given that there are voters in Europe, South America, Africa, Asia, Oceania, as well as North America, we can collect evidence from voters living in countries in these regions of the world. In analyzing the data, research and a fine a lot of differences but they also might find a lot of similarities between voters responding to national level candidates in their countries. The similarities and

differences can help us better understand the relationship declared by the theory. So, by using a more general theory we could subsume the more specific theory that was originally discussed.

It's not to say that a specific theory is less useful than a general theory, because you can see how the two ideas intertwine. By starting with the general theory, we can think more broadly about how it applies in different times, places, and subjects. From here, we can narrow down to specific places that are of greater interest to us knowing that we are feeding into the broader exploration and knowledge creation process.

The second characteristic of theories is to try to make them parsimonious. Parsimonious means frugal or to use something sparingly. When generating a theory, the point is to keep it simple because when you make a theory too complicated it's more difficult to see its generality and, as will discuss momentarily, it's falsifiability. Let's walk through two examples of theories from the most parsimonious to the least parsimonious so we can fix in our mind the utility of maintaining simplicity. Consider that I have a theory about gender and representation. My hypothesis is that gender has an influence on who runs and who wins elected office. Therefore, in a study of voters, male candidates are more likely than female candidates to be elected to office. To explore this hypothesis, I would collect data, analyze it, and reach some initial findings that either support or do not support my hypothesis. This is a relatively straightforward theory in the sense that an attribute of a candidate influences a voter support for that candidate.

Now, let's make our original theory more complicated. Let's consider a theory about candidate attributes, voter behavior, campaign strategies, election processes, and policy outcomes. What should strike you is that we have more than two concepts; here we have five concepts. In proposing this theory, it could be argued that these concepts are linearly related: candidates attributes affect voter behavior, which influences campaign strategies, which then shapes electoral processes, and finally then alters policy outcomes. A well-reasoned explanation for these connections may be convincing to some. However, the length of the theoretical chain makes it susceptible to criticism. For example, are candidate attributes the only thing that influences voting behavior? Moreover, does voter behavior influence campaign strategies or is the relationship the other way around? Therefore, given the complexity of the theory, it can be difficult to discern the nature of the relationships between different concepts. Hence, parsimony is an important characteristic to consider when developing a theory to make clear and bring into relationships within a theory.

Falsifiability is the third characteristic of theories we want to explain. Falsifiability is the ability of a theory to be shown as false. Why should a theory be falsifiable? A theory that is not falsifiable means that no amount of reason or evidence can lead a researcher to suggest that their original theory is incorrect. If reason or evidence cannot be presented, then a theory cannot be scrutinized. Thus, the scientific method process is broken because new information cannot be brought to challenge a theory and suggest a new theory for us to be considered. At some point, enough reason and evidence are brought to bear to suggest a theory is now a law. But the law is not ironclad, it just becomes accepted by the scientific community for the time being. Establishing a theory as a law does not preclude it from being falsified in the future when new times, places, and contexts may challenge the findings from theories.

Together, generality, parsimoniousness, and falsifiability work together to make theories integral parts of the scientific method and the discovery and creation of new knowledge.

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4.3: Generating Hypotheses from Theories

Learning Objectives

By the end of this section, you will be able to:

- Remember the definition of hypothesis
- Understand how a hypothesis is derived from a theory
- Apply a model hypothesis
- Analyze increasingly complex hypotheses
- Evaluate statements to determine if they are hypotheses or not
- Create a hypothesis

A **hypothesis** is an if-then statement that is derived from a theory. While a theory states that there is a relationship between two concepts or objects of interest, a hypothesis declares the values of the two concepts and how the change in the value of one affects the change in the value of the second object. For instance, a hypothesis derived from the theory that elected officials are more responsive to voters during campaigns might be that during the campaign season elected officials are more likely to host town hall meetings as compared to when the candidate is not running for reelection.

Generating hypotheses from theories can be a difficult task because concepts need to be operationalized into objects that can be measured. Recall that theories must be falsifiable. A hypothesis allows us to test the theory, providing evidence in support of our theory. Additional examples of hypotheses include:

- In a comparison of US citizens, those that incur a higher cost of voting will be less likely to vote in each election.
- In a comparison of US states, those that have a more professionalized legislature are more likely to produce complex laws.
- In a comparison of countries, those that have developed natural resources are more likely to have autocratic rulers.
- In a comparison of political leaders, those that have diverse economies are more likely to support climate change policies.

The anatomy of a hypothesis is that it includes the units of observation, one value of the independent variable, and one value of the dependent variable. For example, let's break down one of the examples from above. "In a comparison of US states" the term US states would serve as the units of observation. In the part "a more professionalized legislature", the term professionalized (or professionalization) would serve as the independent variable. And finally, in part "more likely to produce complex law", the term complex (or complexity) would serve as the dependent variable.

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4.4: Exploring Variables

Learning Objectives

By the end of this section, you will be able to:

- Remember that variables can be categorized as discrete or continuous
- Differentiate between discrete and continuous variables

Variables are objects that vary or change. Variables vary because of their inherent properties, by nature, or by manipulation. Let's explore each of these in turn. Variables may hold inherent properties that make them vary. For example, let's explore political efficacy. Political efficacy is a complex concept (Atabey and Hasta 2018), but it boils down to your belief that you can understand politics, influence a political institution, and that the political institution will be responsive to your concerns.

Political efficacy can be high, medium, or low. If, for example, you had a high understanding of politics, a strong belief that you can influence a political institution, a high expectation that a political institution would be responsive to your concerns, then you would have high political efficacy. On the other hand, you would have low political efficacy if you had little understanding of politics, a weak belief that you can influence an institution, and low expectations about institutional responsiveness. How can we measure political efficacy beyond using the high, medium and low categories?

Variables can be placed into two categories: discrete and continuous. Discrete variables can have values which we can count. For instance, a discrete variable can be -2, -1, 0, +1, +2, and so forth. On the other hand, continuous variables have values which we can specifically measure. In this case, a continuous variable can be zero, 0.1, 0.2, 0.3, 0.4, 0.5, and so forth. Within these two categories, exists two additional variable types. Discrete variables can have nominal and ordinal values. While continuous variables can have interval and ratio values. These are discussed in a later chapter.

What's one way we can visualize discrete and continuous variables? Below in Figure #.1, there are three panels. Panel 1, which visually represents two discrete variables. Both the independent variable and the dependent variable have two values: no or yes. Given that we can count no ("0") and yes ("1"), we would consider this a discrete set of variables. Let's consider the following example. Our independent variable is "Registered to Vote" has two values: not registered to vote ("No") or registered to vote ("Yes"). Our dependent variable is "Voted in the prior Presidential election" and has two values: did not vote in the prior presidential election ("No") and did vote in the prior presidential election ("Yes").

		Dependent Variable	
		Value: No	Value: Yes
Independent Variable	Value: No		
	Value: Yes		

Panel 1: Discrete

Figure 4.4.1: Progress from Discrete to Continuous Variables, Panel 1

Panel 2 shows how we begin to move from discrete values to continuous values. This occurs when we add more values of the independent variable, dependent variable, or both simultaneously. For example, instead of our independent variable being "Registered to Vote" as holding only two values, Yes or No, let's think of this as "Likelihood of Being Registered to Vote" which

holds more than two values. The likelihood ranges from higher, medium, and lower, and these values are represented by the increased number of rows.

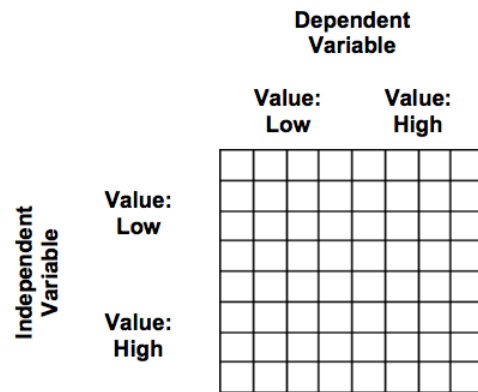


Figure 4.4.2: Progress from Discrete to Continuous Variables, Panel 2

Finally, panel 3 visually represents a continuous independent variable and dependent variable. The reason this is the case we have many values of both variables, as represented by the high number of rows and columns, in comparison to panel 2.

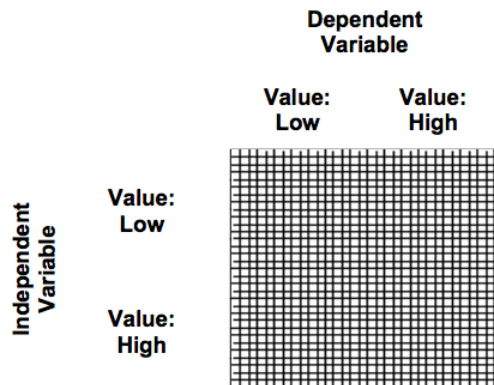


Figure 4.4.3: Progress from Discrete to Continuous Variables, Panel 3

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4.5: Units of Observation and Units of Analysis

Learning Objectives

By the end of this section, you will be able to:

- Understand the difference between a unit of observation and unit of analysis

Political scientists observe a range of political objects, such as political actors, institutions, processes, interactions, and outcomes. Units of observation are the objects that a researcher is specifically observing with the goal of describing the relationship between the objects. On the other hand, a unit of analysis is the object that a researcher is specifically analyzing. These two, units of observation and analysis, may sound similar, but are different concepts. Let's explore three examples from open access, peer-reviewed journal articles to help illuminate the difference between units of observation and units of analysis.

Our first example comes from the *Journal for International Development* and the article “Rethinking research partnerships: Evidence and the politics of participation in research partnerships for international development” by Jude Fransman and Kate Newman (Fransman and Newman 2019). In the article abstract, they write: “This article responds to the drive for research partnerships between academics and practitioners, arguing that while potential benefits are clear, these are frequently not actualized resulting in partnerships that are ineffectual or worse, exacerbate damaging or inequitable assumptions and practices. In order to understand/improve partnerships, a systematic analysis of the interrelationship between what counts as evidence and dynamics of participation is proposed. Drawing on data from a seminar series and iterative analysis of seven case studies of partnerships between Higher Education Institutions and International Non-Governmental Organisations, the article concludes by suggesting substantial shifts in the theory and practice of partnerships.”

Thus, the authors observe how higher education institutions and international non-governmental organizations partner to conduct research. And this means their units of observation are academics and practitioners. However, the question is, what are Fransman and Newman analyzing? Is it the academic organizations, international non-governmental organizations, or both? With a careful read of the article, it could be argued that the units of analysis are case studies of the partnerships themselves. For example, Table 1 in the article shows a comparison of seven case studies that details the lead organization, additional partners Involved, types of funding, level/scale of the partnership, disciplinary/thematic focus, and research approaches. And throughout the remainder of the article, they are focused on the partnerships.

Our second example is found in the *Economics and Politics* and the article “The heterogeneous effect of oil discoveries on democracy” by Tania Masi and Roberto Ricciuti (Masi and Ricciuti 2019). In the article abstract, they state: “This paper evaluates the existence of a resource curse on political regimes using the Synthetic Control Method. Focusing on 12 countries, we compare their democracy level with the weighted democracy level of countries that have not experienced oil shocks and have similar pre-event characteristics. We find that the exogenous variation in oil endowment does not have the same effect on all countries. In most cases, the event has a negative effect in the long run, but countries with a pre-existing high level of democracy are not negatively affected.” This abstract suggests that the authors are observing countries. Now, are the countries the unit of analysis as well? A thorough review of the article suggests that the units of analysis are the countries as well. For example, Figure 1 in the article compares the level of democracy in each country with a “synthetic” version of itself. This suggests that both the unit of observation and the unit of analysis are the same.

Our third example is located in the *Journal of Representative Democracy* and the article “Filling the Void? Political Responsiveness of Populist Parties” by Carolina Plescia, Sylvia Kritzing, and Lorenzo De Sio (Plescia, Kritzing, and De Sio 2019). The abstract reads: “This paper examines the responsiveness of populist parties to the salience of issues amongst the public focusing on a large number of issues on which parties campaign during elections. The paper investigates both left- and right-wing populist parties comparatively in three countries, namely Austria, Germany and Italy. We find that while populist parties carry out an important responsiveness function, they are only slightly more responsive than their mainstream counterparts on the issues they own. The results of this paper have important implications for our understanding of political representation and the future of the populist appeal.” There are several objects mentioned in the abstract that could serve as units of observation: parties, issues, the public, campaigns, elections, and countries. It would follow that the researchers are observing parties within specific countries, so we could assert that the units of observation are countries themselves. However, given the variety of the objects the paper is

examining, it's clear that the units of analysis are not just parties within countries. We could argue that the units of analysis are the relationship between parties and the public. Particularly, this article is interested in how parties are responsiveness to the priorities of the public. Therefore, the researchers are keenly interested in measuring the relationship between these two objects.

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4.6: Casual Modeling

Learning Objectives

By the end of this section, you will be able to:

- Create a causal model

Causal modeling is the process of visualizing the relationships between concepts of interest (Youngblut 1994a, [b] 1994). Additionally, this process also encourages researchers to consider the possibility of other relationships between concepts that were not originally theorized or otherwise considered.

Causal modeling was popularized by Judea Pearl, among other scholars (Pearl 1995, 2009; Pearl, Glymour, and Jewell 2016). Underlying causal modeling is the concept of causality. In a public lecture at the University of California, Los Angeles, Dr. Pearl stated that “causality – namely, our awareness of what causes what in the world and why it matters” (Pearl 2009).

As a student of political science, it is important to know that the concept of causality has been broached with adherence or passivism in the discipline. Those who adhere to the concept of causality are vested in theorizing, hypothesizing, and accumulating empirical evidence that explains the causes and effects of political behavior, processes, and institutions. Research that does not aspire to declare and determine a cause-and-effect relationship is not rigorous, in the view of adherents. On the other hand, passivists of causality believe, while important, the discipline should not preclude or dismiss studies of politics that don’t have an explicit cause-and-effect relationship which is being examined. The aspiration is on discovery and explanation, not only cause-and-effect.

In his book *Causality*, Dr. Pearl (2009) shares: “The two fundamental questions of causality are: (1) What empirical evidence is required for legitimate inference of cause-effect relationships? (2) Given that we are willing to accept causal information about a phenomenon, what inferences can we draw from such information, and how? These questions have been without satisfactory answers in part because we have not had a clear semantics for causal claims and in part because we have not had effective mathematical tools for casting causal questions or deriving causal answers.”

Why are these questions important for political science students and scholars? Regarding the first question, we observe the world. From our observation, we begin the process of stating theories, producing hypotheses, and finding explanations from political actors, behaviors, processes, and institutions. The observed world offers us empirical evidence and this evidence is a prerequisite to inferring a cause-effect relation. With respect to the second question, political science grapples with what inferences can be drawn from information and how. Information includes quantitative and qualitative data. How we draw inferences from this information includes the use of probability, statistics, mathematics, and logic.

Causal modeling, as Dr. Pearl has explored, has an underlying logic and mathematics. For our purposes, we want to explore three visualizations to seed the utility of causal modeling and leave the underlying logic and mathematics for you to further explore on your own or in future courses. Below are three causal models: 1, 2, and 3.

Model 1 shows the simplest relationship between two objects: A and B. There is an arrow that points from A to B, this denotes the direction of the relationship. One can assume when an arrow points from one object to another, that the pointing object is a “cause” while the pointed object is an “effect.”

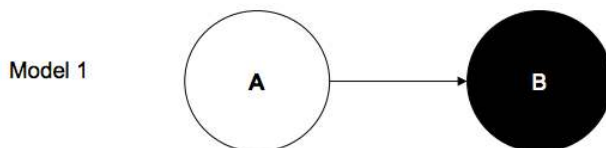


Figure 4.6.1: Causal model: A to B

Model 2 shows the relationship between three objects: A, M, and B. There is an arrow that points from A to M. M stands for mediator, since it mediates, or stands in between, the relationship between A and B. Given that A influences B through M, A is

more precisely stated as an “indirect cause”. While there is an arrow from M to B, M is not considered the “cause” because the model includes A.

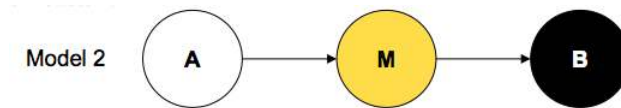


Figure 4.6.2: Causal model: A to M to B

Finally, model 3 shows the relationship between three objects: A, B, and C. First, we notice that A points to B, meaning that A is considered a “cause” of the “effect” B. However, unlike model 2, we also see C. C has a directional relationship with both A and B. In this instance, C is called a “confounder” because we didn’t explicitly include it in the original model, as denoted by the dots instead of solid lines of the circle.

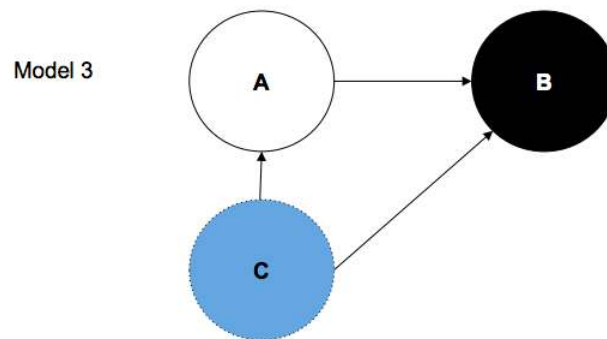


Figure 4.6.3: Causal model: C to A, A to B, and C to B

Drawing causal models is useful because it lets us “see” the relationships between objects of interest. As you explore political phenomenon, keep the tool of causal modeling handy.

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4.7: Key Terms/Glossary

- **Causal modeling:** visual method for describing simple and complex relationships between variables
 - **Causation:** an explanation of how one variable, typically known as the independent variable, affects another variable, typically known as the dependent variable
 - **Correlation:** a relationship between two variables
 - **Hypothesis:** an if-then statement explaining how one variable should influence another variable
 - **Theory:** a statement declaring a relationship between two variables
 - **Unit of analysis:** an object that is analyzed, using qualitative or quantitative methods, by the researcher
 - **Unit of observation:** an object that is observed by a researcher
 - **Variable:** an object that can hold at least two values
-

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4.8: Critical Thinking Problems

Summary of Section 4.1: Correlation and Causation

Causation and correlation are important to political science. Correlation establishes connections between ideas, actors, institutions, and processes while causation establishes a causal connection. Because connections are established does not mean that the connection is a causal one; correlation does not equal causation. Correlation is, however, one condition of causality along with logical time ordering, mechanism, and non-spuriousness. When these four conditions are met, a causal connection is possible.

Summary of Section 4.2: Theory Construction

A theory is an explanation of how the world works. It is a set of assumptions about constants, variables, and the relationship between variables. Generating a theory can occur in three ways: without referencing existing theory, extending an existing theory, or contradicting an existing theory. When creating a theory, researchers should remember that theories should be general, parsimonious and falsifiable.

Summary of Section 4.3: Generating Hypotheses from Theories

A hypothesis is an if-then statement that is derived from a theory. While a theory states that there is a relationship between two concepts or objects of interest, a hypothesis declares the values of the two concepts and how the change in the value of one affects the change in the value of the second object. Hypothesis should contain three elements: units of observation, a value of the independent variable, and a value of the dependent variable.

Summary of Section 4.4: Exploring Variables

Variables are objects that vary or change due to their inherent properties. They can be placed in two categories: discrete (values we can count) and continuous (values we can measure). Discrete values can be nominal or ordinal whereas continuous variables can be interval or ratio.

Summary of Section 4.5: Units of Observation and Units of Analysis

Political scientists observe a wide range of political objects; however, these objects do not have the same purpose. Some objects are units of observation and others are units of analysis. Units of observation are the objects that a researcher is specifically observing with the goal of describing the relationship between the objects. A unit of analysis is the object that a researcher is specifically analyzing.

Summary of Section 4.6: Causal Modeling

Causal modeling is the process of visualizing the relationships between concepts of interest. It allows us to “see” the relationships between objects of interest. It can also be useful in assisting researchers to consider the possibility of other relationships between concepts.

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4.9: Review Questions

1. Correlation is when one variable causes another variable to change.
 - a. True
 - b. False
2. Causation is when one variable is correlated with another variable
 - a. True
 - b. False
3. Hypotheses are typically considered if-then statements
 - a. True
 - b. False
4. Identify the discrete variable(s) and the continuous variable(s).
 - a. Gender and money
 - b. Money and gender
 - c. Race and gender
 - d. Time and race
5. Which of the following best describes a unit of observation compared to a unit of analysis?
 - a. Unit of observation is what the researcher is looking at, while the unit of analysis is what the researcher is analyzing
 - b. Unit of observation is what the researcher is analyzing, while the unit of analysis is what the researcher is observing
 - c. The unit of observation and the unit of analysis are the exact same thing, therefore there is no comparison to be made

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4.10: Critical Thinking Questions

1. Generate a causal theory between two variables you are interested in. Assess the likelihood of causality by addressing the four conditions of causality.
 2. Generate a causal theory between two variables and provide a visual representation. Next, create a hypothesis that would allow you to test your theory.
 3. Identify a variable of interest and assess how you will measure it. Utilizing the same variable, first create a discrete variable and then create a continuous measure of the variable.
-

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4.11: Critical Thinking Questions

Websites

- “Step 3: Generate Hypotheses about Likely Sources | Foodborne Outbreaks | Food Safety | CDC.” 2018. November 5, 2018. www.cdc.gov/foodsafety/outbreaks/investigatingoutbreaks/investigations/sources.html.
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CHAPTER OVERVIEW

5: Conceptualization, Operationalization, Measurement

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5.1: Conceptualization in Political Science

Learning Objectives

By the end of this section, you will be able to:

- Identify the process by which ideas and observations are turned into concepts
- Consider the relationship between concepts, dimensions, and indicators
- Understand the method of concept mapping

What is conceptualization?

Concepts are the building blocks of theories. Concepts are “names for things, feelings, and ideas generated or acquired by people in the course of relating to each other and to their environment.”¹ Creating concepts is one of the first steps to engaging with the world. The process of conceptualization calls for the powers of observation and imagination. A political scientist might observe that all groups of people abide by authority, and that authority looks different across different groups of people. That might lead to the conceptualization of “regime,” or the organization of political authority across different societies. Or a political theorist might imagine that it’s possible to organize a political authority for all of humankind. That might lead to the conceptualization of “global government.” In other words, conceptualization is a process of naming things in the world, either observed or imagined (or sometimes a mix of the two), and using language to communicate those names, or concepts.

Political thinkers have long sought to conceptualize political authority, beginning with early philosophers such as Aristotle. In *Politics*, Aristotle begins by conceptualizing aspects of political life such as citizenship and the state. He asserts, “He who has the power to take part in the deliberative or judicial administration of any state is said by us to be a citizens [sic] of that state; and, speaking generally, a state is a body of citizens sufficing for the purposes of life.”² After noting these building blocks of political life, Aristotle then wonders about the many ways in which citizens and states are organized. He muses,

“We have next to consider whether there is only one form of government or many, and if many, what they are, and how many, and what are the differences between them. ...Governments which have a regard to the common interest are constituted in accordance with strict principles of justice, and are therefore true forms; but those which regard only the interest of the rulers are all defective and perverted forms, for they are despotic, whereas a state is a community of freemen.

“Having determined these points, we have next to consider how many forms of government there are, and what they are; and in the first place what are the true forms, for when they are determined the perversions of them will at once be apparent. The words constitution and government have the same meaning, and the government, which is the supreme authority in states, must be in the hands of one, or of a few, or of the many. The true forms of government, therefore, are those in which the one, or the few, or the many, govern with a view to the common interest; but governments which rule with a view to the private interest, whether of the one or of the few, or of the many, are perversions.”³

Aristotle, writing from a place of observation but also imagination, offers foundational concepts for understanding political life: citizens, states, and varieties of government. A shorthand term for the concept “varieties of government” that we use today is “regime.”

For Aristotle, the key variation in political authority is whether government (or regime) comprises one, a few, or many leaders. Second, he considers in whose interest that government is ruling, a narrow or broader constituency. By conceptualizing government in this way, Aristotle is making some important moves. He is asserting that there are two salient dimensions to regime, the size of the ruling group and in whose interest, they are ruling. Table 5.1 summarizes the types of government (regime) identified by Aristotle.

Table 5.1.1: Aristotle's forms of government (regime types)

	Ruling in whose interest	
Number of Rulers	Common interest	Private interests of one or the few
One	Kingship	Tyranny
Few	Aristocracy	Oligarchy
Many	Polity	Democracy

In short, concept building is determining, to the best of our ability, precise language for observations and ideas that we believe are important for understanding social life. Concepts are the building blocks for theory and theory testing.

Dimensions and indicators

The brief foray into Aristotle's conceptualization of political authority reveals two additional important aspects of concept building: dimensions and indicators. Concepts, especially the complex ones that are foundational in the study of human behavior, often have many dimensions. After identifying a concept such as "forms of government" (hereafter "regime"), concept building involves further thinking about underlying variation in that concept. Regime type, for example, might be thought of in Aristotelian terms: how concentrated political authority is in that society (e.g., in one, a few, or many leaders). Another dimension of regime may be how leaders are selected, regardless of their number. Yet another dimension, considered by Aristotle, is whether leaders serve public or private interests.

These are all dimensions of the same single concept, regime. Consider another important concept in politics, prosperity. There are many dimensions to this concept. One dimension may be the amount of wealth in a society. Another dimension might be how healthy a society is. Another dimension may be how equally goods are distributed in a society. Yet another dimension may be stability in the wealth enjoyed by members of a society. And so forth. Note that there exist many possible measures for each dimension of prosperity, a topic that will be taken up in section 5.3.

Indicators are more concrete aspects of dimensions. They are more specific and are often what we observe in the world around us. Continuing the example of regime, Aristotle and observations of the contemporary world suggests three dimensions to this concept: how leadership is structured, how that leadership rules over society, and how that leadership is selected. Aristotle suggests one indicator for the structure of different regimes: when there is one, a few, or many rulers. More generally, another indicator of this dimension might be the specific number of rulers in a government. In the United States, the number of elected rulers in federal government is 537, or 535 legislators, one president, and one vice president. Today, regime is also understood in terms of whether public office holders are selected via elections. This dimension of regime is leadership selection, and one indicator of this is the presence or absence of elections. Recall the discussion of variables in Chapter 4 and note that dimensions and indicators can be variables.

Concepts, dimensions, and indicators relate to one another in terms of their level of abstraction and how many may be nested within the other. Concepts are building blocks and foundational for scholarly inquiry. They are often abstract, for example the concept of "regime" as a way of naming and thinking about political authority. Dimensions are less abstract, and there may be many dimensions to a concept. Indicators are the most concrete, and there may be many indicators for a single dimension of a concept. Figure 5.1 below sums up how we might think about the concept of "regime", related dimensions, and possible indicators of those dimensions.

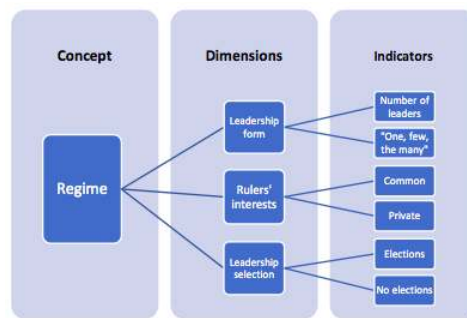


Figure 5.1.1: An example of a concept, dimensions, and indicators

Concept mapping

Concept mapping is a method for identifying concepts, dimensions and indicators, and their relationships to each other. Concept mapping can help with formulating a research topic and eventually a research question. It is a means to place concepts in a visual way such that one has a pictorial understanding of relationships between concepts, dimensions, and indicators. Concept mapping can be done by individuals or groups. Creating a concept map entails several conventions.

First, key concepts are usually enclosed in boxes or circles on a concept map. Another alternative is writing concepts on slips of paper to move them around the concept map. If a researcher wanted to create a concept map around the question, “What are the consequences of different regime types in the world?” they might first start by putting the word “regime” in a box at the top of the mapping space. Other related concepts, such as “conflict” and “prosperity” and “power” might also go in boxes on the map.

Second, concept maps are spatially organized from top to bottom, with more general concepts at the top of the mapping space (anything from a piece of paper to a wall-sized whiteboard) to more specific concepts at the bottom.

Third, lines or arrows are used to connect related concepts. If the researcher wants to explore the relationship between “regime” and “leadership form”, they might put those two phrases in circles and then connect those circles with a line and the words “according to Aristotle, determined by”. Another line might connect “regime” and “private interest” with “is perverted when rulers rule in the”. Figure 5.2 below offers an example of a concept map created using a computer program.

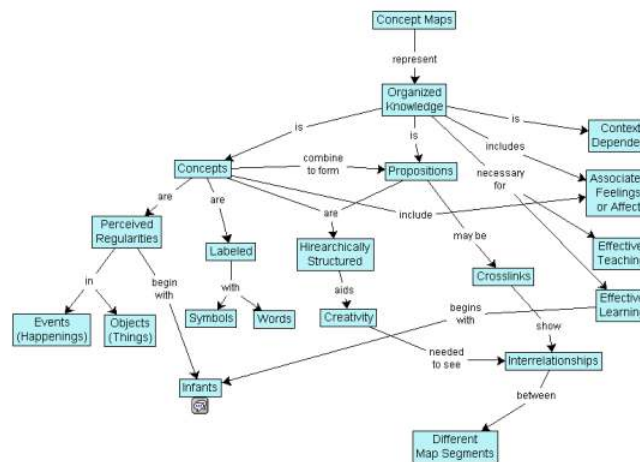


Figure 5.1.2: An example of a concept map created using the IHMC CmapTools computer program by Vicwood40, CC BY-SA 3.0

Concept maps are a useful tool for visually depicting the scope of one’s knowledge on a central concept, relationships between that concept and relevant concepts, dimensions, and indicators.

Concept maps can also reveal how knowledge is organized and gaps in knowledge (i.e., areas for research). Concept mapping is distinct from other activities such as brainstorming because there are specific conventions how concept maps are drawn and how space is utilized in a concept map. Brainstorming can be a more general way to jot down concepts which are related to each other, but there are no conventions in brainstorming for how to organize concepts visually.

¹ Hoover, Kenneth and Todd Donovan. 2011. The Elements of Social Scientific Thinking. Tenth Edition. Wadsworth Cengage Learning, p. 12.

² Aristotle. 350 BCE. Politics. Book 3, Part I. Trans. Benjamin Jowett. Available online at <http://classics.mit.edu/Aristotle/politics.html>.

³ Ibid. Book 3, Parts VI and VII.

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5.2: Operationalization

Learning Objectives

By the end of this section, you will be able to:

- Consider the process by which concepts are operationalized to begin collecting relevant data in the “real” world
- Understand aspects of data collection - What, why, how

Operationalize a concept

After putting a name to observations of the world – creating concepts – the next step is to “operationalize” those concepts. Operationalization is the process by which a researcher defines a concept in measurable terms. In other words, “to operationalize a concept means to put it in a form that permits some kind of measurement of variation.”⁴ Variation implies that the measure selected will take on different values. For example, one operationalization of the concept “regime” might be to focus on the number of leaders in power. This might be measured by counting individuals in power. Observing real world country cases, it would appear that this ranges in number from a single leader (such as Zimbabwe’s Robert Mugabe, who was either prime minister or president from 1980 to 2017) to many (such as China’s Politburo Standing Committee, which has varied from five to eleven decision-makers since 1949).

Note the importance of variation when operationalizing a concept. Without variation, it is difficult to identify patterns of association such as correlation and causation. If “regime” were operationalized more broadly (and poorly) as “presence of a government,” then there would be no variation on this measure in the contemporary world. It would then be difficult to ascertain the causal effect of regime type on some outcome of interest (i.e., dependent variable), such as interstate war, if the operationalization of that concept did not vary.

A constant – the presence of government – cannot therefore explain something that varies, which in this example is the presence or absence of interstate war. This problem also arises if we treat this operationalization of regime as the outcome of interest. Again, an absence of variation makes it difficult to ascertain determinants of that constant. Imagine asking whether levels of economic growth have some effect on regime type. Economic growth varies by country, but if regime type is operationalized as the presence of a government, this constant cannot be explained by other social phenomena which vary.

Operationalizing a concept must be done with some additional considerations in mind, specifically identifying valid and reliable measures of that concept. These considerations will be taken up in section 5.3 of this chapter. At the moment, the important thing is to think about ways to measure a concept and be sure that there is variation on that measure. Returning to the example of Aristotle, he first conceptualizes something we refer to today as “regime,” then operationalizes regime by suggesting two measures: how many leaders are in power and in whose interest they rule. For the first measure, Aristotle offers “one, few, [and] the many [rulers]” as three categories for measuring this concept. For the second measure, Aristotle offers two categories, whether a ruler is ruling in the name of “private” or “common” interests. A third measure that is commonly used today to operationalize the concept of regime is the presence of free and fair elections. This is a binary measure: does a country hold competitive elections or not? With these three measures as starting points, a researcher can embark on the process of data collection.

Collecting data

Data collection is the gathering of relevant information to inform a research topic or question. Ideally, collected data will help with answering a research question, but the process of data collection may entail learning about many aspects of a research topic before a question crystallizes. Chapters 6 and 7 will explore in more depth quantitative and qualitative methods for data collection. For our purposes here, the central questions will be,

- What kind of data should I collect?
- Why am I collecting this data?
- How can I collect this data?

Determining what kind of data to collect hinges of the operationalization of a concept. There are also practical scope considerations to resolve before embarking on data collection. These usually have to do with time and space: which period of time and which parts

of the world (if not the entire world) to focus on. For beginning researchers, the best strategy for answering these questions is asking, what am I interested in? And do I have any prior knowledge that I can bring to bear on answering these questions of research scope? The first question is the more important one and reflecting on personal interest and taste is a good start.

Research and especially data collection require sustained effort and often present unexpected challenges, hence a genuine interest can help motivate a researcher through rough patches. The second question can also help relieve some of the challenges with data collection (e.g., overcoming linguistic constraints, knowledge of existing data sources, contextual expertise) but is of secondary importance. Research and data collection can certainly be about creating new knowledge on entirely unfamiliar topics, and unbridled curiosity is encouraged.

A second set of considerations hinges on whether a researcher is interested in quantitative, qualitative, or mixed sources of data. Chapters 7 and 8 take up qualitative and quantitative research methods, respectively, and here the focus is on which methods to pursue. The method often hinges on how a concept has been operationalized. If we operationalize regime as a simple count of how many leaders are in power in a country, then this lends itself to building a quantitative dataset. If we are interested in collecting the titles of those political offices, this suggests a more qualitative approach is needed. But perhaps both the number of leaders and their titles might be useful, which suggests collecting a mix of quantitative and qualitative data.

Taking up the second question, “Why am I collecting this data?” a researcher might return to first principles. What is the underlying concept of interest in this research project? How has that concept been operationalized, and does the proposed measure (or measures) vary in value? Data collection always demands resources, be it time or money or carbon emissions or all the above, hence it is important to question from the outset what kind of data might be ideal for understanding underlying concepts. Having a research question formulated can also help with this, as the proposed data collection can be more sharply evaluated when thinking about whether the ideal data might help to answer a central question of interest.

Finally, the third question a researcher might ask is, “How can I collect this data?” An important first step is conducting a literature review. As the saying goes, “Don’t reinvent the wheel.” A literature review is the process of reading relevant scholarly work on a research topic or research question of interest. This is often conducted with the assistance of other experts, for example professors, librarians, and colleagues. When reviewing relevant literature, a researcher can ascertain whether relevant data has already been collected and exists in an accessible dataset.

Or they might identify whether related research, and accompanying datasets, might be available and used in part to build a new dataset. There are many publicly available quantitative datasets available for download from the internet. Governments and international organizations such as the United Nations and World Bank are also common repositories of useful social science data. Librarians are also excellent resources and often know where to locate data within a library’s holdings. Figure 5.2 offers a starting point for locating common social science statistical datasets.

Some common sources of data for research in the social sciences

1. **Government Statistics:** National governments are often the only institutions with the resources (and authority) to collect comprehensive social statistics, and thus publish the overwhelming majority of social statistics available. Most countries have a national statistical agency that collects and publishes statistics, and simply perusing that agency’s website or publications catalog is often the best way to find their statistics. The US is more complicated, since responsibility for statistics is spread among many federal agencies. Wikipedia has a list of the [principal federal statistical agencies](#). The United Nations and other international government organizations collate and publish comparative statistical data from their member nations. Most state, provincial, and municipal governments also collect and publish some statistics.
2. **Public Opinion Polls:** News and political organizations routinely conduct or commission opinion polls on a variety of topics. Many of those poll results can be found at the [ICPSR](#) or [other poll archives](#) for which university libraries often have subscriptions.
3. **Academic Research:** Social science researchers often gather data as part of their studies. The results are usually presented in the published academic literature. Search any of the major [article databases](#) to find these articles. Most articles will only contain summary data, but the complete datasets can often be obtained from the original researchers.
4. **Commercial Market and Business Research:** Many corporations and trade organizations collect economic statistics and sell them for profit. Often a very hefty profit, which means university libraries purchase only a limited number of these [data products](#).

Source: UCLA Library. Research Guides, “Social Statistics and Data,” Available online at <http://guides.library.ucla.edu/data/sources>

Statistical datasets are often available for download from the internet or via subscription from a university or college library. Qualitative datasets are generally more difficult to come by. In the course of conducting a literature review, a scholar may cite a qualitative dataset (typically their own), and these are sometimes available on scholars’ personal webpages or the webpages of affiliated research centers. It also doesn’t hurt to contact a scholar directly if you are interested in their data; the scholarly spirit is to share knowledge, after all.

⁴ Hoover, Kenneth and Todd Donovan. 2011. *The Elements of Social Scientific Thinking*. Tenth Edition. Wadsworth Cengage Learning, p. 42.

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5.3: Measurement

Learning Objectives

By the end of this section, you will be able to:

- Analyze different types of measurement
- Evaluate the quality of measures
- Explore existing measures of regime type

Types of measurement

When operationalizing a concept, one important consideration is the kind of measure that will be used. Measurement is “the assignment of numbers or labels to units of analysis to represent variable categories.”⁵ In other words, measurement is putting values on variables. Measurement is highly concrete insofar as it entails translating observations of the world into standard units. Those units can still be very abstract, but measurement is a crucial step for creating the data that can then be analyzed. For example, the research and advocacy organization Freedom House uses a scale that ranges from 0 to 100 to measure the levels of freedom, political and civil, in countries around the world.⁶ The number 100 on the Freedom House scale does not equate to 100 units of something tangible, the way we would measure, say, pounds of flour, yet it is a more precise way of thinking about differing levels of freedom around the world. Based on the Freedom House scale, it is possible to compare levels of freedom across countries and over time and analyze trends more systematically.

There are four types of measures: nominal, ordinal, interval, and ratio. Table 5.3 below summarizes them briefly.

Table 5.3.1: Types of measures

Type of Measure	Description
Nominal	Observations are classified into two or more categories, with numerical values assigned to each category Example: Racial and ethnic categories maintained by the US Census Bureau
Ordinal	Observations are rank ordered, with numbers assigned to indicate the rank ordering on some dimension Example: Attitude question on surveys ranging from 1 = “Strongly Disagree” to 5 = “Strongly Agree”
Interval	Observations fall along a scale with standard units Example: Timeline that ranges from 1945 to 2000 with 5-year periods of time demarcated
Ratio	Interval ratio with an absolute zero Example: Age, weight

Nominal measures are focused on classification. One example of a nominal measure are the racial and ethnic categories used in the US Census, such as “Black or African American” (a racial category) or “Hispanic” (an ethnic category).⁷ Aristotle offered a nominal measure of regime type when he listed six different types of regime, including “democracy” and “tyranny” and so forth.⁸ Numbers can be assigned to each category, but these assignments are arbitrary and not useful for rank-ordering categories. Good nominal measures are those which are exhaustive and mutually exclusive. A nominal measure is exhaustive when every observation falls within the given categories. A well-constructed nominal measure should also have mutually exclusive categories, meaning that there is no overlap between categories. On these criteria, it would appear that the racial categories used by the US federal government are problematic. First, they are not exhaustive as they do not include the possibility of classifying individuals who identify as two or more races. Second, the categories are not mutually exclusive, as the “White” and “Black or African American” racial categories both include individuals who may trace their geographic origins to the African continent.

Ordinal measures classify and rank-order observations. Observations fall along some ranking system, with numbers assigned to different ranks. One example of an ordinal measure is a survey question which asks respondents whether they “strongly agree,” “somewhat agree,” “[are] neutral,” “somewhat disagree,” and “strongly disagree” with a statement, and there are numerical values in descending or ascending order assigned to each response category. Another example of an ordinal measure are socioeconomic categories which may range from “lower class” to “lower middle class” to “middle class” to “upper class”. Note that the categories in ordinal measures provide some information about relative rankings. For example, someone in the upper class probably has higher household income than someone in the lower class. However, ordinal measures are not designed for mathematical manipulation. One should not take the average of all the responses to a survey question noted above to arrive at the “average” level of agreement to a statement.

An interval measure contains numerical values which are assumed to have equal distances between each unit. Taking the Freedom House scale mentioned previously, which ranges from 0 to 100, countries fall on this scale based on observations of levels of freedom in each country. Another example of interval measurement is the numerical score you might receive for each exam in your class, which typically ranges from 0 to 100. Mathematical manipulation can be conducted on these measures. For example, if you received an 80 and a 70 on your two exams, they could be averaged to yield an average exam score of 75 (assuming the exams were worth the same percentage of your final grade).

Ratio measures are interval measures that have a true zero. An example of this is weight or age. What is the significance of a measure having a true zero? This allows for statements comparing observations on the ratio. For example, if two people are 20 and 40, it is possible to state that the 40-year-old is twice as old as the 20-year-old. Taking the example of interval measure noted previously, there is no true zero on the Freedom House measure. It could be the case, for example, that countries fall below zero but are just not captured by the criteria used for the scale. And for an interval measure such as Freedom House’s, it is not possible to state that a country ranked 60 on the Freedom House scale is twice as free as a country ranked 30 on that scale.

Comparing across these four types of measures, each yields information that builds upon the contributions of the previous kind of measure. Nominal measures help with classification. It follows from this that nominal measures allow for counting the total number or frequency of some category within the classification system. Ordinal measures classify as well, but they also allow for ordering observations. Interval measures classify and rank order observations, but they also present equal intervals for measuring observations. Finally, for those variables where there is a true zero, ratio measures allow for classification, rank ordering, and measuring intervals. They also allow for assessing the relative value of observations.

Quality of measures

An important consideration when determining a measure for a concept is whether that measure is of high quality. Some criteria for evaluating this are the precision and accuracy of the proposed measure. A precise measure is one that is exact. For example, consider how to measure education levels. Doing so by tracking the schools from which an individual has graduated is one measure, and it is passably precise. (For example, an individual may graduate from elementary, then middle and high school.) Counting the years that an individual has attended school is perhaps a more precise measure, since not all education systems may be divided into elementary, middle, and high school levels. This second approach allows for more fine-grained data collection – i.e., more precise data – for analysis.

Accuracy presents additional challenges. An accurate measure is one which measures the underlying concept that it was intended to measure. This relates to two characteristics, reliability and validity. A reliable measure is where there is a low possibility of measurement error. One way to assess this is to see whether different researchers still arrive at the same findings when applying the same measure. Reliable measures are those which have the potential for replicability, one of the standards for evaluating the robustness of a research finding. A valid measure is more difficult to evaluate, but it basically reduces to whether a measure is meaningful. For example, is an IQ test a valid way to measure a person’s intelligence? Validity is difficult to assess and therefore hotly debated among researchers.

One way to think about precision, reliability, and validity is to imagine a dart board with concentric circles and a bull’s eye in the center. The bull’s eye in the center of the dart board is the concept that a researcher is trying to measure. A precise measure would be a dart that has a fine needle rather than a fat needle. A reliable measure would be one where repeated darts thrown at the dart board all land on the same spot on the target. That doesn’t mean the darts have landed on the bull’s eye, but at least they are landing on the same spot again and again. A valid measure would be one where repeated darts thrown at the dart board sometimes hit the

bull's eye, but the darts may be scattered all over the target. But a reliable and valid measure would be one where darts thrown at the target consistently strike the bull's eye. (Note that measures may be reliable but not valid. Measures may also be valid but not reliable. And they may be neither, which means the darts are not striking the target at all but instead landing all over the adjacent wall.)



Figure 5.3.1: Dart board as metaphor for precision, reliability, and validity of measure by Christina B. Castro, “Dart board,” 2008, Flickr creative commons, CC BY-NC 2.0

Applying concepts and measures: Some measures of regime type

To circle back to the discussion raised at the beginning of this chapter, the concept of regime has been a perennial focus of political science since antiquity. Regime, or the collection of rules by which political authority is organized in a society, is a locus of political power. Scholars also believe that variation in regime types over time and space can help with understanding outcomes such as individual well-being and societal prosperity.⁹ This chapter began by examining how Aristotle sought to conceptualize his observations of political authority, settling on the concept of “constitution” which we today refer to as “regime”. Early attempts to operationalize and conceive of measures for regime focused on the number of leaders in power and in whose interest they ruled. Political scientists at present have conceived of myriad measures for regime type. This section will examine two different measures which present examples of ordinal and interval measures.

Professor Barbara Geddes of the Political Science Department at the University of California, Los Angeles, offers one ordinal measure for understanding the diverse group of countries in the world which are commonly referred to as authoritarian regimes, or nondemocracies. (We can think of a democracy most simply as a country where there are free and fair elections; a nondemocracy is where these are absent.) For Geddes, nondemocracies include everything from North Korea under the Kim family to Brazil under military dictatorship. Looking at the sheer diversity of nondemocracies in the world, and narrowing her focus to the twentieth century, Geddes devised several categories for dictatorships of the world. The categories she devised were personalist, military, single party, and hybrids of these three categories.¹⁰

Table 5.3.2: Geddes types of nondemocracy (Example of a nominal measure)

Type of dictatorship	Description
Personalist	Rule by a single person <i>Example: Zimbabwe under Robert Mugabe, 1980-2017</i>
Military	Rule by military leaders <i>Example: Turkey, 1960-1965; military coup in 1960 and general in power through 1965</i>
Single party	Rule by a single political party <i>Example: People's Republic of China under the Chinese Communist Party, 1949-present</i>
Hybrid	May be combinations of two or three of the above categories <i>Example: North Korea under the rule of the Kim family, Workers' Party of Korea, and North Korean military since 1953</i>

This ordinal measure for dictatorship offers a first cut at classifying a very diverse universe of cases. There are qualitative differences between the categories constructed by Geddes, for example whether political leadership is concentrated in a single person, the military, a political party, or some combination of these three. Note that there isn't any rank ordering of these types of nondemocracies on any dimension. Because of this, it is not possible to consider whether, for example, a greater concentration of leadership in fewer individuals correlates with greater wealth concentration in the country. Geddes' measure strives to be exhaustive, as she argues that every nondemocracy in the world during the twentieth century might fit into one of these four categories. There may be questions, however, about the reliability of this measure. Might another researcher, starting from scratch, categorize countries in the same way as Geddes? China, for example, might be categorized as a personalist regime under Mao Zedong's rule (1949-1976) rather than a single party regime.

A second example of a widely used interval measure of regime type is known as Polity IV. This measure considers the entire range of regime types, from highly undemocratic to so-called consolidated democracies of the world.¹¹ It places observations on a scale that ranges from -10 (for highly undemocratic) to +10 (for highly democratic). As the Polity Project webpage notes,

"[Polity IV] envisions a spectrum of governing authority that spans from fully institutionalized autocracies through mixed, or incoherent, authority regimes (termed "anocracies") to fully institutionalized democracies.

"The 'Polity Score' captures this regime authority spectrum on a 21-point scale ranging from -10 (hereditary monarchy) to +10 (consolidated democracy). The Polity scores can also be converted into regime categories in a suggested threepart categorization of 'autocracies' (-10 to -6), 'anocracies' (-5 to +5 and three special values: -66, -77 and -88), and 'democracies' (+6 to +10)."¹²

The Polity datasets are publicly available and downloadable from the internet. Scores are available for 151 countries ranging over the period 1800-2017, with annual observations for each country. Countries are placed each year on this -10 to +10 scale depending on the degree of political competition observed, citizen participation, and constraints on the executive. The higher a country scores on these dimensions, the higher its Polity Score. Canada, for example, has a Polity Score of +10 over the period 1946-2017.

Note that this measure rank-orders countries along some underlying dimension of "authoritarianism," where those countries which are deeply authoritarian are closer to -10 while those which are further from authoritarianism, or more democratic, are closer to +10. While the Polity Score is an interval measure of regime type, the excerpt above also suggests that this can be an ordinal measure with the following categories: autocracy, anocracy, and democracy.

Polity Score today is considered one of the most precise and reliable measures for regime type. Its validity, like the validity of most every measure for regime type, is debated. By one scholar's count, there exist today at least nine interval measures of democracy alone.¹³ The endeavor continues. Projects which culminate in measures such as Polity Score are valuable for putting words and measures to concepts which we know are deeply consequential.

⁵ Raymo, James M. 2009. "Methods of Sociological Inquiry." Course slides, University of Wisconsin-Madison.

6 See Freedom House online at <https://freedomhouse.org/>

7 A summary of US Census Bureau racial and ethnic categories is available at <https://www.census.gov/quickfacts/fa...e/US/RHI625218>

8 One of Aristotle's criteria for these categories was the number of rulers, so there was also some attempt at interval measurement in his classification of regime type. However, this was mixed with his focus on whether rulers ruled in the common or private interest.

9 See, for example, Przeworski, Adam et al. 2000. Democracy and Development: Political Institutions and WellBeing in the World, 1950-1990. Cambridge: Cambridge University Press.

10 See Geddes, Barbara. 2003. Paradigms and Sand Castles: Theory Building and Resaerch Design in Comparative Politics. Ann Arbor, MI: University of Michigan Press.

11 Consolidated democracy refers to those democracies where democratic institutions such as elections, checksand-balances within government, and civil society, are robust and democracy is widely accepted as the ideal kind of political authority.

12 The Polity Project is available online at <http://www.systemicpeace.org/polityproject.html>. This website contains downloadable datasets and codebooks.

13 Pemstein, Daniel, Meserve, Stephen A., and Melton, James. 2010. "Democratic Compromise: A Latent Variable Analysis of Ten Measures of Regime Type," Political Analysis 18: 426-449.

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5.4: Key Terms/Glossary

- **Concept mapping:** Method for identifying and visualizing dimensions and indicators of concepts and relationships between concepts
 - **Concepts:** These are the building blocks of theories and are labels or language to describe objects, events, practices, and ideas in social life; complex concepts are further broken down into dimensions and indicators
 - **Conceptualization:** The process of creating concepts by applying the powers of observation and imagination
 - **Dimension:** One aspect of a concept; for example, the concept of “government” might be broken down into multiple dimensions such as “centralization of power,” “levels of bureaucracy,” and so forth
 - **Indicator:** Observable aspect of a concept
 - **Interval measure:** A measure for a variable in which observations fall along a scale with standard units
 - **Nominal measure:** A measure for a variable in which observations are classified into two or more categories
 - **Operationalization:** Process of defining a concept in measurable terms; identifying variables (or indicators) that are relevant for understanding and observing a concept in concrete ways
 - **Ordinal measure:** A measure for a variable in which observations are rank ordered
 - **Ratio measure:** An interval measure with a true zero value
 - **Regime:** The system and rules, either formal or informal, for organizing government in each society; a binary approach to regime is to divide governments into democracies and nondemocracies
 - **Reliability:** When there is a low probability of error for a proposed measure
 - **Validity:** When a proposed measure is a meaningful measure of its underlying concept
-

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5.5: Summary

Summary of Section 5.1: Conceptualization in political science

This section explored what a concept is and the process by which we create concepts. It began with the conceptualization of “regime” (going back to Aristotle). Then it drilled down into how social scientists think about concepts, i.e., dimensions and indicators of concepts. It explored dimensions and indicators of the concept “regime”. The final section discussed one method, concept mapping, that is useful for identifying concepts and, by extension, dimensions, indicators, and research questions.

Summary of Section 5.2: Operationalization

This section continued the example of conceptualizing “regime” and explored how to operationalize the concept. It walked through various considerations in data collection such as “What kind of data should I collect?”, “Why am I collecting this data?”, and “How can I collect this data?”. It concluded with some common data sources for research in the social sciences.

Summary of Section 5.3: Measurement

This section discussed types of measurement such as nominal, ordinal, interval, and ratio measures. It considered criteria for the quality of measures such as precision, reliability, and validity. Finally, the chapter introduced commonly used measures of regime type and discussed each in turn.

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5.6: Review Questions

1. What is the primary difference between operationalization and measurement?
 - a. Measurement is about deciding whether a variable should be measured as nominal, ordinal, interval or ratio while operationalization is about defining a concept
 - b. Operationalization is about deciding whether a variable should be measured as nominal, ordinal, interval or ratio while measurement is about defining a concept
 - c. Operationalization centers on defining a concept, while measurement is focused on describing an abstract idea
2. Concept mapping is the method for identifying and visualizing dimensions and indicators of concepts and relationships between concepts
 - a. True
 - b. False
3. Which of the following statements best describes conceptualization?
 - a. The process of creating concepts by applying the powers of observation and imagination
 - b. Process of defining a concept in measurable terms; identifying variables (or indicators) that are relevant for understanding and observing a concept in concrete ways
 - c. Method for identifying and visualizing dimensions and indicators of concepts and relationships between concepts
4. Reliability is when a proposed measure is a meaningful measure of its underlying concept
 - a. False
 - b. True
5. When a proposed measure is a meaningful measure of its underlying concept. Which term does this phrase best define?
 - a. Validity
 - b. Reliability
 - c. Efficiency

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5.7: Critical Thinking Questions

1. Identify three concepts central to the study of politics.
 2. What is concept mapping?
 3. Taking a concept from Question 1, operationalize it and suggest one measure for that concept.
 4. What does it mean when a measure is reliable?
 5. What does it mean when a measure is valid?
 6. Power is often referred to as the currency of political science. What are some dimensions of power?
 7. How might you operationalize a concept such as power?
 8. What are different types of measures and what are each type good for? If you had to conceive a measure for “power”, what kind of measure would you use and why? Assess the reliability and validity of that measure.
-

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5.8: Suggestions for Further Study

General resources on research methods:

- Geddes, Barbara. 2003. Paradigms and Sand Castles: Theory Building and Research Design in Comparative Politics. Ann Arbor, MI: University of Michigan Press.
- Hoover, Kenneth. And Donovan, Todd. 2014. The Elements of Social Scientific Thinking. Boston: Wadsworth Cengage Learning.

General resources on data sources:

- University of Michigan. Inter-university Consortium for Political and Social Research (ICPSR). Available online at www.icpsr.umich.edu/icpsrweb/instructors/icsc/datasets.jsp
- UCLA Library. Research Guides, “Social Statistics and Data,” Available online at <http://guides.library.ucla.edu/data/sources>

Measuring regime type:

- Center for Systemic Peace. The Polity Project. Available online at <http://www.systemicpeace.org/polityproject.html>
- Freedom House. Freedom in the World. Available online at <https://freedomhouse.org/>

Concept mapping:

- Novak, Joseph D. and Alberto Cañas. 2006. “The Theory Underlying Concept Maps and How to Construct Them.” Available online at web.stanford.edu/dept/SUSE/projects/ireport/articles/concept_maps/The%20Theory%20Underlying%20Concept%20Maps.pdf

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CHAPTER OVERVIEW

6: Elements of Research Design

- 6.1: Introduction- Building with a Blueprint
- 6.2: Types of Design- Experimental and Nonexperimental Designs
- 6.3: Components of Design- Sampling
- 6.4: Components of Design- Observations
- 6.5: Key Terms/Glossary
- 6.6: Summary
- 6.7: Review Questions
- 6.8: Critical Thinking Questions
- 6.9: Suggestions for Further Study

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6.1: Introduction- Building with a Blueprint

Learning Objectives

By the end of this section, you will be able to:

- Understand the role of design in conducting research
- Identify the purposes of conducting research

Observations of the world may lead to research questions and theories about how the world works. For instance, political participation is a topic that political scientists try to understand. A common research question is why people choose to vote for certain presidential candidates. It is possible that multiple theories can explain the same phenomena. As one can already guess, there are multiple answers to this question. One theory suggests that individuals vote for those who share the same party identity because sharing the same party provides an information shortcut, showcasing that the candidate possibly shares the same views on issues.

Another answer to this question is that individuals most likely vote for the incumbent president when the economy is doing well and are less likely to do so when the economy is not doing well. If there are multiple answers to a research question, how can researchers showcase why their answer is the answer to be considered? In other words, why the theory put forth is the best answer. In this chapter, we provide you with the tools to provide evidence to support your answer to your research question.

One way to assess the validity of a theoretical explanation is to understand the research design. Research design is an action plan that guides researchers in providing evidence to support their theory. Another way to think of research design is as a blueprint. When building a house, it is necessary to first create a plan that will provide the foundation for what you are doing. How big will the house be? How many bedrooms should the house have? What kinds of material should be purchased? Like a blueprint, research design is a critical first step that allows decisions to be made in advance. Because it can be exciting to try to find evidence to support your explanation of the world, there is a tendency to jump immediately ahead into data collection and analysis; however, research design comes before gathering data. There are multiple first decisions to make. We will cover different aspects of design, including purpose, types, sampling, and observations.

Suppose you were interested in the outcome of the 2016 presidential elections. In 2016, Hillary Clinton and Donald Trump were the candidates for their respective parties. Clinton was the heavily favored candidate with many national polls predicting she would win. While she did receive the most votes, Donald Trump won the most electoral votes to become the 45th president. How might you go about understanding the result of the election? To proceed, a researcher must first try to figure out the purpose of the research that will be conducted. Ultimately, the type of design will then be determined by its purpose. Three such purposes of research are exploration, description, and explanation.

Exploratory research sounds exactly like what you might be thinking—to explore. It could be possible that a phenomenon has recently occurred, and you do not know what is going on. On the other hand, it is possible that you do know what is going on, but you are trying to observe it so you can better understand it. In both instances, exploratory research seeks to understand an issue, trying to figure out what is going on. In the case of the election, researchers might try to figure out what rules exist to allow an individual to win a presidential election by way of Electoral College votes rather than the popular vote. Since multiple polls were being conducted, how were they conducted and where were they conducted? Who was included in these polls? What circumstances led to individuals to choose one candidate over the other?

Just as exploratory research is associated with exploration, descriptive research is associated with description. Descriptive research builds upon exploratory research to provide further information about a phenomenon. Exploratory research may assist researchers in identifying the many variables while descriptive research can expand on this by collecting additional information on these variables. Additionally, descriptive research can provide information about relationships between identified variables, often called correlational research. Descriptive research might ask what kind of people were most likely to vote for Trump and for Clinton? Which of these voters were most likely to turn out to vote? Were there voters who changed their minds at the last minute? These questions attempt to *describe* what was going on.

While exploratory and descriptive provide answers to “what,” explanatory research seeks to explain “why.” Explanatory research goes further than just explaining the relationships between variables and providing predictions, it tells us which variable likely led to a certain outcome. What *caused* the outcome to occur? In instances such as the 2016 election, it can be difficult to try to determine cause and effect but through research design we might try to create similar conditions and try to make causal inferences.

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6.2: Types of Design- Experimental and Nonexperimental Designs

Learning Objectives

By the end of this section, you will be able to:

- Identify components of experimental designs
- Read and interpret research design notation
- Differentiate between experimental and nonexperimental designs
- Understand why nonexperimental designs are used

In political science, the “gold standard” is an experimental design. An experimental design can help determine the effect of the independent variable or the treatment on the dependent variable or the outcome because the treatment can be isolated as the likely cause. Comparisons are made between the experimental group and the control group to see if the outcomes are different. Because random assignment ensures that the two groups are the same and the only difference is the treatment, researchers can make the conclusion that the difference in the outcomes of the groups is likely due to the treatment. Because of these factors, an experimental design is best suited for the purposes of explanatory research to establish causality.

To help with understanding research design, it is common to utilize notation to provide a visual depiction of the design. We will utilize the following notation as borrowed from Trochim and Donnelly (2005).

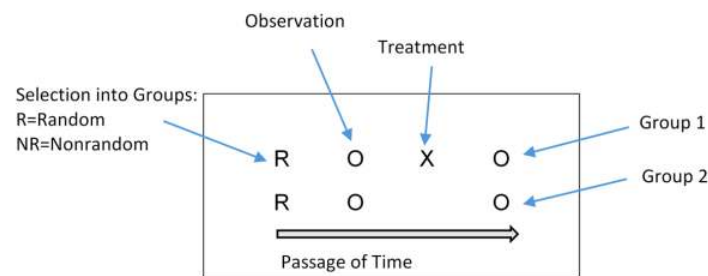


Figure 6.2.1: Notation is useful to present a visual representation of research design. The figure displays the notation for an experimental design

The selection of individuals into groups is denoted by R (random assignment) or NR (nonrandom assignment). Observations are denoted as “O” and “X” is the treatment. One line of notation will refer to a single group. Two lines denote two different groups, three lines denote three groups, and so on. The notation from left to right denotes the passage of time. Using this notation, we can generally classify designs into experimental and nonexperimental. We will talk about the experimental design first and then nonexperimental designs.

There are three crucial components: random assignment, manipulation of the treatment, and the existence of a control group. Generally, there are two groups, an experimental group and a control group. The experimental group will be administered a treatment while the control group will not be administered a treatment. The control group is supposed to be what the experimental group would look like if the experimental group was not given the treatment.

Comparisons are then made between the two groups using pretests and posttests to determine the effect of the treatment on outcomes. Random assignment refers to the placement of cases into control and experimental groups in an unbiased manner such that the likelihood of any case being placed into groups is exactly the same. With random assignment, we can be assured the groups are equal to each other, or any reason that we might think they are different is removed. If there are differences, it is due to chance.

The pretest establishes a baseline, allowing us to understand how things are before the treatment is implemented and the posttest provides us with information about outcomes after the treatment. If this sounds familiar, it is because an experiment in political science is similar to an experiment performed in a science lab!



Figure 6.2.2: A variation on the classic experiment, this is an experimental design that does not contain a pretest.

Experimental designs can vary in relation to the classic example presented. One variation of the classic example is not administering a pretest. This can be due to fears that taking a pretest can affect the results or it just may be that a researcher is unable to administer a pretest. This makes it difficult to attribute the varying outcomes to the treatment but can still allow conclusions about causality because a control group does exist.

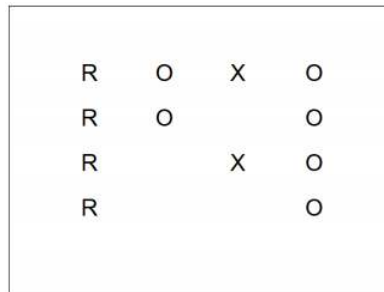


Figure 6.2.3: The Solomon 4-Group Design is an experimental design that combines the classic experiment with the posttest only design.

Another variation to the classic experiment is the introduction of groups beyond the traditional two groups that tries to address the effect of a pretest on outcomes. This variation is known as a Solomon 4-Group Design. As the name indicates, there are four groups. Two are experimental groups and two are control groups. One experimental group and one control will have a pretest and posttest and the remaining groups will not be pretested. In this way, comparisons can be made between the two pairs and it can be determined as to whether the pretest had an effect on results.

As we move further away from the classic experimental design, the ability of researchers to establish causality diminishes. Nonexperimental designs may lack random assignment into groups, the ability of the researcher to control the treatment, a control group, or all of these characteristics of an experiment. Ethical concerns may lead to the implausibility of implementing an experiment. For instance, to determine the effect of a treatment, a researcher may decide to randomly assign individuals into a control group and an experimental group. The experimental group receives a treatment that could cure a serious illness but those in the control group who could benefit from the same treatment are denied it. In a case such as this, ethical concerns may prevent the random assignment of the treatment and instead provide the treatment to all who are willing to be treated.

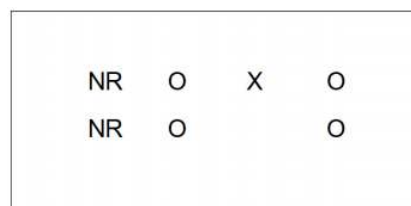


Figure 6.2.4: Quasi-experiments may attempt to be similar to an experiment but, in this particular case, lacks random assignment into groups.

Quasi-experimental designs try to approximate experiments but lack a key component, random assignment. For instance, in a nonequivalent 2-group comparative design, cases are divided into two groups, one an experimental group and a comparison group that is meant to be like a control group. Unlike an experiment, assignment into groups is not random. It is possible that individuals

self-selected into groups. In a design known as matching, cases are matched together on multiple variables with the only variation being that of the treatment variable. While it may be possible to match on identified variables, it is difficult to discern whether variables that are not observed are also evenly distributed. Because the formation of the two groups was not through random assignment, we do not know if the groups are equivalent to one another. Variables that are unaccounted for could potentially be what is truly affecting the outcome rather than the treatment; thus, it is difficult to establish the effect of the treatment on the outcome we are trying to explain.

In the example above, it is possible that individuals who chose to be part of the experimental group to receive the life saving treatment were more likely to be individuals who exhausted all other types of available treatment and are now utilizing the remaining treatment as a last resort. It could also be possible that those in the treatment group wanted to take part in the study because they have a greater zest for life. Because such characteristics might not have been apparent in the matching phase of the study, this might have an added effect that was not accounted for.

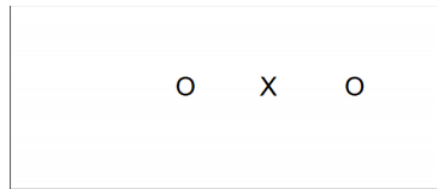


Figure 6.2.5: A nonexperimental design with pre-test and a post-test, but no control group

Difficulty in establishing causality can also result when there lacks a comparison group. Researchers might be able to administer the treatment but are unable to have a control group for multiple considerations. In this case, the same group acts as a control for itself. Because the pretest is administered before the treatment, it provides us with the results of the outcomes before a treatment. It is then compared with the posttest to see if there were any changes between the two.

Comparison is made within-group. If there are differences, it may be attributed to the treatment. This design can be problematic because threats to the validity of the design exist. Without a control group, it can be difficult to attribute the outcome to the treatment because it could simply be due to maturation or normal growth. In other words, the results would have been the same without the treatment. It could also be due to the administration of a pretest that primed cases to be better prepared for the next test.

While there are multiple designs that exist, the purpose of your research will often dictate the best design to use for your study. If you are trying to establish causality, experimental designs will likely be the design of choice. Experimental designs have internal validity, thus ensuring that you can provide causal conclusions about an independent variable's effect on an outcome. When it is not feasible and the reasons as to your research study are not establishing causality, but instead gathering information, nonexperimental studies that do not necessarily require random assignment or a control group will serve your research goal just as well.

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6.3: Components of Design- Sampling

Learning Objectives

By the end of this section, you will be able to:

- Understand the logic of sampling
- Differentiate between samples and population size
- Identify the difference between probabilistic and non-probabilistic sampling

While we have provided you with major designs, it is important to be able to understand additional components of research design. Understanding these components will help you to build on existing designs so you can create blueprints that are specific to your research. Sampling is an important component to consider because it can be difficult to obtain data on every single case in the population. How your sample is created and who is part of your sample have implications for the conclusions you can make about your results.

An important component of research design is determining who will be part of the study, the number of cases, and how cases will be selected into the study. The first step is to determine what population you are interested in. The population refers to all cases that could be a part of the study. For instance, if you are interested in why people vote for certain candidates, the population of interest is all adults who are 18 years or older and are registered to vote.

It would not make sense for your population to include those who are not registered to vote because your question is specific to voter behavior. A case would be a single unit of the population identified, or an adult who is 18 years or older and is registered to vote. If everyone who is part of this population could also be a part of the study, the evidence for the theory put forward would be quite convincing; however, this would be difficult to obtain. Not only would it be very costly, it might not necessarily be feasible due to time constraints because there are more than 130 million voters in the United States. While there is a temptation to try to include every possible case, one thing to consider is that this is still just a snapshot in time. What do we mean by snapshot in time? All cases might be included for one election year but there are several elections a year along with many years! In the end, the population might just really be a sample in the context of time.

The next step would be to try to figure out the number of cases to include that will still provide a convincing argument to support the theory. According to the law of large numbers, we do not necessarily need to include every single case to provide a convincing argument. Rather than the entire population, the study will likely be based on a sample. We need to provide a sample, or a selection of cases from the population, that is large enough that we can approximate the population values we are seeking. The law of large numbers tells us that when we provide a large enough sample that is also representative of the population, it will lead to the results that are close to the results if we collected data on all the cases in the population.

When sampling, another characteristic that we may be looking for is representativeness. It can be argued that the value of the sample is only meaningful in that it can help us draw conclusions about the population we want to know more about. To figure out representativeness, we need a sampling frame. The complete sampling frame is a list of all those in the population. This list might contain information about the characteristics of the population we are interested in. For our sample to provide us with results that can tell us about the population, we need the sample to be representative, or to be similar to that of the population. If you are interested in learning about voters in the United States, only including voters from California will not be very helpful. This sample can provide you with information about voters in California, but not necessarily about voters in the United States. To ensure representativeness, you can select from the sampling frame who it is that should be included in your sample.

There are two ways to sample cases, one of which, if done properly, will produce representative samples and one that will not reflect representativeness. Probability sampling will produce samples that are more likely to be representative of the population as opposed to nonprobability sampling. Probability sampling requires the use of random selection to place cases into a sample. Examples of probability sampling are simple random sampling, stratified sampling and clustered sampling. Nonprobability sampling uses nonrandom processes to select cases to be part of the sample. Examples of nonprobability sampling include convenience sampling, quota sampling, and snowball sampling.

Probability Sampling

Simple random sampling is argued to be the best approach in selecting a sample. In a simple random sample, each case has an equal chance of being selected to be part of the study. Through simple random sampling, your sample is much more likely to be reflective of your population. A simple way to think of random sampling is putting names in a hat and drawing names out of a hat. This means that if you were interested in studying political science students and there were 1,000 political science students, each student would have a 1 in 1,000 chance of being chosen to participate in your study.

Stratified sampling is similar to random sampling but there may exist a concern over what the sample looks like. There may be a concern about the inclusion or exclusion of certain characteristics. To ensure proportional representation, or ensuring the sample has similar characteristics to that of those in the population, stratified sampling will take into consideration such characteristics and ensure the sample looks like the population. Therefore, we need to know these characteristics relative to the population before selecting the sample.

For instance, if not having enough people who are racially representative of the population is a concern, when sampling you will ensure that twenty percent of the sample is African American and twenty percent of the sample identifies as Latinx because that is the proportion they make up in the population of interest. This is known as a proportionate stratified sample. A disproportionate stratified sample oversamples certain groups that otherwise make up a smaller portion of the sample. Oversampling allows researchers to provide greater insight into these groups and might not be able to do so if few are part of the sample.

A **clustered sample** takes into consideration that a simple random sample may not be feasible because the population may be quite dispersed. If your population is all U.S. adults who are registered to vote, it might be difficult to acquire a list of every registered voter and then randomly select individuals to be part of your survey. If administered in person, imagine how difficult it would be to fly from one part of the country to the next all for an interview! Instead, the researcher will narrow it down by selecting areas or clusters and then randomly sampling from these areas. For example, a researcher may randomly select states and from within those states, select counties, then cities, and then precincts. Once precincts have been randomly selected, all those who are in those precincts will be measured.

Nonprobability Sample

While random sampling was noted earlier as the ideal way to create a sample, nonprobability samples also serve a purpose. Nonprobability sampling may be chosen due to the small number of cases available. Nonprobability sampling includes convenience, quota, and snowball sampling. **Convenience sampling** refers to selecting cases that are available. It is almost like not sampling at all because there are no criteria to be part of the sample other than being part of the selected population and a willingness to be part of the sample. An example of selecting cases to be part of a convenience sample is asking individuals who are walking out of a polling place to answer questions.

Quota sampling refers to selecting cases according to a quota or a set number of cases. Researchers may set a fixed number and go about creating a sample that will meet that number. Quota sampling can also be similar to stratified sampling when the researcher is trying to ensure the sample looks similar to the population, meaning that those in the sample are similar in characteristic to the population.

In a **snowball sample**, initial cases are identified to be a part of the sample. It can be one case, or it can be more. These initial individuals will then provide you with referrals of other individuals who could be a part of the sample. Eventually, the number of cases you have will increase through referrals of individuals who you are able to get to be part of the sample. The sample size will pick up momentum as you are able to accumulate more referrals, gaining more mass and picking up more cases along the way. Utilizing this sampling method is especially useful when working with a hard-to-reach population. For instance, if you were to understand the circumstances in which individuals become homeless, a snowball sample would be helpful especially because a list of homeless individuals does not exist.

Probability and nonprobability sampling are methods for choosing cases to be part of a study. We generally utilize samples because trying to collect information from the population can be difficult. The law of large numbers tells us that we do not necessarily need to include every case to provide us with the data we are looking for when the size of our sample is sufficiently large enough. In creating our sample, there are additional rules of thumb to follow. One general rule is that if the population being studied is small--

equal to or less than 100--the best strategy is to include all the cases. Another general rule is to always aim for a larger sample because nonresponse, or not receiving a reply from a case, is a likely possibility.

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6.4: Components of Design- Observations

Learning Objectives

By the end of this section, you will be able to:

- Understand the difference between primary and secondary data sources
- Identify ways in which primary data can be collected
- Differentiate between cross-section and longitudinal data

A critical component of research design is to consider how and when observations will be obtained, or in other words data collection. Researchers must take into consideration the way data will be collected as well as the timing of data collection. Data collection methods can fall under primary sources or secondary sources. Data from secondary sources refers to existing data collected by someone else. Researchers do not need to collect the data again and will instead compile the variables they need for their studies.

For political scientists, a readily available secondary data source is called the American National Election Studies (ANES). The ANES is a collaboration between Stanford University and the University of Michigan. It provides researchers with information about such topics as voting behavior and electoral participation.

Another source of data is the General Social Survey (GSS). The GSS is collected by the National Research Center and the University of Chicago. The data covers topics that might be of concern to social scientists. For instance, psychological well-being and morality are topics the GSS collects data on.

Secondary data sources can be useful and help save researchers time and money; however, the researcher is constrained by the topics collected by the institutions collecting the data. The data available might not necessarily be helpful in answering your research question, so you might have to collect your own data.

Unlike secondary sources, primary sources refer to original data collected by the researchers. Generally, this entails the creation of a data collection instrument. Although obtaining original data may be more time consuming than utilizing secondary resources, one advantage of original data is that it will ensure that the data you get is what you are looking for.

For instance, you might be interested in elections at the local level but the ANES does not ask questions about local elections. You can collect your own data by creating a survey instrument that is specific to elections at the local level. Data can be obtained through multiple approaches. One way to obtain data is to create and administer a survey. Surveys often contain closed-ended questions, limiting the responses that can be provided. An example of a question that might be on a survey is “Are you a registered voter?” or “Did you vote in the last election.” The answer choices to the questions are predetermined. In these two instances, answers that can be provided might be “yes,” “no,” or “not sure.” Interviews are another way to acquire data. In interviews, questions are often open-ended, allowing the cases the opportunity to provide detailed answers which go beyond the limited responses available on a survey. An example of an interview question might be something like, “Why did you register to vote?” or “Why did you choose to vote in the last election?” Questions such as these allow respondents to provide more detailed answers.

Related to what data is collected is when data will be collected. How many observations will you be taking? Will it be just a one-shot survey, or will you be administering the survey over the next few years? A one-shot survey is deemed a **cross-sectional study** whereas the latter would be considered a **longitudinal survey**. In a cross-sectional study, observations are taken at a single point in time. A longitudinal study will have multiple observations over a specified length of time with the same individuals. Longitudinal studies can be either panels or cohort studies. A panel study is often a sample of cases that are likely to be representative of the population. Cases in a cohort study are likely to share characteristics or experiences. Multiple observations are collected from these cases over time. A repeated cross-section is a combination of cross-sectional data and multiple observations; however, observations may not be collected from the same cases. This type of research can help provide insight into established patterns.

In this chapter, we provided an overview of research design. You should be able to recognize research design notation and be able to understand the components of the design as well as differentiate experimental designs from nonexperimental designs. In providing you with this overview, we have given you a foundation to begin building designs of your own. Similar to the use of secondary sources to acquire data, pre-existing designs may not fit the needs of your study. When this occurs, you may have to

adapt them to what you are trying to accomplish with your study. If making causal inferences is what you are trying to achieve, your foundation should be the design that will allow you to establish causality--the classic experiment. From this initial design, you can then determine whether you can randomly assign individuals to groups or how many times it would be possible to take observations. And from this starting point, you can also determine if you have enough information to implement an experiment. If you do not, then you might reconsider and instead start with an exploratory study that can help you identify possible causes of an outcome.

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6.5: Key Terms/Glossary

- **Control group:** one group in an experimental study that is not administered the treatment
 - **Cross-sectional study:** study in which observations are taken at a single point in time
 - **Descriptive:** descriptive research builds upon exploratory research to provide further information about a phenomenon and may also contain information about relationships between variables
 - **Experimental design:** an experimental design can help determine the effect of the independent variable or the treatment on the dependent variable or the outcome because the treatment can be isolated as the likely cause
 - **Experimental group:** one group in an experimental study that is administered the treatment
 - **Explanatory:** explanatory research seeks to explain “why” an outcome occurs
 - **Exploratory:** exploratory research seeks to understand an issue, trying to figure out what is going on
 - **Longitudinal study:** studies in which observations are taken at multiple points in time, often over a specified length of time
 - **Nonexperimental design:** designs that are not experimental due to lack of random assignment, control group, or the ability to manipulate the treatment
 - **Non-probabilistic sampling:** sampling technique that does not utilize probability to place cases into a sample
 - **Population:** all cases that could be a part of the study
 - **Primary source:** original data collected by researcher
 - **Probabilistic sampling:** sampling technique that utilizes probability to place cases into a sample
 - **Random assignment:** the placement of cases into control and experimental groups in an unbiased manner such that the likelihood of any case being placed into groups is exactly the same.
 - **Representativeness:** characteristic of a sample to reflect what the population of interest looks like
 - **Research design:** an action plan that guides researchers in providing evidence to support their theory
 - **Sample:** a selection of cases from the population
 - **Secondary source:** existing source of data that has been collected by other researchers
 - **Treatment:** the cause of an outcome and is able to be manipulated the be researcher in an experiment
-

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6.6: Summary

Summary of Section 6.1: Introduction

The first step in conducting research is not to data collection but making decisions about how you will go about providing evidence to support your theory. This first step is known as research design and can be compared to the blueprint of a house. The research design you utilize will be dependent on the purpose of your research: exploration, description, and explanation.

Summary of Section 6.2: Designs

The gold standard in political science is the experimental design. In the classic experiment, a treatment (or the independent variable) is administered to a group called the experimental group and observations of the experimental group are compared to a control group. This design is ideal for establishing causality, but experiments are not always feasible. Nonexperimental designs may be used to try to also allow the researcher to draw causal inferences, but it does not have key components of experiments: random assignment, manipulation of the treatment, and a control group.

Summary of Section 6.3: Components: Sampling

When conducting research, there is usually a population of interest that is identified. While it may seem ideal to be able to include every case of the population in the study, this is not exactly feasible. Instead, cases from the population are pulled out to create a sample of the population, either through probabilistic or non-probabilistic sampling methods. To provide results that can be generalized back to the population, it is ideal to have a large sample and a sample that reflects the characteristics of the population.

Summary of Section 6.4: Components: Observations

An additional research design component is collecting observations. Observations can be collected through multiple tools, but two popular tools are surveys and interviews. Another aspect of observation collection that needs to be considered is how often observations will be collected. When observations are collected only once, this is called a cross-section. When observations are collected multiple times on the same cases in a set time period, this is known as longitudinal data.

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6.7: Review Questions

1. Research design is analogous to
 - a. drawing a blueprint
 - b. eating a bowl of soup
 - c. spinning a spiderweb
 - d. casting a wide net
2. Which of the following is NOT a purpose for conducting research?
 - a. experimentation
 - b. explanation
 - c. description
 - d. exploration
3. What is the key component in an experiment that differentiates it from a non-experiment?
 - a. random assignment
 - b. treatment
 - c. observation
 - d. control group
 - e. sampling
4. The design deemed to be the gold standard in political science research is experimental design.
 - a. True
 - b. False
5. Taking observations from the same group of people over an extended length of time is NOT called
 - a. a cross-sectional study
 - b. a cohort study
 - c. a longitudinal study
 - d. a panel study

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6.8: Critical Thinking Questions

1. Look for an article that interests you. Utilizing research design notation, identify the design being utilized by the authors and explain the components of the design.
 2. Find a poll completed by any outlet, from newspapers to news channels to research organizations. From this poll, evaluate what it is the individual or organization is trying to do. Decide if this is a representative sample of their population of interest or not and defend your answer.
 3. Practice: Identify a political phenomenon that you are interested in. Put together a design that will allow you to go about studying this phenomenon. First, consider what an experimental design would ideally look like and then consider what is plausible.
-

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6.9: Suggestions for Further Study

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CHAPTER OVERVIEW

7: Qualitative Methods

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7.1: What are Qualitative Methods?

Learning Objectives

By the end of this section, you will be able to:

- Define qualitative research methods
- Understand the strengths and limitations of qualitative research methods

Political science is the study of power, political authority, conflict, and negotiation, all of which can be approached through deep observation and analysis. In understanding these central foci of political life, there is a rich body of work employing qualitative research methods. Qualitative research refers to data collection in which the focus is on non-numerical data. This can include texts, interviews with individuals or groups, observations recorded by researchers, and many other sources of knowledge. Despite the quantitative turn that political science has taken in recent decades, qualitative approaches have provided powerful insights into many important research questions.

Early political thinkers from Aristotle to Sun Tze were deeply analytical in their approach to understanding the world, and they did so by observing and recording phenomena through nonnumerical means. Aristotle, in Book IV of *Politics*, discusses possible types of regimes in the world and argues that polity, a combination of democracy and oligarchy, is the best possible kind of government given his observations of human behavior.¹⁴ Today, political scientists employ a variety of qualitative research methods to understand topics as varied as the dynamics of revolution, campaign strategies, and the impact of political change on communities and individuals.

Qualitative methods can also be part of a larger methodological toolkit used by political scientists. Some scholars rely on “mixed methods” to answer their research questions about the world. Mixed methods utilize both qualitative and quantitative methods. For example, consider the research question, “Under what conditions might Texas become a purple state within the United States, i.e., a place that is a mix of Democratic and Republican voters?” Quantitative data may tell researchers about trends in voter registration and turnout over time. Qualitative methods, such as interviewing Texans in focus groups or town hall-style meetings, will illuminate how voters perceive their political choices and political future. The combination of both qualitative and quantitative data can overcome deficiencies in relying solely on one or the other.

The methods employed by qualitative researchers are myriad, and we will review several of them in this chapter (Table 7.1). Because politics are inherently relational, one starting point in the qualitative method toolkit is talking to people. This can take the form of interviews, either of a single individual or group of people. Documentary sources are also a valuable source of knowledge. Documents may be collected from repositories such as libraries or archives or when visiting relevant sites such as the offices of government bureaus or advocacy organizations. Ethnographic research involves “going into the field,” or conducting fieldwork at one or more research site(s) to address a research question. Fieldwork can include interviewing and document collection and analysis, but it is also a means for a researcher to collect and record observations about their subject.

For example, a Canadian political scientist interested in understanding US southern border policy might be well-served by conducting fieldwork on the US-Mexico border and observing the interplay between US government authorities and citizens on both sides of the border. There are also exciting research possibilities in the digital realm, and digital ethnographers are exploring political dynamics in this space. Some researchers, for example, are mapping the political communication strategies carried out on social media platforms such as Facebook and Twitter. All these methods can come together in the building of case studies, which are in-depth examinations of particular cases to unravel one of the most challenging aspects of political science research, causal mechanisms. Each of these methods will be explored in a separate section in this chapter.

Figure 7.1.1: Summary of Qualitative Methods

Qualitative Method	Brief description
Interviewing	Conversation with one or more people to collect data on a research question
Documentary sources	Texts collected from field sites, relevant organizations, libraries, archives, etc. Archival research, which often focuses on documentary sources, is especially powerful for collecting primary sources, or those documents which are original sources of knowledge on a topic
Ethnographic research	Site-specific collection of data; often referred to as “fieldwork”; researcher records observations “in the field” and may also rely on interviews and collection of documents
Digital ethnography	Collection of data in the cybersphere and observation of activity mediated by computers or related information technologies, including virtual reality
Case studies	Focused examination of an event, place, or individual to explore dynamics of analytical interest; case studies may employ some or all of the above methods

Strengths and limitations of qualitative methods

There are many reasons to employ qualitative methods in research. First and foremost, qualitative methods are useful for identifying causal mechanisms. Recall the scientific method emphasizes the formulation of testable hypotheses from broader theories. These hypotheses imply explanatory (independent) and outcome (dependent) variables. Linking explanatory and outcome variables is a causal logic. This causal logic is essential, as it tells a “story” that connects concepts. Qualitative methods, particularly case studies, can be powerful in illuminating causal mechanisms. If we think of theories as stories, qualitative methods are a way to knit together a narrative in a coherent and plausible way to help us know whether a story is true or false.

For example, scholars in international relations have long observed that modern democracies tend not to go to war with one another.¹⁵ Collecting data on regime type (democracy versus nondemocracy) and outbreak of war has yielded the finding that democracies over the past century have been unlikely to go to war with one another. But why is this? Statistical analysis may yield a significant correlation, but this is not causation. Qualitative methods such as detailed case studies of two democracies in a crisis situation can help uncover what led to reconciliation rather than war. This kind of “process tracing,” or uncovering the process by which events unfolded, is a strength of qualitative approaches.

A second strength of qualitative methods is producing more fine-grained and nuanced analysis than widely used quantitative methods such as regression analysis. Whereas regression analysis attempts to identify trendlines in collected data, fitting a straight line through a cloud of data points, qualitative methods are interested in the messiness of observed data. Qualitative methods, in short, are interested in depth over breadth. For example, it can be illuminating to see that race is a key correlate of party affiliation in the US, but interviewing individuals can help to drill down into how racial identity might shape whether a person identifies as a Democrat, Republican, or independent.¹⁶ Again, qualitative methods are helpful for understanding the “why” by digging into the details.

It is important to note the shortcomings of qualitative methods, too. They are typically very resource intensive. Downloading publicly available data from the Internet on is generally less costly than arranging interviews or making research plans to live in, say, Catalonia for a semester (no matter how delightful the latter would be). Qualitative methods can be resource-intensive, both in terms of time and money expended. Related, the resource-intensiveness of some qualitative methods, such as case studies, implies that a researcher may only generate one or a few of them to answer a research question. Suppose a researcher wanted to compare the quality of governance around the world. One quantitative starting point for exploring this topic would be to download the World Bank’s Worldwide Governance Indicators.¹⁷ A more in-depth, qualitative approach might be reading World Bank and other organizations’ reports on select countries’ governments. Crafting case studies of even two countries’ quality of governance might

take weeks, months, or years of careful data collection and writing. This would yield an “n” of two -- and here again the tradeoff is depth over breadth.

A final critique of qualitative methods relates to the difficulty replicating findings. If one gold standard in hypothesis testing is replicability of research findings, this is challenging to achieve with many qualitative methods. The observations that a researcher might record while embedded in pro-independence organizations in Catalonia, Spain, are very difficult to confirm by subsequent researchers. Even if a researcher were to have access to the same fieldwork sites, they will likely face very different circumstances. Compounding this are issues with access to research sites. A researcher conducting fieldwork in China and visiting government bureaus may share their findings and conclusions in research papers, but due to the closed nature of the government in China, other researchers are unlikely to have access to the same government bureaus. This also relates to the reliability of inferences reached solely from qualitative research. If other researchers cannot confirm the data used for a research paper, how reliable are the findings? One workaround is employing mixed methods to triangulate across multiple sources and findings. This can at least demonstrate that the findings within a study have internal validity.

¹⁴ Internet Encyclopedia of Philosophy, “Aristotle: Politics,” available online at www.iep.utm.edu/arispol/#H10. Accessed August 2019.

¹⁵ See Bruce Russett, *Grasping the Democratic Peace* (Princeton: Princeton University Press, 1993).

¹⁶ See Pew Research Center, “Trends in party affiliation among demographic groups,” March 20, 2018. Available online at <https://www.people-press.org/2018/03/20/1-trends-in-party-affiliation-among-demographic-groups/>. Accessed August 2019.

¹⁷ These indicators have been tracked for 215 countries and territories over the period 1996-2014 and involve quantifying six different governance indicators. They are available for download from <https://datacatalog.worldbank.org/dataset/worldwide-governance-indicators>.

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7.2: Interviews

Learning Objectives

By the end of this section, you will be able to:

- Explore interviewing as a qualitative research method
- Consider approaches to interviews such as interviewee selection, structured versus unstructured interviewing, and recording data

Simply put, interviews are conversations with relevant human subjects for the purposes of answering a research question. There is great variation in how to approach interviewing. Key decisions for researchers revolve around interviewee selection, whether to structure interviews or leave them unstructured, and whether to record what is said during an interview.

Interviewee selection hinges on identifying those individuals who possess the knowledge and experience to best answer a research question. Consider again the research question, “Under what conditions might Texas become a purple state?” Texas is a huge state, with a population in the tens of millions. To select interviewees whose responses might provide leverage in answering this research question, there are two approaches. Ideally, researchers would randomly select and then interview a sample of Texans which represents the diversity of the Texas electorate. For example, they might try to locate a mix of interviewees who represent the racial, ethnic, gender, religious, educational attainment, urban/rural, and other relevant dimensions of diversity among the state’s voters.

More realistically, especially for solo researchers just getting started, a second approach to interviewing is more network-based. This is nonrandom selection and involves interviewing Texans whom a researcher knows directly or through networks. A researcher might consult their address book for everyone they know who lives in Texas, then contact those Texans for interviews. Then the researcher might ask those contacts or initial interviewees to introduce them to other Texans who might want to discuss their political views. In this way the researcher can interview subjects with relevant knowledge, but the entire sample of interviewees may not be representative.

One significant upside of nonrandom interview selection is potentially having greater rapport with the interview subjects. When a researcher already has a relationship with an interviewee or has been introduced by a trusted third party, interviewees are more likely to be candid in their responses. Independent researchers often have to bow to reality and rely on nonrandom selection with the aim of getting as close to the ideal as possible. This opens the interview data to challenges of unreliability, but even with nonrandom information from interviews, the data obtained is more nuanced in terms of how voters actually think about their party affiliation and insights into trends in voter attitudes in Texas.



Figure 7-1: Conducting an interview in Cibeuving, Jawa Barat, Indonesia by Ikhlasul Amal, photo taken on June 7, 2011, “Interview Scene,” [CC BY-NC 2.0](#)

A second consideration is whether to conduct structured versus unstructured interviews. Structured interviews are interviews conducted with a pre-written set of questions which are read word-for-word to each interview subject. There is no deviation from these prescribed questions as the interview progresses. Structured interviews will yield higher levels of consistency and comparability in the data collected. For this reason, structured interviews are recommended if a team of researchers is fanning out to interview many subjects. Structured interviews are also recommended for less experienced interviewers who may benefit most from careful preparation and having a prepared script for an interview.

An unstructured interview is one where the researcher has a general sense of the topics or questions the interview will cover, but the intention is to ask follow-up questions in “real time” as the interview progresses. This is the most flexible approach to an interview. It also creates the most space for discovery and in-depth exploration of a topic during an interview. Unstructured interviews are ideal when a researcher is in the initial stages of exploring a research topic. On the other hand, unstructured interviews are also very demanding of the interviewer. The interviewer must be mindful of probing an interesting topic as much as possible while balancing constraints

such as being mindful other topics to cover, the time allocated for the interview, the energy levels of the interview subject, and other such considerations. Unstructured interviews run the risk of wandering too far off topic that important topics may not be discussed.

Interviews may also be semi-structured. These are interviews where the researcher has a prepared list of questions to ask, but the researcher is also willing to deviate from this list when a question piques their curiosity or demands additional follow-up questions not on the initial list. Semi-structured interviews seek to combine the benefits of structured and unstructured interviews and maximize, on the one hand, preparation by the researcher and, on the other hand, flexibility when encountering unexpected information.

A third consideration is whether and how to record interviews. Imagine the interview as a key site for data collection in the research project. Data from the interview must be collected and recorded, then merged with data collected from other interviews. This pooled data can then be analyzed or referenced when writing up research findings. A key initial step is for the researcher to decide how to collect data from the interview itself. There are a variety of ways to do this, but all data collection requires consent from each interview subject.

The simplest technology is pen and paper: write notes during the interview or immediately after to recall as much as possible of the conversation. A second option is recording the interview, either just a sound recording or video. Then, to analyze or reference content from the interview, it is important to transcribe the recording into text. This can be done using transcription software or manually transcribing a replay of the recording. Having a text of recorded interviews is critical to search the interview for key words or quotes that may inform research findings.

Which is recommended, handwritten notes or recording an interview? Handwritten notes have the advantage of setting and interview subject more at ease, as subjects tend to be more restrained when they know they are being recorded. Some interview subjects, especially public figures, may be more used to having their comments recorded and hence more readily grant permission. If the subject matter is sensitive, handwritten notes are likely the better choice. Recording the interview has the benefit of greater accuracy and allows the interviewer to focus more on guiding the interview rather than juggling notes and interview questions at the same time.

At some point, the data collected from an interview will need to be entered into a larger database. This can be as simple as creating a document or spreadsheet with notes from all the interviews conducted or using one of many open source software packages available for entering and analyzing interview data.

A note on conducting research on human subjects

Research which involves engaging with people, or human subjects, must be accompanied by protections for those subjects. This is critical for ensuring the integrity of the research project and the credibility of both the researcher and any sponsoring institutions. Research with human subjects will be addressed in the chapter on ethics in research.

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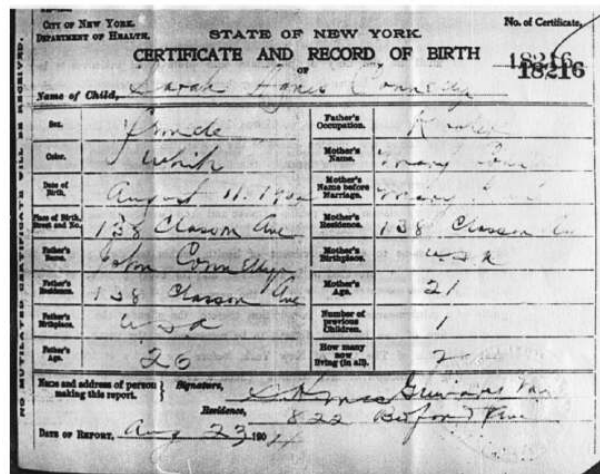
7.3: Exploring Documentary Sources

Learning Objectives

By the end of this section, you will be able to:

- Understand the variety of documentary sources available to researchers
- Explore documentary data analysis techniques such as content analysis

Documentary sources can contain a wealth of information to address a research question. Documents here are treated as primary sources, or original source material that can help with answering some aspect of a research question. Documents need not be created at the time or place that we are interested in studying, however. For example, a scholar may have a research project focused on the codification of human rights post-World War II. A key document in this research would be the Universal Declaration of Human Rights (UDHR).¹⁸ The researcher could locate a copy of the UDHR online or when visiting the United Nations headquarters in New York City, but it isn't necessary for them to have access to the original document. In other research projects, however, access to original documents may be critical, for example actual ballots if the research concerns election fraud. But even in those cases, resource constraints and difficulties with procuring access to field sites may be insurmountable. Reports by credible organizations may substitute as enough documentary sources.



CITY OF NEW YORK. DEPARTMENT OF HEALTH.		STATE OF NEW YORK.		No. of Certificate	
CERTIFICATE AND RECORD OF BIRTH or DEATH					
Name of Child, <i>Sarah Louise</i>					
Sex.	<i>Female</i>	Father's Occupation.	<i>Farmer</i>		
Color.	<i>White</i>	Mother's Name.	<i>Mary Jane</i>		
Date of Birth.	<i>August 11, 1904</i>	Mother's Name before Marriage.	<i>Mary Jane</i>		
Place of Birth.	<i>138 Clason Ave.</i>	Mother's Residence.	<i>138 Clason Ave.</i>		
Father's Name.	<i>John Cronin</i>	Mother's Residence.	<i>138 Clason Ave.</i>		
Father's Residence.	<i>138 Clason Ave.</i>	Mother's Age.	<i>21</i>		
Father's Age.	<i>26</i>	Number of previous Children.	<i>1</i>		
Place and address of person making this report.		Signature, <i>John Cronin</i>			
Date of Report.		<i>Aug 29 1904</i>			

Figure 7.3.1: Universal Declaration of Human Rights, proclaimed 10 December 1948, available online at <https://www.un.org/en/universal-decl...-human-rights/>

This is an exciting time to draw on documentary sources because of the digitization of many documents. This has vastly increased accessibility to documents and decreased costs to researchers. The U.S. National Archives, for example, contains a wealth of documents that are cataloged on its website. Researchers may access digital documents in the National Archives through databases such as ProQuest, which is often available through university and community college libraries.¹⁹

There are limits to documentary sources, as some political phenomena are not inherently text based. The rise of the bureaucratic state heralded the rise of documents in our lives, but many political activities are non-textual. Some examples include illicit activities such as human trafficking or smuggling. Yet so long as the illicit world must interact with the modern state at some point, for example in banking activities or as subjects of government reports, there is often some oblique way of obtaining documents to understand these seemingly undocumented topics.

The variety of documentary sources available to a researcher will be a function of the researcher's resources, access, and creativity. Some researchers are fortunate to have deep research pockets and can travel to far flung sites to collect documents. Compounding this is access to key sources, for example relationships with government officials in relevant bureaucracies. More typically, researchers will run into limits when it comes to resources and access. In these cases, and generally, a researcher must think creatively about which documents to search for to address a research question.

One step is getting to know librarians and, related, the databases and archives that are available through libraries. Librarians often know about collections of documents, archives, or other repositories of key documents. To continue the U.S. National Archives example mentioned above, researchers today do not need to make costly trips to Washington, D.C., to search the Archives, as many documents are now available through subscription-based databases such as ProQuest.

Another step is understanding the organizational landscape in which a given research topic is embedded. To continue the previous example of researching the codification of human rights, one starting point would be to explore UN archives, some of which are digitized and available online. Another tack would be to contact law school libraries to examine their collections. A researcher could also probe whether there are human rights lawyer associations which might

have libraries open to researchers. Nongovernmental organizations active in human rights law might also have relevant documents, such as reports or recommended language for draft laws in various areas of human rights.

After collecting documents, there are several ways to utilize them in research. One is drawing out key sections in collected documents to reference or quote from when writing up research findings. This can be as low-tech as manually highlighting passages on paper copies of documents and flagging them with sticky notes or going fully digital and using text-recognition software to search for key terms and passages on digital versions of documentary sources.

Another way to utilize collected documents is to conduct content analysis on keywords or phrases. This can be as basic as counting the frequency a term appears in a set of documents. For example, if a researcher wanted to examine whether there was change over time in the codification of the human right to asylum, they might collect as many human rights-related treaties as possible from the UN, say during the period 1945 to 1985, then count the frequency of “asylum” in the documents and see whether this changed significantly over the chosen period of time. Quantitative methods such as factor analysis can also be used to determine whether there are underlying “factors” or common explanatory variables, which might explain the variation observed across documents.²⁰ The actual mechanics of such techniques are beyond the scope of this chapter, but it is worthwhile knowing that documents may be analyzed and utilized in ways that go beyond their service as sources of quotable material.

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7.4: Ethnographic Research

Learning Objectives

By the end of this section, you will be able to:

- Understand the basics of ethnographic research - What, why, and how
- Consider the emerging field of digital ethnography

All research is immersive, but ethnographic research is particularly immersive because it calls upon the researcher to situate themselves in the social contexts of their research subjects. Ethnographic research calls on the researcher to be a close observer of the practices, language, culture, beliefs, and other aspects of the life of their research subjects. Ethnographic research ranges from observing the political strategies of candidates on the campaign trail in small town USA to living in remote Chinese counties and interviewing officials on their local development strategies.²¹

What is ethnographic research? As noted by Reeves et al., “Ethnography is the study of social interactions, behaviours, and perceptions that occur within groups, teams, organisations, and communities.”²² Ethnography calls upon the researcher to engage in “thick description” (attributed to Clifford Geertz) of a research site. Accordingly, ethnography has its roots in anthropology. Ethnographic fieldwork became prominent during the early twentieth century, when scholars such as Bronislaw Malinowski sought to document in detail the lives of people in remote locales such as Papua New Guinea and the Canary Islands. The purpose then, as now, was not just to collect detailed notes on the lives of others, but also to answer questions raised by social science theories about human behavior, motivations, and organization.

Why engage in ethnographic research? Ethnographic research is a powerful tool for building a more holistic understanding of hitherto unknown or very superficially understood phenomena in the social world. For solo researchers, ethnographic research is a particularly demanding and resource intensive form of data collection. Yet, it has the potential to accomplish something that is highly valued in research: depth of understanding. When presented with a world event as complex as, say, the economic rise of China in the late twentieth century, conducting ethnography at sites where there is a great deal of economic dynamism can be illuminating and anchor our understanding of large, abstract global events. China’s economic “miracle” is due to decisions made by individuals, in response to incentives embedded in their social context. Ethnographic fieldwork, more than any other research tool, helps generate knowledge about these individual- and society-level factors.

How does a researcher conduct ethnographic research? First and foremost, a researcher must record their observations when engaged at their research site (or sites). These observations may take the narrative form of diary entries, for further distillation when writing up research findings. Observations may be captured in a more analytical way from the outset of the ethnographic research, for example noting categories of behavior and adding annotations accordingly. To take the example of a researcher immersed in a Chinese township, their field notes might be sorted into observations about economic life, political life, social life, and so forth. These initial recorded observations form the bulk of ethnographic data. Second, ethnography may also draw on the qualitative tools noted earlier in this chapter such as interviews and documentary sources. Researchers may shift away from pure observation to conduct interviews with research subjects in order to collect data in a more focused way. And documents can supplement (or call into question) observations. In all, the goal is to build a rich portrait of a place and its people in order to address an underlying research question.

Digital Ethnography

Given vast changes in information and communication technologies (ICT), new sites for ethnographic research have emerged in recent decades. Whereas traditional ethnography relied on researchers being situated in a physical space and observing social life there, digital ethnography challenges these notions of physical immersion. Instead the researcher is immersed in relevant digital spaces such as online chat rooms and other social media platforms where information is exchanged. Digital ethnography asserts that there is a “materiality of digital worlds, which are neither more nor less material than the worlds that preceded them.”²³

The Internet, like all social spaces, is deeply political. Government documents are uploaded to government webpages in “transparency” initiatives, and societal actors in turn upload leaked government documents to sites such as Wikileaks to further challenge official narratives. Myriad groups now create Facebook pages, build virtual communities, and push out information via

such twentieth and twenty-first century information and communication technologies (ICT). Political parties seek to reach constituents via various social media platforms, and US president Trump has drawn attention to the power of “tweeting” via the online communication tool Twitter. Far- right political movements located in wealthy democracies around the world have created global networks through a variety of social media platforms. These platforms have created the capacity for rapid and far-reaching mobilization of like-minded individuals.

All of this creates a rich opportunity for research and analysis. Researchers engaging in digital ethnography seek to record and identify patterns in the digital worlds of their research subjects.

A researcher attempting to map the political strategies of groups supporting Brazil’s president Jair Bolsonaro might subscribe to the Facebook pages of various groups supporting the president and his political party, for example. She might record the messages that are posted on such sites and conduct content analysis on the kinds of vocabulary employed. Or she might examine photos uploaded to these Facebook pages to determine the tactics used to signal who “belongs” to such a movement.

In short, new ICT offer many new -- and potentially lower cost -- possibilities for conducting research on important political topics. An important debate animating the study of social movements and state-society relations concerns the nature of Internet-based technologies: to what degree are they “liberation technologies” versus tools for continued repression by authoritarian governments?²⁴ Researchers engaging in digital ethnography are opening up a rich trove of data sources to begin to weigh in on this and other debates.

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7.5: Case Studies

Learning Objectives

By the end of this section, you will be able to:

- Define a case study as a qualitative research method
- Understand the process of case selection

What is a case study?

In the words of political scientist John Gerring, a case study is “an intensive study of a single unit for the purpose of understanding a larger class of (similar) units.”²⁵ A case study is above all else an in-depth description and exploration of an event, person, group, and/or place. In addition to deep analytical description, case studies may be critical and present evidence to build counter-narratives to the dominant narrative of an event. The “intensive study” of a case study may stem from utilizing all of the methods described above, from interviewing subjects to engaging in ethnographic fieldwork, in order to build a comprehensive understanding of the case. Quantitative data may also be marshaled to deepen the case study. The goal of crafting a case study is to draw inferences from that case to test theory.

The first issue the researcher must address is case selection. First, given the definition above, a case study should be relevant to the theory or hypothesis that a researcher wishes to test. For example, if a researcher wanted to investigate how mineral wealth might contribute to poor governance outcomes in a country, it would not make much sense to select a country without mineral wealth. (To be concrete, the Democratic Republic of Congo might be a good country case to explore, but Haiti less so. However, to make the inferences from that case study more valid, a researcher might want to consider crafting a second case study on a country similar to the DRC, but without sources of mineral wealth, to explore whether governance outcomes differ across the two cases.)

Second, the selected case should be representative of a larger group. This is to head off criticism that the chosen case is too much of an outlier to provide leverage on understanding the general phenomena of interest. To take up the previous example, if a researcher wishes to study the DRC as a case of the so-called “resource curse,” in what ways is the DRC like other mineral-rich countries? In which ways does it differ? And are those differences so significant that the DRC is not representative of the “class” of mineral-rich countries that the researcher would be exploring with this case study? Of course, every place and person is *sui generis*, but an important consideration is whether there are such enormous differences that a case is an outlier rather than representative.

Third, case selection hinges on practical considerations. Is this a case for which there exists a robust body of secondary literature to build a baseline of preliminary knowledge? Does understanding the case require language skills? Does the researcher know which organizations or individuals to contact to collect information? Do they have access to those organizations and individuals? Will building the case study require conducting fieldwork? If so, for how long, and how much might this require in research funds?

Case studies are a powerful tool in the qualitative methods toolbox. They are a means to investigate the causal processes which are often lost in traditional quantitative approaches such as regression analysis. They are also empirical and hence testing theory against what is transpiring in the “real” world. They demand a researcher to think creatively and holistically about a subject, then dive fully into learning as much about it as possible.

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7.6: Key Terms/Glossary

- **Case study:** Focused examination of an event, place, group or individual to explore dynamics of analytical interest and/or test theory
 - **Digital ethnography:** Ethnographic research conducted online or in cyberspace, where activity is mediated by computers, information technologies, and/or virtual reality
 - **Ethnographic research:** Research conducted at a relevant research site (or sites), often referred to as “fieldwork,” whereby the researcher records observations and may conduct interviews and collect documents or other data
 - **Interview:** A conversation with one or more people to obtain information related to a research topic or question. Interviews may be structured, unstructured, or semi-structured.
 - **Qualitative research:** Refers to data collection in which the focus is on non-numerical data
-

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7.7: Summary

Summary of Section 7.1: What are qualitative methods?

This section introduced qualitative methods as a suite of methods that generate non-numerical data. Qualitative methods can include interviews, documentary sources, ethnographic researcher, and case study-building. Qualitative methods are most powerful for the depth of understanding they can generate on a topic, especially the leverage they provide for grasping causal mechanisms. Drawbacks to these methods include their resource-intensive nature and questions about representativeness and reliability.

Summary of Section 7.2: Interviews

Interviews are a key source of data on political life. This section discussed interviewee selection and other considerations such as whether and how to record interviews. It also discussed the difference between structured, unstructured, and semi-structured interviews.

Summary of Section 7.3: Exploring documentary sources

There are a variety of documentary sources that researchers may locate to collect data on their research topic. Documentary sources are also amenable to different kinds of analysis, some quantitative, such as content analysis and factor analysis.

Summary of Section 7.4: Ethnographic research

Ethnographic research is immersive research in which researchers conduct observation-based research and collect data at one or more sites relevant to their research question. Digital ethnography is a newer kind of ethnography in which researchers explore the digital world to address research questions.

Summary of Section 7.5: Case studies

This section introduced case studies, which are analytical, in-depth analyses of an event, person, group, and/or place with the purpose of providing insights on a research topic or to test theory. This section explored aspects of case selection as well as practical considerations such as access to relevant data sources.

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7.8: Review Questions

1. b. False
2. observations “in the field” and may also rely on interviews and collection of documents. Which of the following terms matches this definition?
 - a. Ethnographic research
 - b. Interviewing
 - c. Documentary sources
 - d. Case studies
3. What is a strength of qualitative methods?
 - a. useful for identifying causal mechanisms
 - b. useful for conducting statistical analyses
 - c. useful for identifying correlations
 - d. useful for conducting causal analyses
4. a. True
 - b. False
5. analysis on _____ or phrases.
 - a. Keywords
 - b. Passwords
 - c. keystones
 - d. Passages

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7.9: Critical Thinking Questions

1. What are some of the major advantages of qualitative research? What are some drawbacks of qualitative research?
 2. What are some of the considerations a researcher should have in mind when planning interviews?
 3. What are some potential places to locate documentary sources?
 4. Compare and contrast ethnographic research and digital ethnography.
 5. What are some characteristics of a strong case study?
 6. might employ to learn more about this research topic?
 7. about this topic? Think big! Who might be “dream” interviewees, and what are some ways to contact them? Be pragmatic! Who are some individuals you might contact?
 8. might explore before committing to in-depth research on a single case study? Recall the criteria for a strong case study.
-

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7.10: Suggestions for Further Study

Documentary Sources:

- United Nations Archive: <https://archives.un.org/>
- U.S. Congressional Record: <https://www.congress.gov/congressional-record>
- U.S. Library of Congress Catalog: <https://catalog.loc.gov/vwebv/searchBrowse>

- U.S. National Archives Immigration Records:

<https://www.archives.gov/research/immigration>

- Frisch, Scott A., and Sean Q. Kelly. 2012. "Political Science and Archival Research."

Doing Archival Research in Political Science, 35. https://www.researchgate.net/profile/...4_Doing_Archival_Research_in_Political_Science/links/5d1cf76992851cf44062e65c/Doing-Archival-Research-in-Political-Science.pdf#page=47.

Ethnography/Fieldwork:

- Maria Heimer and Stig Thøgersen, eds. *Doing Fieldwork in China*. University of Hawai'i Press (2006).
- **Digital Ethnography:**
- Digital ethnography research centre. RMIT University. Available online at digital-ethnography.com/

Case Study:

- Robert H. Bates, Avner Greif, Margaret Levi, Jean-Laurent Rosenthal, and Barry R. Weingast. *Analytic Narratives*. Princeton: Princeton University Press (1998).
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CHAPTER OVERVIEW

8: Quantitative Research Methods and Means of Analysis

- 8.1: What are Quantitative Methods
- 8.2: Making Sense of Data
- 8.3: Introduction to Statistical Inference and Hypothesis Testing
- 8.4: Interpreting Statistical Tables in Political Science Articles
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8.1: What are Quantitative Methods

Learning Objectives

By the end of this section, you will be able to:

- Understand what quantitative methods are
- Learn Steven's Four Scales of Measurement
- Master the differences between cases, coding, and variables

As mentioned in Chapter Two, quantitative methods are defined by Flick (2018) as “research interested in frequencies and distributions of issues, events, or practices by collecting standardized data and using numbers and statistics for analyzing them”. Again, what this means is that political scientists solve puzzles using mathematical analysis or complex mathematical measurement. This differs from using qualitative methods where the main source of evidence used to solve a puzzle is the use of words. When using such methods, we often turn to appraising evidence in the form of words. As mentioned in Chapter Seven, we can use interviews and focus groups, archival research, and even digital ethnographies to understand the world. Given this, quantitative methods are simply the use of numbers to draw conclusions rather than words.

In political science, statistical analyses of datasets are the preferred quantitative method. This mostly developed from the behavioral wave in political science where scholars became more focused on how individuals make political decisions, such as voting in each election, or how they may express themselves ideologically. This often involves the use of surveys to collect evidence regarding human behavior. Potential respondents are sampled using a questionnaire constructed to elicit information regarding a subject. When using voters as an example, we may develop a survey that asks citizens if they are registered to vote, if they intend to vote, and which candidate for an office they might vote for. Respondent choices are then coded, usually using a scale of measurement, and the data is then analyzed often with the use of a statistical software program. Scholars probe for correlations among the constructed variables for evidence in support of their hypotheses on the topic.

However, quantitative methods extend beyond statistical analyses of survey datasets. Formal models are one such method. In formal models, political scientists attempt to understand representations of political institutions and political choices in the abstract. Relying on logic and causality, these scholars express relationships among concepts and variables in mathematical terms. They often use precise statements, written as equations, where the results can be replicated, almost always through a mathematical proof. Modeling the behavior of individuals or institutions has proven quite helpful in political science, particularly in the applied side of political science: public policy making. In this field, elected officials and subject matter experts work together to develop programs that can benefit society. Often the effect of a program is not discernible until the program has been implemented. However, formal models could help in projecting or predicting the effects of the program before implementation, which can help policymakers immensely.

Given that quantitative methods in political science often includes the analysis of data sets, it is often referred to as **large-n analysis**, where the “n” stands for number. Thus, we have an analysis of a large number of cases, again often assembled as sets of data. **Cases** are the people, places, things or actions (subjects) that are being observed in a research project. They are often also the **unit of analysis**. Units of analysis the “who” or the “what” that you are analyzing for your study. So, for large-n analyses of surveys, each case could consist of one respondent to the survey, or one person. Alternatively, cases could include the recording of individual actions taken. For quantitative analyses of institutions, cases could include people, such as senators or representatives, or the decisions made by lawmakers and/or policymakers.²⁶

Keep in mind that cases and data are intertwined, but not the same thing. Each case can produce numerous data points. For example, each respondent in a survey can answer multiple questions, which could lead to large amount of data collection. In addition, in observational studies, where researchers observe and record the actions of individuals, there can also be a plethora of data points(Diez, Barr, and Cetinkaya-Rundel 2012).²⁷

As statistical analyses of datasets are the popular quantitative method in political science, it is good to understand how such analyses work. First, it is important to understand that in some analyses, words must be transformed into numbers. By this we mean that any responses provided in surveys must be converted to numerical expressions, or value, for an analysis to take place. We often

refer to this as **coding**. Coding is essential for the creation of variables to analyze in any quantitative research. A **variable** is defined by Hatcher (2013) as having “some characteristic of an observation which may display two or more values in a data set”.

In other analyses, there may be no need to code. The data itself is already in numerical form and forms the variable without any changes. An example could be a survey instrument that asks a respondent if they donated money to a campaign and what was the amount. As campaign donations is measured in dollars, there may be no need to code as the amounts represent individual data points for that variable.²⁸ In other examples, respondents might be asked to rate themselves or some item/activity on a scale of 1-5. Consequently, each response and corresponding number could also be brought in directly, such as the campaign donations above. Or researchers can recode the data points, in some cases changing the way the variable is analyzed, or even create new variables entirely.

To better understand how variables work, we reference the four scales of measurement often used by statisticians. In his book on data analysis, Hatcher (2013) recounts this classification system, which is partially reproduced below in Table 8.1. These scales help researchers determine which statistical techniques would be the most proper to use to analyze the relationships between variables, which are all measured, coded and constructed differently,

Table 8-1: Steven’s Four Scales of Measurement

Type of Measurement	Definition*	Example
Nominal Scale	Identifies the groups to which a participant belongs; does not measure quantity or amount	This is a variable that classifies a respondent. An example could include political party identification, where the distance between the variables is unimportant
Ordinal Scale	Subjects are placed in categories, and the categories are ordered according to amount or quantity of the construct being measured. However, the variables are not equidistant from each other.	This is a variable that is constructed from an ordinal scale, or a ranking of variables. An example could include asking students on a scale of 1-5 how liberal they might be. Ordinal variables are normally constructed from just one survey question, or a single item. Thus, the distance between the choices (1 through 5) are not necessarily equal.
Interval Scale	A quantitative variable that possesses the property of equal intervals, but does not possess a true zero	This is a variable that is constructed from a Likert- scale, or when several survey questions are used to create a score, or multiple items. An example would be asking students to complete a number of survey questions regarding their ideology on scales of 1-5. The responses are totaled and divided by the number of questions, providing a single score on where the student is positioned ideologically.
Ratio Scale	An interval quantitative variable that displays a true zero	This is a variable that has equal intervals between the responses or scores, but also includes a zero option which indicates that no amount of the construct has been measured.

*definitions taken directly from Hatcher (2013)

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8.2: Making Sense of Data

Learning Objectives

By the end of this section, you will be able to:

- Identify different types of graphs
- Explain the measures of central tendency, including mode, median, and mean
- Understand measures of dispersion, including deviation, variance, and standard deviation

In political science research, some scholars are primarily interested in describing the world while others are interested in explaining a particular phenomenon in the world. In other words, political science research involves dual goals of description and explanation. It is important to note that the craft of describing and explaining are interactive in nature, and they often feed to each other. However, in most cases, we first have to know something about the world before embarking on the task of explaining something that happens in that world. In this section, we will explore the various techniques for summarizing the data.

Whether one is collecting original data or compiling a dataset based on existing data sources, the first step is to organize the raw data into a more manageable format. Johnson, Reynolds, and Mycoff (2020) suggest first convert raw data into a data matrix where each row represents a unique entry and each column represents different variables (see Table 8-2). While this format of data organization allows researchers to clearly see information about each observation and compare a few observations, it is not the most suitable format for summarizing the data so that the researcher can grasp on to the general information about the world she is interested in. So, what is the correct format in presenting numerical data to describe the information that a researcher is interested in? It all depends on the level of measurement of the variables (i.e., nominal, ordinal, interval, and ratio) that your dataset includes.

Table 8.1

County	Unemployment Rate	Life Expectancy	Average High Temperature(Celsius)	Most Common Language
Belgium	7	81	6	Dutch
France	10	82	7	French
Ireland	6	81	8	English
Luxembourg	6	82	2	Luxembourgish
Monaco	2	89	13	French
Netherlands	5	81	6	Dutch
United Kingdom	4	81	8	English

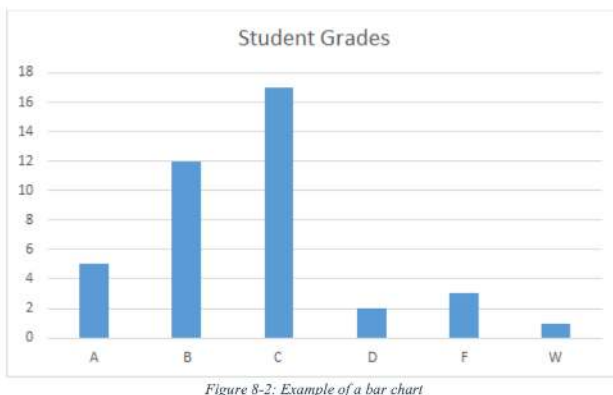
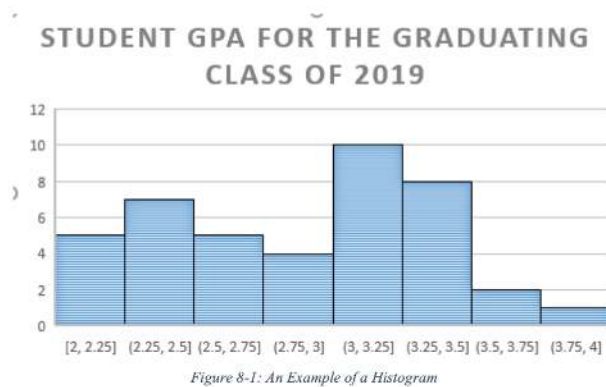
It is important to note that representing data in a table format in itself was not the shortcomings of Table 8-2. It was the type of information included in the table was the issue here in the purpose of the table was to present summary information about the observed data here. Often, we refer to this as **descriptive statistics**, or the numerical representation of certain characteristics and properties of the entire collected data. The goal of the descriptive statistics table is to simply present numbers that describe the cases, or that the basic features of the data in the study. Take a look at Table 8-3 below. This is an example of a **frequency table** that includes frequency, proportion, percentage and cumulative percentage of a particular observation. Even in this table, some are more useful in terms of understanding one particular observation relative to the rest in the world one is interested in describing and explaining. Proportion and percentage (measures of relative frequency) allow us to easily make a comparison between different observations of the same variable.

Table 8.2: Frequency Distribution: Airport in Western European Countries

County	Frequency	Proportion	Percentage	Cumulative Percentage
Belgium	41	0.04	4	4
France	464	0.45	45	49
Ireland	40	0.04	4	53
Luxembourg	2	0.00	0	53
Monaco	0	0.00	0	53
Netherlands	29	0.03	3	56
United Kingdom	460	0.44	44	100
Total	1036	1.00	100	

Source: Johnson, Reynolds and Mycoff(2015)020)

A frequency distribution for a quantitative variable could be presented in a graph format called **histogram**. This is a type of graph here the height and area of the bars are proportionate to the frequencies in each category of a variable. A histogram can be used for interval or ratio variable with a relatively large number of cases. For categorical variables (ordinal or nominal), a researcher can display the data in a similar fashion with a **bar graph**. A bar graph is a visual representation of the data, usually drawn using rectangular bars to show how sizable each value is. The bars can be vertical or horizontal. Given the nature of ordinal or nominal data, a bar graph deals with a much smaller number of categories than its histogram cousin which deals with interval or ratio data.



If a researcher is interested in presenting a relationship between two variables in a graphic format, a **scatterplot** would be an excellent choice. This form of graph uses Cartesian coordinates (i.e., a plane that consists of x-axis and y-axis) to display values for two variables from a dataset to display how one variable may influence the other variable.

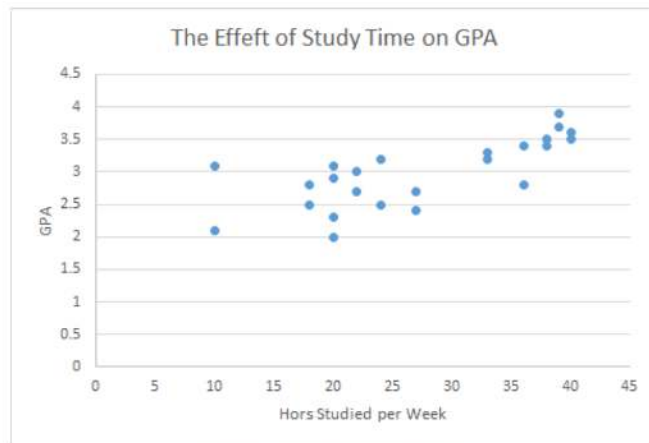


Figure 8-3: An Example of a scatter plot

Social scientists, in general, and political scientists and economists are often interested in the trend of a variable over time. A **time-series plot** can be used to display the changes in the values of a variable measured at a different point in history. For this graph, the x-axis represents the time variable (e.g., months, year, etc.) and the y-axis represents the variable of interest. Unlike the scatterplot, each dot (observation) is connected to each other to display the changes in the value of the variable of interest. We can, for instance, display the number of proposed constitutional amendments in the United State since its finding or the number of women in the U.S. Congress over the years. For the latter example, we can use two lines to differentiate the presence of female representatives in the House of Representatives and the Senate by using two separate lines on the same graphics plane.

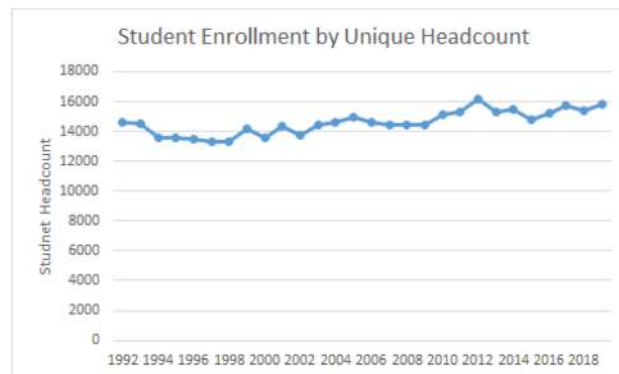


Figure 8-4: An Example of a Time-Series Plot

As mentioned above, researchers can describe the data by relying on descriptive statistics. Descriptive statistics are the numerical representation of certain characteristics and properties of the entire collected data. One of the primary purposes of descriptive statistics is to “explore the data and to reduce them to simpler and more understandable terms without distorting or losing much of the available information”. (Agresti and Finlay 1997). The most frequently used descriptive statistics are information that locates the center or middle of data distribution and information about how data are distributed relative to the located center.

Measures of **central tendency** - the mode, median, and the mean - locate the center of a distribution of a particular data set. In other words, a measure of central tendency identifies “the most typical case” in that data distribution. First, the **mode** is the category with the highest frequency. Second, the **median** is the point in the distribution that splits the observations into two equal parts. It is the middle point of the data distribution when the observations are ordered by their numerical values. If there are odd numbers of observations in the data, the single measurement in the middle is the median. In the case of even numbers of observations, the average value of the two middle measurements is the median. Finally, the **mean** or the average is perhaps the most common way of identifying the center of a distribution. It is the sum of the observed value of each subject divided by the number of subjects. It can be expressed more formally:

$$\bar{Y} = \frac{\sum Y_i}{n} \quad (8.2.1)$$

where $\bar{Y}$ represents the mean (the average), $\sum$ means $Y_1 + Y_2 + \dots + Y_n$ (Y s are measurements of each observation, and n represents the number of observations. For example, if there are 5 students with midterm exam scores of 80, 77, 91, 62, and 85, $n = 5$, and $\sum = 395$ (add all the test score). The mean score for this midterm exam is $395 \div 5$, which is 79.

In addition to the measures of central tendencies, researchers often rely on the measure of data variability to fully understand the data being utilized in their research. Perhaps the simplest measurement of data variation is the **range**. The range is the difference in the value between the maximum and minimum value. For example, if the highest midterm test score for a class was 100 and the lowest score was 70, the range for this particular dataset is $100 - 70 = 30$. Another related measurement of variability is called the **interquartile range** or IQR. The IQR is the difference between the 75th percentile (where 75% of values are located under that point) and the 25th percentile (where 25% of observations are below this point). In other words, the IQR is the range where the maximum values is the third quartile (Q3) and the minimum values is the first quartile (Q1). This measurement tells us how spread the middle 50% of the observations are. Some scholars use a boxplot to graphically display, quartiles and the median

Another way of measuring the dispersion of data is by examining how distant the included observations are from the mean. The distance of an observation from the mean is called the **deviation**. **Variance** is simply defined as the average of the squared deviation. To calculate variance, you first measure the distance of each observation from the mean and square them. Add all the squared deviations and divide it by the number of observations (for population variance) or divide it by the number of observations minus one (for sample variance). We denote variance by using σ^2 (pronounced sigma squared).

Population Variance:

$$\sigma^2 = \frac{\sum (Y_i - \mu)^2}{N} \quad (8.2.2)$$

Sample Variance:

$$\sigma^2 = \frac{\sum Y_i \bar{Y}}{n - 1} \quad (8.2.3)$$

In Equation 8.2.2, μ (pronounced mu) is the population mean (or average) of a variable Y and Y_i represents each observation. The equation is slightly different for the sample variance (Equation 8.2.3). Doing this by hand is rather tedious for data with a large population or sample. As a result of many researchers rely on various statistical analysis software or spreadsheets like Excel.

The **standard deviation** is the square root of the variance. It represents the typical deviation of observation as opposed to the average squared distance from the mean.

Population Variance:

$$\sigma^2 = \frac{\sum (Y_i - \mu)^2}{N} \quad (8.2.4)$$

Sample Variance:

$$\sigma^2 = \frac{\sum Y_i \bar{Y}}{n - 1} \quad (8.2.5)$$

The standard deviation is useful in further interpreting the data at hand. Typically, about 68% of observations fall within the first deviation from the mean. What does that mean? Well, let us consider the following example. Your political science professor tells you that the average/mean score for an exam you just took was 85 with the standard deviation of 5. It means that the scores of 68% of the students fall between 80 - the mean of 85 minus the standard deviation of 5 - and 90 - the mean of 85 plus the standard deviation of 5. It is important to note that an observation deviates from the mean in both positive and negative directions.

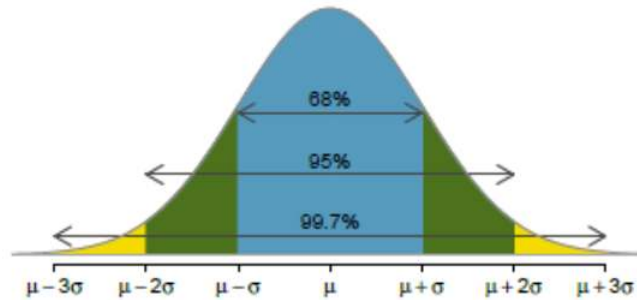


Figure 8-5: Normal distribution Source: OpenIntro Statistics 4th Edition

As Figure 8.1 shows, about 95% of the data falls within the second standard deviation. It means then that 95% of the exam scores should fall between 75 and 95. So if you have scored 96 on this exam, what can we say about your score? Well, you could say that you did very well since your score is beyond the second deviation, which means there are only less than 5% of people who scored higher than you. Differently put, there are about 95% of your peers who scored lower than your score.

In the next section, we will build on the content of this section and explore the means of testing relationship.

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8.3: Introduction to Statistical Inference and Hypothesis Testing

Learning Objectives

- Explain the properties of the normal distribution
- Explain the concept of z-score and calculate it
- Conduct a hypothesis testing (differences of means test)
- Differentiate between Type-I and Type-II errors

Statistical inference is defined as the process of analyzing data generated by a sample, but then used to determine some characteristic of the larger population. Remember, surveys analyses are the bread and butter of quantitative political science. As we are most likely unable to survey everyone in each population, such as all registered voters in the U.S., we instead generate a sample that allows to draw inferences or draw conclusions about the studied population. Samples are useful as it allows scholars to test relationships between variables without having to spend the millions needed to research a larger population.

Before we discuss the concepts of statistical inference and the means of testing relationships, let us begin by revisiting Figure 8.1 located at the end of the previous section (Section 8.2). You will notice that the curve is bell-shaped, with the exam scores peaking in the middle. This curve is called a **normal distribution** where the value of the mean, median, and the mode is the same, and data near the mean are more frequent in occurrence. It is safe to say that most variables that political scientists are interested can be assumed to be normally distributed. But, what does this curve represents? The height of the line represents the density of a particular observation.

Do you notice that the peak of the curve is located at the middle of the distribution? It means that there are a lot more observations with the value of the mean or close to it than any other values in a normally distributed variable. In other words, as you move away (or deviate) from the mean, you will see fewer observations. It may make more intuitive sense using the test score example from the previous section. The mean test score of 85 signifies that a large proportion of students scored something close to 85. Recall the idea of standard deviation? Approximately 68% of the scores will fall between the first standard deviation from the mean. In the above example, we noted that 68% of students fall between the scores of 80 and 90.

Another thing you might notice about the normal distribution curve is that is symmetrical. Half of the observations fall above the mean and the other half lies under the mean. Again, a normal distribution has the same value for mean, median and mode, meaning that the value of the mean is the most occurring and is also the middle value. Given this, the normal distribution is often referred to as $N(\mu, \sigma^2)$.

Sometimes, you may be interested in comparing certain values using different measures that are designed to measure similar concepts. Let us take the SAT and ACT for this example (adopted from OpenIntro Statistics). High school students who are interested in applying for four-year colleges and universities, are required to complete at least one of these aptitude examinations. Universities and colleges then use the SAT or ACT score, along with a combination of other inputs, such as GPA and community service, to determine if a student's application is accepted. It is important to note that the SAT is scored out of 1600 and that the ACT is scored about 36. For example, say Carlos took the SAT and scored a 1300, and Tomoko took the ACT and scored a 24. How can you compare and determine who has performed better? Well, one way is to standardize the scores if certain statistics are available: the mean and the standard deviation. With the mean and standard deviation along with the values of interest (in this case the test scores of Carlos and Tomoko), we can calculate the **Z-score**, which tells us the number of standard deviations that a particular observation falls above or below from the mean.

$$Z\text{-score} = x - \mu / \sigma \quad (8.6)$$

In Equation 9.6, x represents an observation you are interested in. The mean is represented by μ and σ denotes the standard deviation of the dataset. So, in order for us to be able to compare the score of Carlos and Tomoko, we first calculate z-scores for both and compare them. We need the information below as well to accomplish this task.

Statistics	SAT	ACT
Mean(μ)	1100	21
Standard Deviation(σ)	200	6

Carlos took the SAT and scored 1300 so his z-score is:

$$Z = (1300 - 1100) / 200 = 1$$

Carlos took the ACT and scored 24 so his z-score is:

$$Z = (24 - 21) / 6 = 0.5$$

These statistics mean that Carlos's score was 1 standard deviation above the mean whereas Tomoko's score was 0.5 standard deviation above the mean. So, who performed better on the standardized test? The answer is Carlos as 1 standard deviation above the mean is better than 0.5 standard deviation above the mean. Keep in mind that it is quite likely for a z-score to have a negative value as well. This simply means that the standard deviation is below the mean by a certain distance. Z-scores allow researchers to compare the scores of the same exam taken in different class sections, provided that the mean and the standard deviation for both classes are available.

Once we establish the techniques for comparing data, such as scores for the SAT and ACT, research can start developing **statistical hypotheses**. Statistical hypotheses are statements about some characteristics of a variable or a collection of variables. There are two types of hypotheses used in statistical hypothesis testing. A **null hypothesis (H_0)** is a working statement that posits the absence of statistical relationship between two or more variables. In statistics, we desire in proving whether a working statement can be proven false. Related to the null hypothesis is the **alternative hypothesis (H_a)**. Also known as research hypothesis, it is simply an alternative working statement to the null hypothesis. Essentially, it is the claim a researcher is making when testing the relationships between data. To best illustrate statistical hypotheses, null and alternative hypotheses, let us consider the following data and go through the process of hypothesis testing.

The Department of Political Science at San Diego City College wanted to see if extra study sessions will have any effect on the students' performance on the midterm exam. We have randomly selected students to attend extra study sessions. for the American politics (population mean) class was 75, with the standard deviation of 7 amongst 200 students. The mean score of the students who attended the extra study session (sample mean) was 82 and there were 50 students who were attended. Can we figure out if the extra study sessions on average had any effect on student performance?

In order for us to be able to conduct this test, we have to decide on a couple of more things. First, we have to determine the level of probability that you are comfortable with in terms of mistakenly accepting the alternative hypothesis. This is called **statistical significance** or the **alpha level**. In other words, it is the probability of rejecting the null hypothesis when it is true. For example, an alpha of 0.05 means that we want to be 95% confident, and this is typically the level that most political scientists would agree as being acceptable. For this example, let us use the alpha of 0.05 (95% confidence). This decision lead us to identify another critical element needed for hypothesis testing: critical z-score. This value tells us whether we need to reject the research claim or not. Since we have decided that the alpha to be used here is 0.05, the critical z- score is 1.96. You can identify this number by a z-score probability table often located at the back of an introductory statistics textbook. Also, we need to decide whether we are going to be conducting one-tailed or two-tailed test. Since this is beyond the scope of this textbook, I will use the two-tailed test for this example. The summary of the information we have for this example can be found in the table below.

Statistic	Value
Population Mean(μ)	75
Population Deviation(σ)	7
Sample Mean($\bar{Y}$)	82
Sample size(n)	50
Alpha-level	0.05
Critical z-score	1.96
Null Hypothesis(H_0)	$\bar{Y} = \mu$
Alternative Hypothesis(H_a)	$\bar{Y} = \mu$ or $\bar{Y} > \mu$

Now we have all the necessary information, we can conduct the hypothesis testing using this example. Ultimately, a hypothesis testing involves the examination of the observed test statistic relative to the threshold that you have determined (critical z-score). If the observed test statistic goes beyond the critical value, we can safely say that your research claim may be correct. To calculate the observed test statistic (in this case z-score for the samples) by using the equation below.

$$Z_{obs} = |\bar{Y} - \mu| /$$

$$Z_{obs} = |82 - 75| / 7 * \sqrt{50}$$

Now compare the observed z-score and the critical z-score.

$$Z_{obs} : |7.07| > 1.96 (Z_{critical})$$

In this case, since the observed z-score was larger than the threshold of 1.96 we can say that the claim that $\bar{Y} = \mu$ can be rejected. Conversely, if the observed z-score was smaller than 1.96, we will say, we failed to reject the null hypothesis. It is important to note that we never accept the null hypothesis. So, what does this mean ultimately? According to the test result here, we can safely say that the observation that the average score of those who received extra support was higher than the population average was not the result of change. In other words, we can make a conjecture that the extra support may have contributed to the higher average for the sample (extra support) group. While our example used the comparison of the means using z-scores, we can use the same concept for the comparison of the means tests with t-test and a comparison of proportions as well.

When conducting a hypothesis testing to make a statistical inference, it is possible that your decisions about whether to reject the null-hypothesis or not was incorrect. It is possible for you to mistakenly reject the null-hypothesis that was true. This type of error is called a **type-I error**, and this is the case of “false-positive” conclusion. When a researcher fails to reject the null hypothesis that is false, the researcher has committed a **type-II error** (“false-negative” conclusion). We can try to safeguard against these errors. The significance level that we discussed above (alpha-level) is the probability that you will commit a type-I error. By increasing the alpha-level, you can ensure that your chance of committing this type or error is reduced. As for a type-II error, the probability of committing this error relates to the concept of “power” in the testing. Simply put, the larger the sample included in the test, the less likely that the study will suffer from a type-2 error.

In this section, we have introduced the foundational knowledge to expand on your interest in advancing your quantitative method skills. What you were exposed here is a small tip of a huge statistical iceberg. If you are interested in the quantitative political research, we highly encourage you to enroll in an introductory level statistics course, preferably in political science (if your school offers) or in other social and behavioral sciences department.

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8.4: Interpreting Statistical Tables in Political Science Articles

Learning Objectives

By the end of this section, you will be able to:

- Read and understand a standard regression table commonly found political science journals
- Comprehend the numerical expressions in a regression table, including the coefficient, standard error, and confidence level

Political scientists often present their analytical results of the research in the table. In addition, quite a few articles or books often will include summary statistics as well, usually prior to presenting their analysis. The previous sections equipped you with enough information to accurately review analyzes data published in various journals. However as mentioned throughout this book, methodological advancements are a feature in political science, particularly in the advancement of quantitative approaches. Researchers will often borrow techniques from other disciplines, especially those with tangential puzzles or problems, such as economics, or psychology. Likewise, they will seek to incorporate new developments from statisticians and/or from mathematicians in formal modeling or game theory.

Again, even though some researchers in political science use mathematical models of behavior or have begun using experimental methodology, quantitative research in political science relies heavily on observational methods. Once the information has been coded and arranged into a datasets, political scientists will often use a type of regression analysis. Even though this type of quantitative analysis is the most common approach, an in-depth discussion on regression and other statistical techniques is beyond the scope of this chapter and the textbook. However, we believe that it is nevertheless important to introduce you to a basic understanding of a statistical table in a journal article, and how analytical results of quantitative research are generally presented.

To repeat, a student needs additional exposure and training in quantitative methods in order to properly interpret a table of results generated by a regression statistical analysis. However, there are some elements of a regression table that warrants a discussion in this section as political science students will be required to read such tables in the articles they have been assigned in class. However, even before a student begins the analysis of a regression table, she first needs to identify the causal relationship being examined in the article. In other words, the first task in the analysis of a statistical results table is to identify the outcome (dependent) variable(s) and the explanatory (independent) variables. In the process of identification, one also needs to understand how each variable is quantified/measured (see Section 8.1). Also, it is important to identify the statistical model being estimated. Again, all this discussion is beyond the scope of the current chapter. We merely want to make you aware that there are many things to consider when looking at a regression table.

Explaining Registered Voters in 2000 (Arkansas, South Carolina)	
Dependent variable:	
Is Respondent a Voter?	
Age	0.016*** (0.004)
Female	0.310** (0.151)
Education	0.225** (0.090)
Income	0.094*** (0.022)
Constant	-0.878** (0.376)
Observations	1,500
Note: * p<0.1; ** p<0.05; *** p<0.01	

Figure 8-6: An Example of a Regression Table

The first number to understand in the regression table above is called the **coefficient**. Coefficients inform the reader of the nature of the relationship between the outcome and explanatory variables. Each coefficient has either a positive or negative sign. A negative

sign indicates an inverse relationship with the outcome variable. In simpler terms, if the value of a coefficient goes up, then the value of the outcome variable goes down. Conversely, a positive sign on a coefficient means that an increase in the value of the coefficient results in an increase in the value of outcome. In terms of substantive definition of a coefficient, or what does this relationship, either inverse or positive, really mean will depend on the statistical model utilized in the study.

The second number, right below the coefficient in parentheses is the **standard error**. In a very useful website by Steven Miller (“Reading a Regression Table: A Guide for Students” 2014), he notes that “the standard error is [an] estimate of the standard deviation of the coefficient”. This helps us in understanding just how correlated the two variables are. And it tells us how potentially wrong the estimate is as it captures how much uncertainty we have in the model. The higher the standard error, the weaker the model is relative to variables. This means that we are not as sure if the correlation, or relationship between the variables, is as certain as it may appear. Finally, researchers use the standard error when looking to improve the certainty of the findings.

The third set of numbers to consider are at the bottom of the regression table. These are the **confidence levels** for each coefficient. The idea of confidence is very similar to the concept of statistical significance or alpha levels introduced in Section 8.3. Typically speaking in the social sciences, researchers use asterisks (*) to report the level of significance. A coefficient with one asterisk “*” indicates that the relationship between the outcome and that particular variable has 90% confidence. In addition, two asterisks “**” indicates 95% and three asterisks signifies 99% confidence accordingly. Most statistical software programs, including Stata, R, SPSS, and SAS, automatically report the significance level of the explanatory variables. If the coefficients do not have any asterisk at all, that means that the model was unable to distinguish if the relationship between the outcome and the variables were important. Instead, it could be a result of random or systematic factors. In this case, researchers would report that these coefficients without any asterisks were *statistically insignificant*.

Finally, remember that in a regression table, there could be quite a few additional reported numerical indicators. In addition, the variety of statistical figures these will change depending on the utilized models. Furthermore, a researcher may include additional diagnostic tests, often to ensure the robustness of the model. As noted above, in order for a student to feel fully equipped to confidently be a “consumer” of quantitative political research, additional quantitative method and statistic courses will be required. However, we hope that in the very least this chapter has piqued your interest in quantitative approach to political research.

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8.6: Summary

0. Quantitative methods are the use of mathematical analysis or complex mathematical measurement to solve problems or puzzles. These methods generally involve the use of statistical techniques, particularly when analyzing datasets constructed from surveys. Datasets consists of data points generated from cases. Cases can include people, or decisions made by people. Data can be measured differently, using four scales - nominal scales, ordinal scales, interval scales, ratio scales.

Summary of Section 8.2: Making Sense of Data

The initial step is to organize the raw data into a more manageable format. Afterwards, there are various ways that the data can be presented: frequency table, histogram, bar graph, scatterplot, time-series plot. Datasets all have a central tendency, which locates the center of the data, which then allows for an analysis to take place. The mode, median, and the mean can help us determine the central tendency. From this, we can determine the range and interquartile range, the deviation, the variance, and the standard deviation.

Summary of Section 8.3: Introduction to Statistical Inference

Once we have established some elementary statistics, we can then begin to analyze the data. First, we look at the normal distribution of the data. It is often represented through a bell curve. with the exam scores peaking in the middle. If the value of the mean, median, and the mode is the same, and data near the mean are more frequent in occurrence, we can refer to this curve as a normal distribution. Understanding the distribution of the data then allows us to begin comparing. Using a z-score, we can determine if a particular data point falls above or below the mean, and how many standard deviations as well. With these techniques, we can begin developing statistical hypotheses. The two most common are the null hypothesis and the alternative hypothesis. To determine if we can accept or reject the null and/or alternative hypotheses, we have to establish the level of statistical significance we are interested in, or the alpha level. At times we mistakenly reject the null-hypothesis that was true. This type of error is called a type-I error. However, when a researcher fails to reject the null hypothesis that is false, the researcher has committed a type-II error.

Summary of Section 8.4: Interpreting Statistical Tables in Political Science Articles

Political scientists often use regression analyses to understand relationships between variables. These regression results are often represented in table format. In these tables, there are three numerical expressions that every student should understand, regardless of their skill levels. The first is the coefficient, which is a numerical expression of the relationship between the outcome and explanatory variables. The second is the standard error, defined as the estimate of the standard deviation of the coefficient. The third is the confidence level, which communicates the statistical significance of the correlation between the variables. Researchers use asterisks (*) to report the level of significance in the table.

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8.7: Review Questions

- What are quantitative methods?
 - a. analyses that involves some kind of mathematical analysis or complex mathematical measurement
 - b. analyses that involves some kind of observation of a person or group
 - c. analyses that involves some kind of visual aid, such as a piece of art or drawing
 - a. True
 - b. False
 - a. True
 - b. False
 - a. An error of mistakenly reject the null-hypothesis that was true
 - b. An error of failing to reject the null-hypothesis that was false
 - a. An error of failing to reject the null hypothesis that is false
 - b. An error of mistakenly reject the null-hypothesis that was true
-

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8.8: Critical Thinking Questions

1. What are quantitative methods?
2. What are cases? What are variables?
3. What are the differences between the level of measurements (i.e., nominal, ordinal, interval, and ratio)?
4. What are the different ways data can be presented?
5. What are the measures of central tendency?
6. What are the variance and the standard deviation, and how are they related?
7. What is z-score and how is it used the process of hypothesis testing?
8. What is a null hypothesis? What is an alternative hypothesis?
9. What are type-I and type-II errors?
10. What are three main reported numbers in a regression table?
11. Think about how datasets are constructed. What are the potential pitfalls in this process? How are variables possibly designed? How could your personal biases enter into these processes?
12. How important is the standard deviation to understanding relationships between data points? Why do you think students find it so hard to understand this concept? What could students do to better understand the standard deviation?
13. What is statistical inference? How can the z-scores help us understand statistical inference? How can these statistical techniques help us think about hypothesis testing?

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8.9: Suggestions for Further Study

Suggestions for Further Study

Websites

- “Reading a Regression Table: A Guide for Students.” n.d. Steven V. Miller. Accessed December 15, 2019. [svmiller.com/blog/2014/08/rea...ssion-table-a- guide-for-students/](http://svmiller.com/blog/2014/08/reading-a-regression-table-a-guide-for-students/).

-

- [http://www.stats.gla.ac.uk/steps/glo...s_testing.html](http://www.stats.gla.ac.uk/steps/gloss_testing.html).

- **Journal Articles**

-

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- Agresti, Alan. 2017. *Statistical Methods for the Social Sciences*, 5th ed. Pearson.
- Marchant-Shapiro, Theresa. 2015. *Statistics for Political Analysis: Understanding the Numbers*, Sage/CQ Press.
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- • 1st edition, 2020: Dino Bozonelos, Ph.D., Masahiro Omae, Ph.D. ◦ Peer reviewers: TBD

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8.5: Key Terms

- **Alpha Level (statistical significance):** The probability of rejecting the null hypothesis when it is true
- **Alternative hypothesis (Ha):** Also known as research hypothesis, it is simply an alternative working statement to the null hypothesis. Essentially, it is the claim a researcher is making when testing the relationships between data
- **Bar Graph:** A visual representation of the data, usually drawn using rectangular bars to show how sizable each value is. The bars can be vertical or horizontal
- **Cases:** are the people, places, things or actions (subjects) that are being observed in a research project
- **Central Tendency** - consists of the mode, the median, and the mean, which locate the center of a distribution of a particular data set. It identifies “the most typical case” in that data distribution
- **Coding:** refers to the conversion of words or words phrases into numerical expressions that can be used for statistical analyses
- **Coefficient:** a numerical expression of the relationship between the outcome and explanatory variables
- **Confidence Levels:** representation of statistical significance or alpha levels on regression tables
- **Descriptive Statistics:** The numerical representation of certain characteristics and properties of the entire collected data
- **Deviation:** distance of an observation from the mean
- **Frequency Table:** A table that includes frequency, proportion, percentage and cumulative percentage of a particular observation
- **Histogram:** A type of graph here the height and area of the bars are proportionate to the frequencies in each category of a variable.
- **Interquartile Range (IQR):** The IQR is the difference between the 75th percentile (where 75% of values are located under that point) and the 25th percentile (where 25% of observations are below this point)
- **Interval Scale:** A quantitative variable that possesses the property of equal intervals, but does not possess a true zero
- **Large-n:** a dataset with a large number of cases
- **Mean:** Sum of the observed value of each subject divided by the number of subjects
- **Median:** The point in the distribution that splits the observations into two equal parts. It is the middle point of the data distribution when the observations are ordered by their numerical values.
- **Mode:** The most frequently occurring category/value in data.
- **Nominal Scale:** Identifies the groups to which a participant belongs; does not measure quantity or amount
- **Normal Distribution:** A distribution with a bell-shaped curve where the value of the mean, median, and the mode is the same, and data near the mean are more frequent in occurrence.
- **Null hypothesis (Ho):** A working statement that posits the absence of statistical relationship between two or more variables. In statistics, we desire in proving whether a working statement can be proven false
- **Ordinal Scale:** Subjects are placed in categories, and the categories are ordered according to amount or quantity of the construct being measured. However, the variables are not equidistant from each other
- **Quantitative Methods:** analyses that involves some kind of mathematical analysis or complex mathematical measurement
- **Range:** the difference in the value between the maximum and minimum value
- **Ratio Scale:** An interval quantitative variable that displays a true zero
- **Scatter Plot:** A graph that uses Cartesian coordinates (i.e., a plane that consists of x-axis and y-axis) to display values for two variables from a dataset to display how one variable may influence the other variable
- **Standard Deviation:** The square root of the variance. It represents the typical deviation of observation as opposed to the average squared distance from the mean.
- **Standard Error(s):** An estimate of the standard deviation of the coefficient (Miller)

- **Standard Error**: An estimate of the standard deviation of the coefficient (value)
- **collection of variables**
- **Statistical inference**: Defined as the process of analyzing data generated by a sample, but then used to determine some characteristic of the larger population
- **Time-Series Plot**: A graph used to display the changes in the values of a particular variable measured at a different point in history.
- **Type-I error**: An error of mistakenly reject the null-hypothesis that was true
- **Type-II error**: An error of failing to reject the null hypothesis that is false
- **Units of Analysis**: the “who” or the “what” that you are analyzing for your study. Often interchangeable with word cases
- **Variable**: defined by Hatcher (2013) as having “some characteristic of an observation which may display two or more values in a data set”.
- **Variance**: The average of the squared deviation.
- **Z-score**: A statistic that tells us the number of standard deviations that a particular observation falls above or below from the mean.

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CHAPTER OVERVIEW

9: Research Ethics

- 9.1: Ethics in Political Research
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- 9.3: Navigating Qualitative Data Collection
- 9.4: Research Ethics in Quantitative Research
- 9.5: Ethically Analyzing and Sharing Co-generated Knowledge
- 9.6: Key Terms/Glossary
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9.1: Ethics in Political Research

Learning Objectives

By the end of this section, you will be able to:

- Define research ethics
- Understand the purpose of Institutional Review Boards (IRBs)

Now that you have become familiar with many of the details associated with the scientific method, research design, and the various methods for conducting research, we still have one final puzzle to address—how do we conduct research the “right” way? Just as individual judgments and choices are guided by a society’s morals, norms, and principles, so too is the discipline of political science. For instance, what is the right way to frame our questions without misleading our research subjects? How ought we interpret results that may be ‘fuzzy’ or prone to manipulation? And what, if anything, do we owe the individuals and communities that makes much of our scholarship possible in the first place?

These are just a few of the ethical challenges that confront political science researcher, and like the principles that guide any given society, they are subject to debate, interpretation, and tend to operate at the intersection of theory and practice. Thus, in order to research and produce knowledge in an ethical way, our craft is governed by a number of principles and rules that depends on researchers exercising sound judgment when their exact application may be unclear.

The word ethics comes from the Greek word *ēthos*, meaning moral character, and *ēthikos*, pertaining to customary behavior. Put another way, ethics are the systems of principles that guide a particular group’s appropriate action. Indeed, all scientists are expected to conduct research in a particular way, which observes agreed upon principles established and revised by various “epistemic communities,” or communities of learning and knowledge production. Some of these ethical principles may seem obvious: not claiming credit for the work of others (e.g. plagiarism); misrepresenting sources or inventing data; using unreliable data, and distorting opposing views (Booth, Colomb, and Williams 2008). However, some ethical considerations are less straightforward, such as contemplating the potential effects of one’s research on society. Indeed, from the invention of dynamite to the creation of the internet, scientists are seldom capable of maintaining a monopoly on how their research, inventions, and discoveries will ultimately impact individuals, society, or our planet.

Failing to take ethical considerations in one’s research may not only do irreparable harm to others, but also to your reputation, that of your home institution and our discipline—political science. It is for this reason that in the United States, political scientists must submit their research proposals to Institutional Review Boards (IRBs), which assesses the degree to which the researcher and their project’s design has taken appropriate measures to protect the rights and well-being of their “human subjects.” A full discussion of IRBs is beyond the scope of this chapter, as their particular protocols and emphasis varies depending on their location. Yet generally speaking, IRBs were developed between 1970-1990 in response to unethical research on human subjects, such as that conducted by Dr. Josef Mengele and others during the Nazi Regime (Yanow and Schwartz-Shea 2011). Although designed to protect the researcher, their research participants, and the universities or institutions in which they are typically housed, they have been critiqued for being overly bureaucratic and legalistic in nature (Yanow and Schwartz-Shea 2011).

Moreover, because IRBs cannot anticipate the numerous judgments calls we may confront when conducting research, a common refrain by most IRBs is that when in doubt, err on the side of caution (Shively 2017). Thus, the task of preparing young political scientists for the ethical challenges that await them in designing, conducting, and hopefully, publishing their findings is largely the responsibility of the guardians and practitioners of our discipline—such as authors of this text and your instructor. That being said, what follows is by no means a compressive guide to ethical research nor can your instructor prepare you for all the potential ethical questions and dilemmas that may arise as you progress in this field. What we instead offer are a number of key principles, some of which are subject to debate, that you must grapple with and consider when engaged in research.

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9.2: Research Ethics

Learning Objectives

By the end of this section, you will be able to:

- Consider the unique ethical considerations that pertain to working with human research subjects
- Understand the significance of fully informed consent and how to go about obtaining it

All scientists must consider the potential impacts of their work. Yet, what is arguably distinct about the social sciences in general and political science specifically is the central role that humans play in our studies. For instance, as Chapter 7 on qualitative methods demonstrates, approaches to political science rely heavily on interviewing human subjects, and in some instances, living with and significantly immersing oneself in their cultures, communities and ways of life. For instance, the relational character of participant observation often requires researchers to establish relationships with participants to co-create knowledge, rather than simply treating them as informants which are mined for academic data (Yanow and Schwartz-Shea 2011). Indeed, one of the rewarding and challenging aspects of conducting research in political science, perhaps unlike the study of atoms, rocks, or even the cosmos, is that our “subjects” are not only a means to testing theories, illuminating puzzles, and discovering new ones, but are also ends in themselves. Consequently, this requires striking a balance between one’s role as a researcher, an active participant in the phenomenon under investigation, a friend, and in certain instances, an adversary.



Figure 9.2.1: Research participants from the Buklod Tao organization in Brgy by Steven Cauchon

To be sure, political research always entails an element of human costs, be it the time our participant gives us, reliving a private or traumatic event, or worse. This is true for both qualitative and quantitative approaches. That being said, research that minimizes such costs and

is conducted in an ethical fashion can help us better understand certain political phenomena that can lead to positive change for humanity, emancipation for the oppressed, and the empowering process of having one’s voice heard. And while there is no exact formula for assessing when our research ends justify our means, as a scientific community, we generally agree on a number of foundational principles and practices that assist us in making ethical research considerations and choices. For instance, we must consider to what extent our study might harm our subjects, be it physical, psychological, and emotional, intentional or not.

It is for this reason that we are expected to be forthcoming with our research participants and avoid misleading them as our research and its dissemination may put them in harm’s way. For example, given the personal and individual nature of qualitative data collection, the principle of “fully informed consent” is employed before participants engage in our study. There are a number of ways this can be done, but it is often useful to use a consent script that is read to all participants, which is useful to maintain a common standard for all participates and is often reviewed by an IRB before the study can even begin (See Image 9.2) . This script typically informs participants about the exact nature of the study, the potential implications for them, what will happen to them during this process, what will happen to the data they provide, how it will ultimately be used, and that they have the right at any time during the study to withdraw if they feel uncomfortable or are no longer willing to participate (Gibbs 2008).

Although a consent script gives the research and their home institution legal protection and provides the study's participants with the information they need to decide if it is in their interest to proceed, this is no substitute for the trust often necessary for conducting qualitative research. For example, the use of participant observation and other forms of immersion research are frequently instrumental to not only learn, but also engender trust with human subjects. Even if a researcher has a profound research question, theory, or hypothesis, without access to the necessary archives, organizations, or communities, let alone the trust of key individuals, the project cannot proceed beyond the theoretical. However, once access and trust are established, multiple opportunities can emerge for one to learn from. Given that many of our initial hunches and subsequent questions we ask interviewees emerge from provisional inferences made before we conduct any fieldwork, participant observation can help us construct survey instruments that minimize the potential for confirmation bias and/or misrepresenting our study's participants (Yanow and Schwartz-Shea 2011).

Moreover, establishing deep connections with human subjects can give researchers unique access and perception as an ‘insider,’ rather than an ‘outsider,’ with only scholarly interests. For example, when conducting qualitative interviews, surveys, or ethnography, we often have access to rich details of our participants’ lives, communities, etc. This richness often entails getting close to our participants and it is not uncommon for friendships and deep connections to grow. Indeed, one of the exciting aspects of this kind of research is that it is unpredictable and can lead to new discoveries that we did not originally anticipate. However, while this can lead to a deep understanding of the phenomena under investigation, we may be exposed to data that could be illegal, ethically dubious, or might put us or our participants in danger. With this in mind, the following section discusses how such access and trust entails a number of ethical considerations, such as being forthcoming about our interests and intentions as both scholar, participants, and who we are individually.

9.3: Navigating Qualitative Data Collection

Learning Objectives

By the end of this section, you will be able to:

- Understand the importance of anonymity and confidentiality to ethical data collection
- Consider how a reflexive approach to data collection can minimize bias and open ourselves to new ways of thinking

As the above section points out, engendering trust can provide access to individuals, communities and insights that would be otherwise difficult to obtain. But with such access also comes a great deal of responsibility when it comes to data collection. For instance, an important ethical consideration is offering to conduct an interview, survey, or observation under the condition of confidentiality. This not only allows human subjects the comfort to speak their truth but takes seriously the principle of “first do no harm,” rather than treating them as means to our own academic ends.

It is not uncommon that a researcher may come to the realization that one or a number of the participants in their study may face some kind of retribution, embarrassment, or worse as a result of our study, even if the participant may not have realized it at the time of consent. Once again, we are confronted with an ethical dilemma: do we cite the source knowing that it will give more credibility to our study or do we anonymize, if not completely omit this information, knowing the potential harm that could befall our participant(s)? This is not an easy decision, but as we have mentioned, the ethical researcher is encouraged to be cautious rather than risk human harm. Indeed, we are asking our subjects to help us learn and create knowledge. Therefore, it would not only be selfish but unethical to knowingly put them in harm’s way for the sake of our study, if we know there is even a possibility of negative repercussions.

Beyond minimizing the potential of physical or psychological harm that could befall our human subjects, we must also consider the epistemic violence, or harm that can come as a result of local knowledge being displaced and/or distorted by our alternative own frameworks, concepts and ways of knowing (i.e. epistemology) (Spivak 2010). For example, political scientists also adjust their instruments data collection methods in the field based on how different participants interpret the phenomenon under investigation, and the meanings *they* ascribe to them. Similar to Schaffer’s study of “demokrassi” in Senegal, how interviewees understand key concepts and ideas under investigation, in this case democracy, frequently vary from language used in academic debates (Schaffer 2000). It can be incredibly frustrating when our survey instruments, typically rooted in theoretical literature or previous studies, do not mesh with what participants are articulating in the field. It is therefore not uncommon for scholars, either subconsciously or otherwise, to gather data in such a way that can mistakenly confirm hunches, and related questions, which animate their projects.

Yet, the desire to confirm what we are looking for can unwittingly bias the responses of our interviewees, based on how one frames their questions and any perceived position of authority or power of the interviewer. Ethically, avoiding the temptation to impose our conceptual apparatus on human subjects can discipline the researcher’s thinking, help them productively rethink initial hunches in useful ways, avoid the presumptive authority of academic concepts, and be open to a constant integration and revaluation of them (Godrej 2011). For instance, participant observation is often an essential tool for providing evolving survey instruments with the appropriate language for bridging academic debates with what our interviewees are trying to tell us. However, a key dimension of such an approach is a commitment to *reflexivity* regarding the ways in which one’s personal identity, perception by others, and worldview may affect the way they are able to gather and analyze one’s data (Yanow and Schwartz-Shea 2011). This may involve “interrogating forms of inclusion and exclusion and breaking down boundaries. Likewise, it may involve listening for silences and sometimes responsibly sustaining those silences, depending on the context (Ackerly and True 2010; Cecelia Lynch 2013).”

Reflexive research also includes an awareness of the distorting effects that arise from ones’ location in their academic field, one’s personal relationship to their subjects, and acknowledging the fact that they are inextricably involved in the social processes under observation (Cecilia Lynch 2014). Yet, as one learns how to mitigate potential response bias (the tendency of participants to answer our question inaccurately due to the wording of questions or how their answer will be perceived by the researcher) and confirmation bias (the tendency of researchers to interpret data in such a way that it confirms their existing beliefs), our unique position in the field can also help bridge boundaries between academic debates and our research subjects, along with those between theory and practice. Ethically engaging the voices, stories, and insights of human subjects thus have both material and

epistemological consequences. Specifically, allowing researchers not only contribute to key debates in political science, but also share what we have learned with those who helped co-generate this new knowledge.

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9.4: Research Ethics in Quantitative Research

Learning Objectives

By the end of this section, you will be able to:

- Explain the rationale behind the principle of data access and research transparency
- Understand the benefit of increased openness in quantitative research

While quantitative/statistical analysis, when used properly, could yield powerful information to support one's theoretical claims, improper use of such technique could ultimately challenge the integrity of the quantitative method as well as the research being conducted. Without proper precautions, statistics can lead to misunderstanding as well as intentional misrepresentation and manipulation of the findings.

One of the most important facts to consider when applying the quantitative method to one's research, is to make sure that the principle of objectivity, which is at the heart of the scientific method, is reflected in practice (Johnson, Reynolds, and Mycoff 2015). In other words, in

addition to presenting the information in an objective manner as possible, one must ensure that all relevant information in interpreting the results is also accessible to the readers as well. The implication of this principle in practice is that not only should a researcher provide access to data used in a research project but also explain the process of how one has reached the conclusion that is presented in the research. This resonates with the current discourse on data access and research transparency in the political science discipline.

The most recent work on data access and research transparency in political science discipline were borne out of the concerns amongst practitioners that scholars were unable to replicate a significant proportion of research produced in top journals. In order for the discipline to advance knowledge across different subfields of political science and different methodological approaches, the principle of data sharing and research transparency became ever relevant in the discourse of the discipline. The idea is that evidence-informed knowledge needs to be accessible by the members of other research community whose research may rely on different methodological approaches. As a result of the growing concerns about the lack of norms of data sharing and research transparency culture amongst practitioners of various methodological communities and substantive subfield, the American Political Science Association (APSA), the national professional organization for political scientists, have produced an ethics guideline to ensure that the discipline as a whole can advance the data sharing and research transparency culture and practice.

The recently updated ethics guidelines published by APSA which is mentioned in (Lupia and Elman 2014) states that “researchers have an ethical obligation to facilitate the evaluation of their evidence-based knowledge claims through data access, production transparency, and analytic transparency so the at their work can be tested and replicated”. According to this document, quantitatively oriented research must meet the three prongs of research ethics: data access, production transparency, and analytical transparency. When conducting quantitative political research, all three needs to be incorporated for it to be considered meeting the ethical standard.

First, researchers must ensure data accessibility. Researchers should clearly reference the data used in their work, and if the data used were originally generated, collected, and/or compiled by the researcher, she should provide access to them. This is a practice already adopted by many journals where the condition of publication of an article is to provide access to data used in the manuscript. Some researchers include code and commands used in various statistical software, such as Stata, SAS, and R, so that one can replicate the published work.

Second, researchers need to practice production transparency. Not only should the researcher share the data themselves, but she also needs to provide a full account of the procedures used in the generation and collection of the data. First and foremost, this principle provides safeguards against unethical practice of misrepresenting or inventing data. One of the most famous recent cases of data fraud in political science research perhaps is the case involving Michael LaCour (Konnikova 2015). He completely fabricated the data he and his co-author Donald Green used in their research where many political scientists thought was miraculous findings. Only when two UC Berkeley grad students, David Broockman and Josh Kalla, tried to replicate the study and

contacted the firm that LaCour supposedly used in the collection of the survey data, it was revealed that LaCour completely made up the “survey data” the authors used in their research.

Finally, researchers need to ensure analytical transparency where the link between the data and the conclusion of the research is clearly delineated. In other words, a researcher must explicitly explain the process that led to the conclusion of a research project based on the data being used in such a study. The empirical evidence must be clearly mapped on the theoretical framework of a given research project. Some scholars are concerned about the implication of radical honesty in political science research, identifying that the probability of successful journal publication may diminish as the level of transparency and radical honesty increases (Yom 2018). As a result, the idea of radical honesty in political science research requires the institutional buy-in beyond an ethical practice at the individual level. Unless such a practice is beneficial to a scholar, as opposed to being a challenge, the culture of analytical transparency may not cascade to the greater political science community beyond the pockets of ethical practitioners that currently exist.

It is important to note that increased openness in quantitative research provides political scientists with a number of benefits beyond what is promised in the ethical front (Lupia and Elman 2014). First, transparency and increased data access offer members of a particular research community to examine the current state of their own scholarship. Through such “internal” self-assessment within a particular subfield of political science, scholars are able to cultivate “an evidentiary and logical basis of treating claims as valid” (Lupia and Elman 2014). In many subfields, the validity of their knowledge requires replication of existing work. When access to quality data is limited, it becomes challenging to determine whether we should have confidence in the research findings presented. Without the culture and practice of data access and research transparency, it affects the confidence of a particular subfield as well.

In the literature of civil war onset, Hegre and Sambanis, for example, conducted a sensitivity study on the findings of various published works (Hegre and Sambanis 2006). Essentially, a sensitivity study is the examination of a numerical measurement (e.g, whether a civil war started or not) under a different condition than the original setting. In this particular case, the scholars of civil war literature uses different definitions of when a violent conflict constitute a civil war. The implication of this is that some scholars may have included or excluded certain cases from their dataset. Consequentially, it will influence the results of their study. So, one way to conduct a sensitivity study is to use the same definition, for example, of an outcome variable and replicate the study to examine the effect of such change.

This project was the result of the observation that several empirical results are not robust or replicable across studies. Because the authors of these articles in the sensitivity analysis practiced the ethical culture of data sharing and research transparency, scholars of civil war literature were able to reflect on the state of their research community. For the members of other research communities, the culture and practice of openness could contribute to the persuasiveness of the findings. This is based on the idea that the more one is empowered to understand the process through which the researchers have reached a particular conclusion, the more likely that the reader is likely to believe and value the knowledge.

Next, the culture and practice of openness help political scientists more effectively communicate with members of other communities, including non-political scientists. This is very important, for our research findings often carry real political and social implications. Generally speaking, good political research must contribute to the field of political science as well as to the real world (King, Keohane, and Verba 1994). Our findings are often used by political actors, policy advocates as well as various non-profit organizations that affect many lives of the general public. For example, Dr. Tom Wong, an expert on immigration policy, has worked as an expert advisor in the Obama administration and testified in various federal court cases to advocate for the rights of undocumented immigrants. He supported his position by relying on his research on the impact of undocumented immigrants which were primarily written for academics. However, he was also able to communicate with non-political scientists partly because of the fact that his research reflected the value of data access and research transparency (Wong 2015, 2017).

Although political scientists should intrinsically adopt ethical research practices, it is also quite effective to identify the potential benefit of such practices to their research communities so that the practitioners have the incentive to adopt the culture of data sharing and research transparency and becomes second nature.

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9.5: Ethically Analyzing and Sharing Co-generated Knowledge

Learning Objectives

By the end of this section, you will be able to:

- Critically evaluate the epistemic power associated with knowledge production
- Consider the ethical implications associated with publishing one's research

Given the differences in the way qualitative and quantitative scholars tend to approach political research, what constitutes ethical practice may seem to operate differently as well. For example, due to the reliance on statistics, many students of political science may mistakenly believe that the quantitative method is *always* transparent, objective and, therefore, ethical as opposed to the qualitative method where the reliance on human communications and interactions is thought to always be subjective. The quantification of political data involves human processes where there are plenty of opportunities for the product (i.e., dataset) to be biased, especially when such a process is not transparent. Conversely, a series of interviews for the purpose of data collection for qualitative scholars can be conducted in such a way to reduce potential biases in the processes. These claims about whether qualitative or quantitative approaches are better suited for minimizing biases and upholding the standard of objectivity may be rooted in the idea that the primary, and for some, *only*, purpose of political research is to make inferences about the political world.

Smith (Smith and Renwick Monroe 2005) notes that part of the reason why there is this type of methodological dispute is because political scientists have not agreed on what makes good political science research. He argues that while inference testing is essential to political science research, such an endeavor requires substantively interesting questions and hypotheses about the political world. As such, political science, as a discipline, needs to reconsider the notion that both qualitative and quantitative approaches are essential, for the formation of substantively interesting hypotheses and questions and the improvement of our analytical technique are both critical in the advancement of the field. Because of the differences in the nature of both approaches, it is essential to approach the discussion on the standard of ethical practice accordingly as well. In other words, some ethical standards can be more or less relevant to each approach because of the differences in how data are collected and analyzed.

As noted in the previous chapter, findings from political science research often become a basis for political and social changes that have serious real-life implications. Unless the practitioners of political research, whether they are qualitatively or quantitatively oriented, conduct their research in an ethical manner, the integrity of the discipline as well as policies being produced based on our research, for example, could face serious challenges. Because political scientists are thought to be experts on political and social problems to some extent, we have some perceived authority on these issues. As a result, when we make some claims about political and social issues in the public sphere, it may carry some weight than an individual's opinion, for example, on various political issues.

Academics have and reproduce what Audie Klotz and Cecelia Lynch (Klotz and Lynch 2007) refer to as “epistemic power,” through the knowledge we generate as researches and disseminate through writing and lecturing. Consequently, we can never be entirely value-neutral or eliminate our personal biases as we replicate or challenge the assumptions of our discipline through our scholarship and our individual methodological choices (Klotz and Lynch 2007). From using translators in the field to employing professional services to transcribe interviews, we must take great pains to consider the potential for bias to creep into our analysis, to not misrepresent our study's participants, and to always consider their wellbeing.

Therefore, when one begins to analyze what they have learned in the field and prepare to share their findings, it is important to offer reflections on instances where one's fieldwork resulted in dissonance with their initial theoretical framework and where our interviewees challenged and/or enriched the initial line of inquiry (Yanow and Schwartz-Shea 2011). For example, the reflexive approach mentioned in the previous section is also useful when the researcher is analyzing their data. This includes strategies such as “member checking,” in which findings are discussed with those studied in the field. This does not deny or undermine the researcher's epistemological role, but rather acts as a strategy for addressing the dynamics associated with a researcher's subjectivities (i.e. confirmation bias). Ultimately this is your study, and it would be unwise to let your participants editorialize your findings. However, if a quote or the like might make them uncomfortable, misrepresent their meaning, or worse, we must take this under consideration.

Lastly, when it comes to publication, it is argued that qualitative researchers in particular have an ethical responsibility to consider how this research will be used, given the trust, intimacy, and potential for human impact this chapter has addressed (Gibbs 2008). In this final stage of research, it is ethically important to reflect on how this information may impact those that made the researcher's study possible in the first place. Indeed, many research agendas pertaining to sensitive topics that might put the researcher and/or their participants in danger. Therefore, many interviews and surveys must not only be conducted on the basis of anonymity, the original data stored in a secure location, but also evaluated now that all the pieces of the puzzle have come together and are almost ready for publication.

For instance, publishing and sharing one's findings may entail information and/or quotations for which the research is ethically unable to provide full citations based on confidential interviews, field, and participant observations. As subsequent researchers may therefore be unable to replicate our findings, effectively using quotes and accounts from anonymous subjects is often dependent on such data being shared by more than one person or sources. Another way to bolster the credibility of anonymous sources is triangulating their accounts and linking them in the analyses with contextual information (e.g. "according to several soldiers involved in the conflict"). Once again, being transparent as possible entails a delicate balance between protecting our human subjects and the integrity of our research.

Congratulations, your study is published and the colleagues who cite your work continue to grow in number! Nevertheless, it is unlikely that the study's participants that made your accolades possible subscribe to the American Journal of Political Science. Indeed, researchers are routinely criticized for failing to bring the study's findings back to the individuals/community under investigation, if not providing it in such a way that they can understand, use, or verify. Ethically, we should avoid being parasitic with our work and strive to bring something of value back to the community and/or persons that made your study possible. This may seem like an onerous last step with little instrumental reward, but as this chapter has endeavored to point out, when you conduct and report your research ethically, "you join a community in search for some common good...you discover that research focused on the best interest of others is also your own" (Booth, Colomb, and Williams 2008).

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9.6: Key Terms/Glossary

- **Epistemology:** concerns the theory of knowledge creation, specifically to its method, scope and criteria for validation
 - **Fully informed consent:** the process of obtaining permission from human subjects, after thoroughly conveying the risks, benefits, methods, and purpose of the study
 - **Reflexivity:** the act of reflecting on the role that researcher's personal characteristics (biases, culture, etc.) may impact their research design, data collection, and interpretation processes.
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9.7: Summary

Summary of Section 9.1: Ethics in Political Research

To conduct political research in an ethical way, our practice must follow a number of principles and rules that are established by the community of practitioners. One of the primary reasons for establishing and following such standards is to ensure that our research is not causing any irreparable harm to others as well as to protect the integrity and reputation of the political science discipline. The Institutional Review Board helps ensure that ethical research practices are institutionalized and potential harms to the subjects of a study are reduced by embedding various safeguards into the design of a research project.

Summary of Section 9.2: Ethics and Human “Subjects”

It is important to note that our “subjects” are not only a means of testing theories, illuminating puzzles, and discovering new ones, but are also ends in themselves. As such, it is necessary to be cognizant about the need to balance between one’s role as a researcher, an active participant in the phenomenon under investigation, a friend, and in certain instances, an adversary. When engaging in research involving human subjects, it is essential that the participants are fully informed as they consent to their participation.

Summary of Section 9.3: Navigating Qualitative Data Collection

In the process of qualitative data collection, it is important to ensure the anonymity and confidentiality of the subjects to achieve ethical data collection. A researcher must also consider a reflexive approach to data collection so that one can minimize bias and open ourselves to new ways of thinking.

Summary of Section 9.4: Research Ethics in Quantitative Research

Although all political science share core ethical principles, there are potential differences between qualitative and quantitative approaches to political science, such as their respective approaches to addressing issues associated with objectivity and subjectivity. One key concern for the quantitative researcher are the ethical and analytical benefits associated with facilitating data access, production transparency, and analytical transparency.

Summary of Section 9.5: Ethically Analyzing and Sharing Co-generated Knowledge

Due to the fact that academics possess “epistemic power”, it is essential to be aware that we can never be entirely value-neutral or eliminate our personal biases as we conduct political research. It is ethically important to reflect on how the results of a study may impact those that made the study possible. Also, let us strive to bring something of value back to the community and/or persons that made your study possible.

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9.8: Review Questions

1. Epistemology concerns the theory of knowledge creation, specifically to its method, scope and criteria for validation
 - a. True
 - b. False
 2. Fill in the blank: All scientists must consider the potential impacts of their work. Yet, what is arguably distinct about the social sciences in general and political science specifically is the central role that _____ play in our studies.
 - a. Humans
 - b. Creatures c. Animals
 - d. Organisms
 3. Fill in the blank: Beyond minimizing the potential of physical or psychological harm that could befall our human subjects, we must also consider the _____, or harm that can come as a result of local knowledge being displaced and/or distorted by our alternative own frameworks, concepts and ways of knowing (i.e. epistemology)
 - a. epistemic violence
 - b. mind altering
 - c. epistemic undermining d. undermining
 4. Fill in the blank: The idea is that _____ knowledge needs to be accessible by the members of other research community whose research may rely on different methodological approaches.
 - a. evidence-informed b. intuition-informed
 - c. gut-informed
 - d. experience-informed
 5. Fully informed consent: the process of obtaining permission from human subjects, after thoroughly conveying the risks, benefits, methods, and purpose of the study
 - a. True b. False
-

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9.9: Critical Thinking Questions

Critical Thinking Questions

1. What are some of the major advantages and disadvantages of working with human subjects?
2. What are three key ethical considerations one must consider while engaged in political science research.
3. What are some unique differences in ethical practices between qualitative and quantitative research?
4. Why are data access, production transparency, and analytical transparency critical to political research?
5. What is “epistemic power”, and the role it plays in society?
6. You just finished one of your best interviews, but you forgot or didn’t have the opportunity to read your IRB approved consent script to your participant: what do you do?
7. You found out the possibility that the publication of your research could potentially threatens the lives of your “subjects.” However, your academic career advancement depends on the publication of this research. How do you resolve this dilemma?
8. You have just finished a fresh round of interviews that seem to contradict not only what other interviewees have already shared with you, but potentially the central thesis of your project. Ethically, what are your best options to resolve this dilemma?

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9.10: Suggestions for Further Study

Websites

1. "Institutional Review Boards and Social Science Research | AAUP." n.d. Accessed December 14, 2019. www.aaup.org/report/institut...ds-and-social-science-research.
2. "Human Subjects Research Ad Hoc Committee." n.d. Accessed December 14, 2019. <https://connect.apsanet.org/hsr/>.
3. "Academy Adopts Five Ethical Principles for Social Science Research." n.d. Accessed December 14, 2019. <https://www.acss.org.uk/developing-g...ciples-social-science/academy-adopts-five-ethical-principles-for-social-science-research/>.

Journal Articles

1. Fujii, Lee Ann. 2012. "Research Ethics 101: Dilemmas and Responsibilities." *PS: Political Science & Politics* 45(04): 717–23.
2. Fisher, Pamela. 2012. "Ethics in Qualitative Research: 'Vulnerability', Citizenship and Human Rights." *Ethics and Social Welfare* 6(1): 2–17.
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Books

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2. Panter, A. T., and Sonya K. Sterba. 2011. *Handbook of Ethics in Quantitative Methodology*. Taylor & Francis.
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CHAPTER OVERVIEW

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10.1: Congratulations!

Congratulations! For anyone who reads a book from beginning to end, it is important to recognize the accomplishment. Taking the time and making the effort to read through material that is new, challenging, and worthy of recognition. Too often, we minimize these wins or ignore them completely. So, a hearty congratulations to you.

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10.2: The Path Forward

It is rare to have a course on political science research methods for students in their first or second year at a college or university. For example, there are only 12 out of 114 community colleges in California that offer the course you just completed. At my undergraduate and graduate institution, the University of California, Merced, the political science program has one lower division course and one upper division course in political science research methods.

While rare now, it's fair to expect that political science research methods will become a staple in most political science programs. With this course under your belt, what is the path forward now that you have introduced yourself to political science research methods? The path forward includes consulting with your professors, looking ahead to see what upper division courses may be available to you, and seriously considering earning a Master's or doctoral degree in the discipline.

Your professor who taught the course will have a sense of additional opportunities that are available to you at your college or university. If your student had the community college your professor may consider offering individual or group research opportunities. This may be done informally by meeting once a week during office hours, or this can be done formally through a course such as special topics or individualized studies course. For example, when I was a student at Cerritos Community College, I completed 5 units of Directed Studies in Political Science in spring and summer of 2004.

While students at community colleges can't take upper division courses since they are not offered at two-year institutions, they can certainly look ahead to their four-year institutions of interest to see what's available. For students already at a four-year college or university, they should meet with the professors and academic advisors to map out what upper division courses can help strengthen the research methods. It's important to plan ahead about how you want to develop your knowledge, skills, and abilities. Most of the time, we can be fixated on the idea of a single class or just earning a degree. But, instead of thinking about college or university in this traditional way, consider it in a continuous way you're thinking about the amount of knowledge you're acquiring, the number of skills you're developing, and the number of abilities that you're practicing.

As I shared with my students over the years, being in college or university is a special time in your life not only because you grow personally, introduce yourself to professional opportunities, but you get to intellectually engage in a range of topics and later on into a specific discipline that you're intrigued by. This intellectual experience is something to be embraced not just for the degree you'll earn, but for all the other tangibles and intangibles that come with learning about the world.

Thinking about earning a graduate degree, such as a Master's or PhD, may not be at the forefront of your mind when you're starting your college or university experience. Obviously, you're probably worried about how you can pay for the experience, where you are going to live, who your friends are going to be, or how you do your laundry. It is just some of the things that students who go from high school directly into college or university have to grapple with. Now, for returning or nontraditional students, there may be another set of factors that you're preoccupied with: how do you go to work and school, who can take care of your children while you're in class, and how can you carve out time to do homework at night or the weekends.

All this is what we call life, but part of living life is looking ahead. While we may be stuck in the day, concerned about how we're going to pay our rent or mortgage, or who is going to cook dinner tonight after a long day of work, we just have to think ahead. And part of that future is furthering your education. My advice here is rather simple: just think about it. Let the idea evolve in your mind as you begin the long hike up to your goal of earning a bachelor's degree. As it stews there, take concrete steps to seriously position yourself to take that next step: ask your professors about their experience, visit the websites of graduate programs, call college or university you are interested in and ask to speak with somebody about what it takes to earn a Masters or PhD. This will go a long way in helping you determine if this is the next step you.

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10.3: Frontiers of Political Science Research Methods

Political science research methods is a dynamic area of study, research, and practice. Advances in computer technology, modeling, and interdisciplinary work is pushing political science in new and exciting directions. There are several frontiers of research methods within the discipline that represent the cutting edge of the field. Let's explore just one of these directions.

Geographic information systems, or GIS for short, use spatial data to help understand the world, identify relationships, and discover patterns with respect to place. Can you remember a world where you didn't have Google Maps to help you get from point A to point B? Before the rapid expansion of GIS, people relied on a paper map. People would then estimate the time it would take to travel using distance divided by miles per hour, not taking into traffic or weather, because the data was simply not integrated.

GIS is a relatively new tool to political science, but it has been used in politics since the founding of the country. For example, when carving out new states longitudinal and latitudinal lines were used to denote the boundaries of states. State legislatures, when drawing new congressional districts or state legislative districts, would use maps to see how the party in power to give itself the upper hand in electing their peers. Campaigns would use maps of polling locations to determine where to deploy the volunteers to help encourage people to vote. All these are examples of our rudimentary GIS, this case maps merged with political knowledge, was used.

Researchers are increasingly using GIS to conduct and visually present research findings. For example, how would you decide where to build a nuclear power plant? Now, this may not seem like a political question initially, more a technical or engineering question but in reality, the country of Nigeria is actively considering whether and where to build nuclear power plants. The Nigerian Atomic Energy Commission is tasked with answering this question. Using GIS software, Eluyemi et. al. (2020) compare proposed sites by the Commission with all available tectonic maps. In their research article, they present 12 figures to help geographically contextualize potential nuclear power plant sites. With this information now publicly available, government officials, interest groups, and the people can more meaningfully engage in a debate about the utility of this energy source.

In addition to GIS as a way to conduct and visually presented information, there is a related field called spatial statistics. As was discussed in the chapter about Quantitative Research Methods, traditional statistics has been a staple in political science research for decades. What makes spatial statistics unique is that it integrates geocoded data into analyses. Why is geocoded data important to integrate into statistical analyses? First, statistics relies on an assumption that units of observation are independent and identically distributed. What this means is that how one person responds to a survey question should have no bearing on how another person responds to the same survey question. Or, what the state of California does with respect to gun control laws has no influence on what the states of Oregon, Nevada, and Arizona do with respect to gun control laws. In both of these examples, we can imagine how the actions of one person, or one state may influence the actions of another person or another state.

Spatial statistics allow the researcher to mathematically connect units of observation together based on their geographic location with one another. By making this connection, we can begin to measure the influence that one person or state can have on another. This is important because we are aware that such connections exist, but traditional statistics is unable to establish these connections. By measuring this influence that units can have on one another, we can better determine how strong the relationship is between a set of factors and the outcome that were interested. For example, what if the state of California increases its gas tax? Would we expect to see the states of Oregon, Nevada, or Arizona also increase their gas tax to keep up with California? Or would we expect to see the opposite, where neighboring states would lower their gas tax to demonstrate how competitive they were compared to the Golden State? By using spatial statistics, we can consider that geographic proximity, while also considering how the state demographics, or political party control may also influence this decision.

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10.4: How to Contribute to this OER

For the students who just finished reading this book, recognize that you can contribute to. Far too often, the voices of students are overlooked when it comes to textbooks. This is interesting, isn't it. The traditional textbook is written by an individual professor or group of professors who have the knowledge, skill, and ability to take a concept from their discipline and crystalize it into a digestible set of materials. And the primary audience is students, so while students are viewed as consumers of the textbook, they aren't considered producers of the content. In some ways, this makes no sense. Students who contribute to what they read. And they can.

You are personally invited to contribute to Introduction to Political Science Research Methods. This textbook is an Open Education Resource with the CC-BY-NC license. What does this mean? It means that the end of this book has been reached, but it is just the beginning for you to contemplate how you want to contribute to this textbook.

Maybe a key term definition was unclear? Well, update it to make it clear. Maybe a chapter section was under-explained? Ok, then add to it or re-write it all together. Maybe a picture would have been worth a thousand words? Great, then find a CC-BY-NC picture that include it. Or maybe we missed an entire topic that should be its own chapter? Superb, then draft a chapter and add it to the resource.

The beauty about Open Education Resources is that they are freely available to everyone, which invites everyone to participate in their cultivation. Up until very recently, this cultivation was reserved for people who made it through graduate school, join the ranks of the professoriate, and maintained their membership in the academy. But, as with all things, changes afoot. What this OER represents is an opportunity to shape knowledge and to create a broader understanding of our world to the eyes of more, and more people. If you are planning on contributing to this OER, then we encourage you to reach out to the authors and co-authors of the various chapters. They will be more than happy to answer your questions and encourage you to become a contributor. There are a variety of resources that can help you get a lay of the OER land. We would strongly encourage you to visit the Academic Senate for California Community Colleges' Open Educational Resources Initiative webpage for a host of information: www.asccc.org/directory/open...initiativeoeri.

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descriptive statistics

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Glossary

Journal | a collection of peer-review journal articles that is produced by a publishing company

Journal article | a peer-reviewed research paper that was typically written by researchers who hold advanced degrees

Literature review | a process of collecting, reading, and synthesizing journal articles, books, and other scholarly materials related to your research topic

Peer-review | a process by which a research paper is evaluated by a journal editor and researchers in the field who issue a judgment about whether the paper should be accepted for publication, rejected for publication, or revised and resubmitted for consideration.

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