THE FUNDAMENTALS OF

Political Science Research

Second Edition

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versions of our chapters. Our fathers, Lyman A. ("Bud") Kellstedt and David G. Whitten, provided their own unique and valuable perspectives on early drafts of the book. In separate but related ongoing conversations, John Transue and Alan M. Brookhart engaged us in lengthy debates about the nature of experiments, quasi-experiments, and observational studies. Other colleagues and friends provided input that also improved this book, including: Harold Clarke, Geoffrey Evans, John Jackson, Marisa Kellam, Eric Lawrence, Christine Lipsmeyer, Evan Parker-Stephen, David Peterson, James Rogers, Randy Stevenson, Georg Vanberg, Rilla Whitten, and Jenifer Whitten-Woodring.

Despite all of this help, we remain solely responsible for any deficiencies that persist in the book. We look forward to hearing about them from you so that we can make future editions of this book better.

Throughout the process of writing this book, we have been mindful of how our thinking has been shaped by our teachers at a variety of levels. We are indebted to them in ways that are difficult to express. In particular, Guy Whitten wishes to thank the following, all from his days at the University of Rochester: Larry M. Bartels, Richard Niemi, G. Bingham Powell, Lynda Powell, William H. Riker, and David Weimer. Paul Kellstedt thanks Al Reynolds and Bob Terbog of Calvin College; Michael Lewis-Beck, Vicki Hesli, and Jack Wright at the University of Iowa; and Jim Stimson and John Freeman at the University of Minnesota.

Though we have learned much from the aforementioned professors, we owe our largest debt to our parents: Lyman A. "Bud" Kellstedt, Charmaine C. Kellstedt, David G. Whitten, and Jo Wright-Whitten. We dedicate this book to the four of them – the best teachers we ever had.

1 The Scientific Study of Politics

OVERVIEW

Most political science students are interested in the substance of politics and not in its methodology. We begin with a discussion of the goals of this book and why a scientific approach to the study of politics is more interesting and desirable than a "just-the-facts" approach. In this chapter we provide an overview of what it means to study politics scientifically. We begin with an introduction to how we move from causal theories to scientific knowledge, and a key part of this process is thinking about the world in terms of *models* in which the concepts of interest become variables that are causally linked together by theories. We then introduce the goals and standards of political science research that will be our rules of the road to keep in mind throughout this book. The chapter concludes with a brief overview of the structure of this book.

Doubt is the beginning, not the end, of wisdom.
– Chinese proverb

1.1 POLITICAL *SCIENCE*?

"Which party do you support?" "When are you going to run for office?" These are questions that students often hear after announcing that they are taking courses in political science. Although many political scientists are avid partisans, and some political scientists have even run for elected offices or have advised elected officials, for the most part this is not the focus of modern political science. Instead, political science is about the scientific study of political phenomena. Perhaps like you, a great many of today's political scientists were attracted to this discipline as undergraduates because of intense interests in a particular issue or candidate. Although we are often drawn into political science based on political passions, the most respected political science research today is conducted in a fashion that makes it impossible to tell the personal political views of the writer.

Many people taking their first political science research course are surprised to find out how much science and, in particular, how much math are involved. We would like to encourage the students who find themselves in this position to hang in there with us – even if your answer to this encouragement is "but I'm only taking this class because they require it to graduate, and I'll never use any of this stuff again." Even if you never run a regression model after you graduate, having made your way through these materials should help you in a number of important ways. We have written this book with the following three goals in mind:

- *To help you consume academic political science research in your other courses.* One of the signs that a field of research is becoming scientific is the development of a common technical language. We aim to make the common technical language of political science accessible to you.
- *To help you become a better consumer of information.* In political science and many other areas of scientific and popular communication, claims about causal relationships are frequently made. We want you to be better able to evaluate such claims critically.
- *To start you on the road to becoming a producer of scientific research on politics.* This is obviously the most ambitious of our goals. In our teaching we often have found that once skeptical students get comfortable with the basic tools of political science, their skepticism turns into curiosity and enthusiasm.

To see the value of this approach, consider an alternative way of learning about politics, one in which political science courses would focus on "just the facts" of politics. Under this alternative way, for example, a course offered in 1995 on the politics of the European Union (EU) would have taught students that there were 15 member nations who participated in governing the EU through a particular set of institutional arrangements that had a particular set of rules. An obvious problem with this alternative way is that courses in which lists of facts are the only material would probably be pretty boring. An even bigger problem, though, is that the political world is constantly changing. In 2011 the EU was made up of 27 member nations and had some new governing institutions and rules that were different from what they were in 1995. Students who took a facts-only course on the EU back in 1995 would find themselves lost in trying to understand the EU of 2011. By contrast, a theoretical approach to politics helps us to better understand why changes have come about and their likely impact on EU politics.

In this chapter we provide an overview of what it means to study politics scientifically. We begin this discussion with an introduction to how we move from causal theories to scientific knowledge. A key part of this process is thinking about the world in terms of *models* in which the concepts of interest become **variables**[1] that are causally linked together by theories. We then introduce the goals and standards of political science research that will be our rules of the road to keep in mind throughout this book. We conclude this chapter with a brief overview of the structure of this book.

1.2 APPROACHING POLITICS SCIENTIFICALLY: THE SEARCH FOR CAUSAL EXPLANATIONS

I've said, I don't know whether it's addictive. I'm not a doctor. I'm not a scientist.

– Bob Dole, in a conversation with Katie Couric about tobacco during the 1996 U.S. presidential campaign

The question of "how do we know what we know" is, at its heart, a philosophical question. Scientists are lumped into different disciplines that develop standards for evaluating evidence. A core part of being a scientist and taking a scientific approach to studying the phenomena that interest you is always being willing to consider new evidence and, on the basis of that new evidence, change what you thought you *knew* to be true. This willingness to always consider new evidence is counterbalanced by a stern approach to the evaluation of new evidence that permeates the scientific approach. This is certainly true of the way that political scientists approach politics.

So what do political scientists do and what makes them scientists? A basic answer to this question is that, like other scientists, political scientists develop and test theories. A **theory** is a tentative conjecture about the causes of some phenomenon of interest. The development of **causal** theories about the political world requires thinking in new ways about familiar phenomena. As such, theory building is part art and part science. We discuss this in greater detail in Chapter 2, "The Art of Theory Building."

[1] When we introduce an important new term in this book, that term appears in boldface type. At the end of each chapter, we will provide short definitions of each bolded term that was introduced in that chapter. We discuss variables at great length later in this and other chapters. For now, a good working definition is that a variable is a definable quantity that can take on two or more values. An example of a variable is voter turnout; researchers usually measure it as the percentage of voting-eligible persons in a geographically defined area who cast a vote in a particular election.

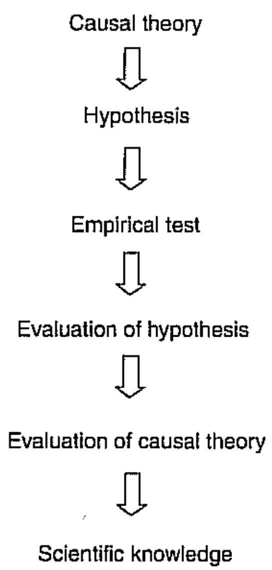

Figure 1.1. The road to scientific knowledge.

Once a theory has been developed, like all scientists, we turn to the business of testing our theory. The first step in testing a particular theory is to restate is as one or more testable hypotheses. A **hypothesis** is a theory-based statement about a relationship that we expect to observe. For every hypothesis there is a corresponding **null hypothesis**. A null hypothesis is also a theory-based statement but it is about what we would observe if there were no relationship between an independent variable and the dependent variable. **Hypothesis testing** is a process in which scientists evaluate systematically collected evidence to make a judgment of whether the evidence favors their hypothesis or favors the corresponding null hypothesis. The process of setting up hypothesis tests involves both logical reasoning and creative design. In Chapter 3, "Evaluating Causal Relationships," we focus on the logical reason side of this process. In Chapter 4, "Research Design," we focus on the design part of this process. If a hypothesis survives rigorous testing, scientists start to gain confidence in that hypothesis rather than in the null hypothesis, and thus they also gain confidence in the theory from which they generated their hypothesis.

Figure 1.1 presents a stylized schematic view of the path from theories to hypotheses to scientific knowledge.[2] At the top of the figure, we begin with a causal theory to explain our phenomenon of interest. We then derive one or more hypotheses about what our theory leads us to expect when we measure our concepts of interest (which we call variables – as was previously discussed) in the real world. In the third step, we conduct **empirical** tests of our hypotheses.[3] From what we find, we evaluate our hypotheses relative to corresponding null hypotheses. Next, from the results of our hypothesis tests, we evaluate our causal theory. In light of our evaluation of our theory, we then think about how, if at all, we should revise what we consider to be scientific knowledge concerning our phenomenon of interest.

A core part of the scientific process is skepticism. On hearing of a new theory, other scientists will challenge this theory and devise further tests. Although this process can occasionally become quite combative, it is a necessary component in the development of scientific knowledge. Indeed,

[2] In practice, the development of scientific knowledge is frequently much messier than this step-by-step diagram. We show more of the complexity of this approach in later chapters.
[3] By "empirical" we simply mean "based on observations of the real world."

a core component of scientific knowledge is that, as confident as we are in a particular theory, we remain open to the possibility that there is still a test out there that will provide evidence that makes us lose confidence in that theory.

It is important to underscore here the nature of the testing that scientists carry out. One way of explaining this is to say that scientists are *not* like lawyers in the way that they approach evidence. Lawyers work for a particular client, advocate a particular point of view (like "guilt" or "innocence"), and then accumulate evidence with a goal of proving their case to a judge or jury. This goal of *proving* a desired result determines their approach to evidence. When faced with evidence that conflicts with their case, lawyers attempt to ignore or discredit such evidence. When faced with evidence that supports their case, lawyers try to emphasize the applicability and quality of the supportive evidence. In many ways, the scientific and legal approaches to evidence couldn't be further apart. Scientific confidence in a theory is achieved only after hypotheses derived from that theory have run a gantlet of tough tests. At the beginning of a trial, lawyers develop a strategy to *prove* their case. In contrast, at the beginning of a research project, scientists will think long and hard about the most rigorous tests that they can conduct. A scientist's theory is never *proven* because scientists are always willing to consider new evidence.

The process of hypothesis testing reflects how hard scientists are on their own theories. As scientists evaluate systematically collected evidence to make a judgment of whether the evidence favors their hypothesis or favors the corresponding null hypothesis, they *always* favor the null hypothesis. Statistical techniques allow scientists to make probability-based statements about the empirical evidence that they have collected. You might think that, if the evidence was 50–50 between their hypothesis and the corresponding null hypothesis, the scientists would tend to give the nod to the hypothesis (from their theory) over the null hypothesis. In practice, though, this is not the case. Even when the hypothesis has an 80–20 edge over the null hypothesis, most scientists will still favor the null hypothesis. Why? Because scientists are very worried about the possibility of falsely rejecting the null hypothesis and therefore making claims that others ultimately will show to be wrong.

Once a theory has become established as a part of scientific knowledge in a field of study, researchers can build upon the foundation that this theory provides. Thomas Kuhn wrote about these processes in his famous book *The Structure of Scientific Revolutions*. According to Kuhn, scientific fields go through cycles of accumulating knowledge based on a set of shared assumptions and commonly accepted theories about the way that the world works. Together, these shared assumptions and accepted theories form what we call a **paradigm**. Once researchers in a scientific field have widely accepted a paradigm, they can pursue increasingly technical questions that make sense only because of the work that has come beforehand. This state of research under an accepted paradigm is referred to as **normal science**. When a major problem is found with the accepted theories and assumptions of a scientific field, that field will go through a revolutionary period during which new theories and assumptions replace the old paradigm to establish a new paradigm. One of the more famous of these scientific revolutions occurred during the 16th century when the field of astronomy was forced to abandon its assumption that the Earth was the center of the known universe. This was an assumption that had informed theories about planetary movement for thousands of years. In the book *On Revolutions of the Heavenly Bodies*, Nicolai Copernicus presented his theory that the Sun was the center of the known universe. Although this radical theory met many challenges, an increasing body of evidence convinced astronomers that Coperinicus had it right. In the aftermath of this **paradigm shift**, researchers developed new assumptions and theories that established a new paradigm, and the affected fields of study entered into new periods of normal scientific research.

It may seem hard to imagine that the field of political science has gone through anything that can compare with the experiences of astronomers in the 16th century. Indeed, Kuhn and other scholars who study the evolution of scientific fields of research have a lively and ongoing debate about where the social sciences, like political science, are in terms of their development. The more skeptical participants in this debate argue that political science is not sufficiently mature to have a paradigm, much less a paradigm shift. If we put aside this somewhat esoteric debate about paradigms and paradigm shifts, we can see an important example of the evolution of scientific knowledge about politics from the study of public opinion in the United States.

In the 1940s the study of public opinion through mass surveys was in its infancy. Prior to that time, political scientists and sociologists assumed that U.S. voters were heavily influenced by presidential campaigns – and, in particular, by campaign advertising – as they made up their minds about the candidates. To better understand how these processes worked, a team of researchers from Columbia University set up an in-depth study of public opinion in Erie County, Ohio, during the 1944 presidential election. Their study involved interviewing the same individuals at multiple time periods across the course of the campaign. Much to the researchers' surprise, they found that voters were remarkably consistent from interview to interview in terms of their vote intentions. Instead of being influenced by particular events of the campaign, most of the voters surveyed had made up their minds

about how they would cast their ballots long before the campaigning had even begun. The resulting book by Paul Lazarsfeld, Bernard Berelson, and Hazel Gaudet, titled *The People's Choice*, changed the way that scholars thought about public opinion and political behavior in the United States. If political campaigns were not central to vote choice, scholars were forced to ask themselves what *was* critical to determining how people voted.

At first other scholars were skeptical of the findings of the 1944 Erie County study, but as the revised theories of politics of Lazarsfeld et al. were evaluated in other studies, the field of public opinion underwent a change that looks very much like what Thomas Kuhn calls a "paradigm shift." In the aftermath of this finding, new theories were developed to attempt to explain the origins of voters' long-lasting attachments to political parties in the United States. An example of an influential study that was carried out under this shifted paradigm is Richard Niemi and Kent Jenning's seminal book from 1974, *The Political Character of Adolescence: The Influence of Families and Schools*. As the title indicates, Niemi and Jennings studied the attachments of schoolchildren to political parties. Under the pre–Erie County paradigm of public opinion, this study would not have made much sense. But once researchers had found that voter's partisan attachments were quite stable over time, studying them at the early ages at which they form became a reasonable scientific enterprise. You can see evidence of this paradigm at work in current studies of party identification and debates about its stability.

1.3 THINKING ABOUT THE WORLD IN TERMS OF VARIABLES AND CAUSAL EXPLANATIONS

So how do political scientists develop theories about politics? A key element of this is that they order their thoughts about the political world in terms of concepts that scientists call *variables* and causal relationships between variables. This type of mental exercise is just a more rigorous way of expressing ideas about politics that we hear on a daily basis. You should think of each variable in terms of its *label* and its *values*. The **variable label** is a description of what the variable is, and the **variable values** are the denominations in which the variable occurs. So, if we're talking about the variable that reflects an individual's age, we could simply label this variable "Age" and some of the denominations in which this variable occurs would be years, days, or even hours.

It is easier to understand the process of turning concepts into variables by using an example of an entire theory. For instance, if we're thinking about U.S. presidential elections, a commonly expressed idea is that the incumbent president will fare better when the economy is relatively healthy. If we restate this in terms of a political science theory, the state of the economy becomes the **independent variable**, and the outcome of presidential elections becomes the **dependent variable**. One way of keeping the lingo of theories straight is to remember that the value of the "dependent" variable "depends" on the value of the "independent" variable. Recall that a theory is a tentative conjecture about the causes of some phenomenon of interest. In other words, a theory is a conjecture that the independent variable is causally related to the dependent variable; according to our theory, change in the value of the independent variable *causes* change in the value of the dependent variable.

This is a good opportunity to pause and try to come up with your own causal statement in terms of an independent and dependent variable; try filling in the following blanks with some political variables:

____________________ causes ____________________

Sometimes it's easier to phrase causal propositions more specifically in terms of the values of the variables that you have in mind. For instance,

higher ____________________ causes lower ____________________

or

higher ____________________ causes higher ____________________

Once you learn to think about the world in terms of variables you will be able to produce an almost endless slew of causal theories. In Chapter 4 we will discuss at length how we design research to evaluate the causal claims in theories, but one way to initially evaluate a particular theory is to think about the **causal explanation** behind it. The causal explanation behind a theory is the answer to the question, "why do you think that this independent variable is causally related to this dependent variable?" If the answer is reasonable, then the theory has possibilities. In addition, if the answer is original and thought provoking, then you may really be on to something. Let's return now to our working example in which the state of the economy is the independent variable and the outcome of presidential elections is our dependent variable. The causal explanation for this theory is that we believe that the state of the economy is *causally related* to the outcome of presidential elections *because* voters hold the president responsible for management of the national economy. As a result, when the economy has been performing well, more voters will vote for the incumbent. When the

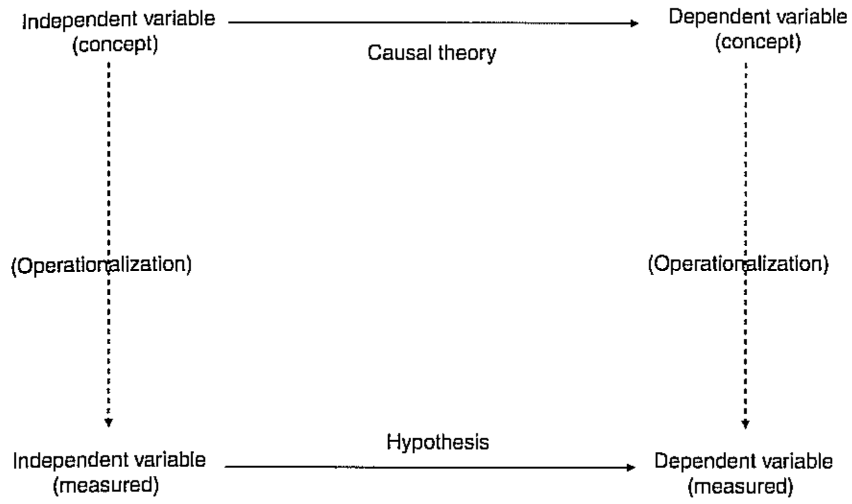

Figure 1.2. From theory to hypothesis.

economy is performing poorly, fewer voters will support the incumbent candidate. If we put this in terms of the preceding fill-in-the-blank exercise, we could write

<u>economic performance</u> causes <u>presidential election outcomes</u>,

or, more specifically, we could write

<u>higher economic performance</u> causes <u>higher incumbent vote</u>.

For now we'll refer to this theory, which has been widely advanced and tested by political scientists, as "the theory of economic voting."

To test the theory of economic voting in U.S. presidential elections, we need to derive from it one or more testable hypotheses. Figure 1.2 provides a schematic diagram of the relationship between a theory and one of its hypotheses. At the top of this diagram are the components of the causal theory. As we move from the top part of this diagram (Causal theory) to the bottom part (Hypothesis), we are moving from a general statement about how we think the world works to a more specific statement about a relationship that we expect to find when we go out in the real world and measure (or **operationalize**) our variables.[4]

[4] Throughout this book we will use the terms "measure" and "operationalize" interchangeably. It is fairly common practice in the current political science literature to use the term "operationalize."

At the theory level at the top of Figure 1.2, our variables do not need to be explicitly defined. With the economic voting example, the independent variable, labeled "Economic Performance," can be thought of as a concept that ranges from values of very strong to very poor. The dependent variable, labeled "Incumbent Vote," can be thought of as a concept that ranges from values of very high to very low. Our causal theory is that a stronger economic performance causes the incumbent vote to be higher.

Because there are many ways in which we can measure each of our two variables, there are many different hypotheses that we can test to find out how well our theory holds up to real-world **data**. We can measure economic performance in a variety of ways. These measures include inflation, unemployment, real economic growth, and many others. "Incumbent Vote" may seem pretty straightforward to measure, but here there are also a number of choices that we need to make. For instance, what do we do in the cases in which the incumbent president is not running again? Or what about elections in which a third-party candidate runs? Measurement (or operationalization) of concepts is an important part of the scientific process. We will discuss this in greater detail in Chapter 5, which is devoted entirely to evaluating different variable measurements and variation in variables. For now, imagine that we are operationalizing economic performance with a variable that we will label "One Year Real Economic Growth Per Capita." This measure, which is available from official U.S. government sources measures the one-year rate of inflation-adjusted (thus the term "real") economic growth per capita at the time of the election. The adjustments for inflation and population (per capita) reflect an important part of measurement – we want our measure of our variables to be comparable across cases. The values for this variable range from negative values for years in which the economy shrank to positive values for years in which the economy expanded. We operationalize our dependent variable with a variable that we label "Incumbent Party Percentage of Major Party Vote." This variable takes on values based on the percentage of the popular vote, as reported in official election results, for the party that controlled the presidency at the time of the election and thus has a possible range from 0 to 100. In order to make our measure of this dependent variable comparable across cases, votes for third party candidates have been removed from this measure.[5]

[5] If you're questioning the wisdom of removing votes for third party candidates, you are thinking in the right way – any time you read about a measurement you should think about different ways in which it might have been carried out. And, in particular, you should focus on the likely consequences of different measurement choices on the results of hypothesis tests. Evaluating measurement strategies is a major topic in Chapter 5.

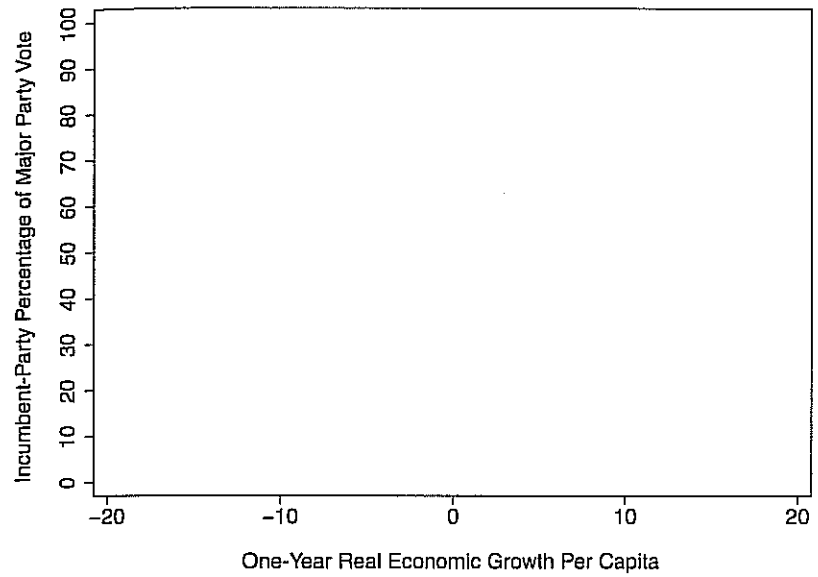

Figure 1.3. What would you expect to see based on the theory of economic voting?

Figure 1.3 shows the axes of the graph that we could produce if we collected the measures of these two variables. We could place each U.S. presidential election on the graph in Figure 1.3 by identifying the point that corresponds to the value of both "One-Year Real Economic Growth" (the horizontal, or x, axis) and "Incumbent-Party Vote Percentage" (the vertical, or y, axis). For instance, if these values were (respectively) 0 and 50, the position for that election year would be exactly in the center of the graph. Based on our theory, what would you expect to see if we collected these measures for all elections? Remember that our theory is that a stronger *economic performance* causes the *incumbent vote* to be higher. And we can restate this theory in reverse such that a weaker *economic performance* causes the *incumbent vote* to be lower. So, what would this lead us to expect to see if we plotted real-world data onto Figure 1.3? To get this answer right, let's make sure that we know our way around this graph. If we move from left to right on the horizontal axis, which is labeled "One-Year Real Economic Growth," what is going on in real-world terms? We can see that, at the far left end of the horizontal axis, the value is –20. This would mean that the U.S. economy had shrunk by 20% over the past year, which would represent a very poor performance (to say the least). As we move to the right on this axis, each point represents a better economic performance up to the point where we see a value of +20, indicating that the real economy has grown by 20% over the past year. The vertical axis depicts values of "Incumbent-Party Vote Percentage." Moving upward on this axis represents an increasing share of the popular vote for the incumbent party, whereas moving downward represents a decreasing share of the popular vote.

Now think about these two axes together in terms of what we would expect to see based on the theory of economic voting. In thinking through these matters, we should always start with our independent variable. This is because our theory states that the value of the independent variable exerts a causal influence on the value of the dependent variable. So, if we start with a very low value of *economic performance* – let's say –15 on the horizontal axis – what does our theory lead us to expect in terms of values for the *incumbent vote*, the dependent variable? We would also expect the value of the dependent variable to be very low. This case would then be expected to be in the lower-left-hand corner of Figure 1.3. Now imagine a case in which economic performance was quite strong at +15. Under these circumstances, our theory would lead us to expect that the incumbent-vote percentage would also be quite high. Such a case would be in the upper-right-hand corner of our graph. Figure 1.4 shows two such hypothetical points plotted on the same graph as Figure 1.3. If we draw a line between these two points, this line would slope upward from the lower left to the upper right. We describe such a line as having a positive slope. We can therefore hypothesize that the relationship between the variable labeled "One-Year Real Economic Growth" and the variable labeled "Incumbent-Party Vote Percentage" will be a **positive relationship**. A positive relationship is one for which higher

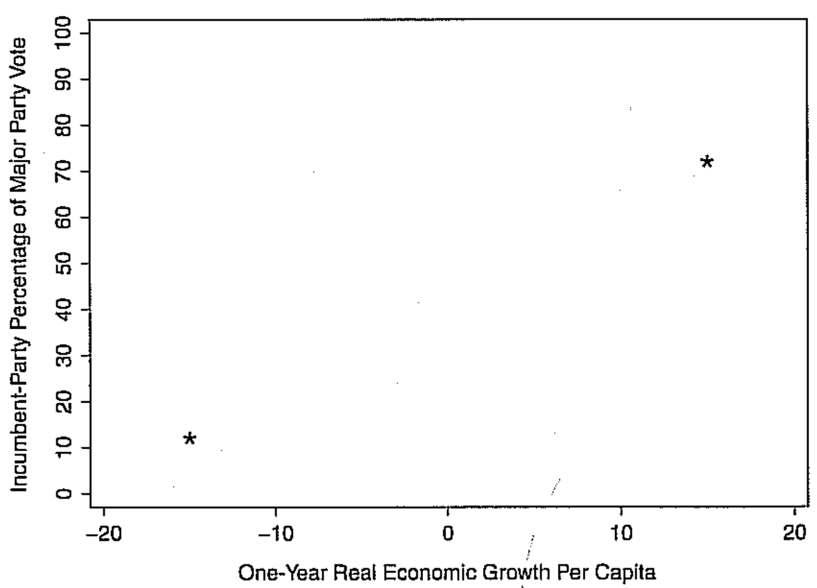

Figure 1.4. What would you expect to see based on the theory of economic voting? Two hypothetical cases.

values of the independent variable tend to coincide with higher values of the dependent variable.

Let's consider a different operationalization of our independent variable. Instead of economic growth, let's use "Unemployment Percentage" as our operationalization of economic performance. We haven't changed our theory, but we need to rethink our hypothesis with this new measurement or operationalization. The best way to do so is to draw a picture like Figure 1.3 but with the changed independent variable on the horizontal axis. This is what we have in Figure 1.5. As we move from left to right on the horizontal axis in Figure 1.5, the percentage of the members of the workforce who are unemployed goes up. What does this mean in terms of economic performance? Rising unemployment is generally considered a poorer economic performance whereas decreasing unemployment is considered a better economic performance. Based on our theory, what should we expect to see in terms of incumbent vote percentage when unemployment is high? What about when unemployment is low?

Figure 1.6 shows two such hypothetical points plotted on our graph of unemployment and incumbent vote from Figure 1.5. The point in the upper-left-hand corner represents our expected vote percentage when unemployment equals zero. Under these circumstances, our theory of economic voting leads us to expect that the incumbent party will do very well. The point in the lower-right-hand corner represents our expected vote percentage when unemployment is very high. Under these circumstances our theory

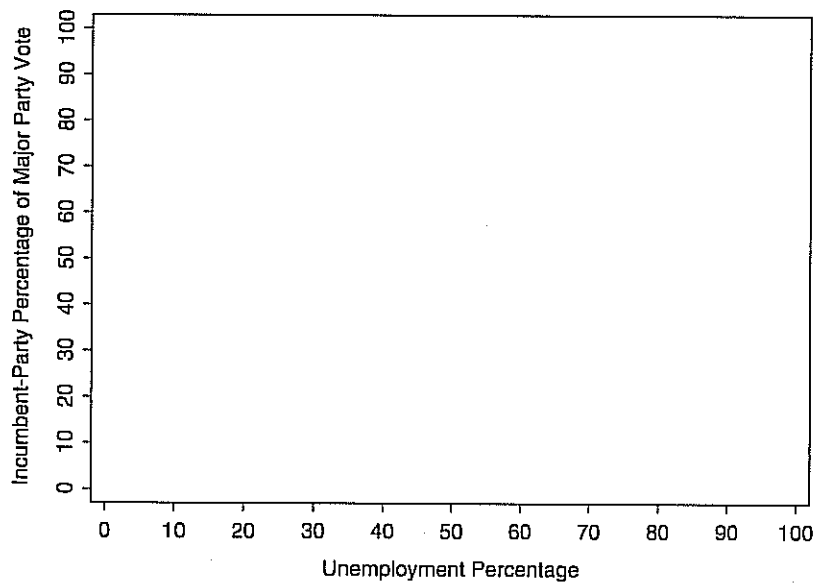

Figure 1.5. What would you expect to see based on the theory of economic voting?

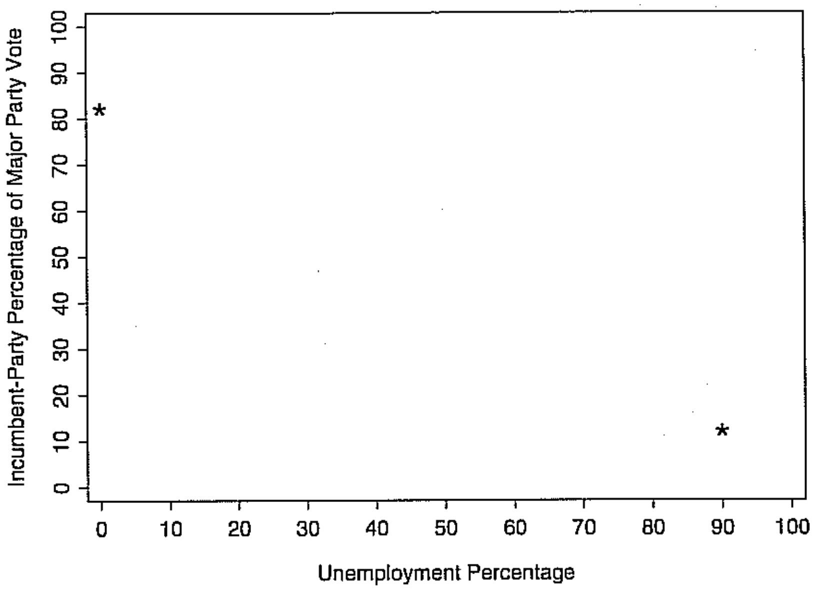

Figure 1.6. What would you expect to see based on the theory of economic voting? Two hypothetical cases.

of economic voting leads us to expect that the incumbent party will do very poorly. If we draw a line between these two points, this line would slope downward from the upper-left to the lower-right. We describe such a line as having a negative slope. We can therefore hypothesize that the relationship between the variable labeled "Unemployment Percentage" and the variable labeled "Incumbent-Party Vote Percentage" will be a **negative relationship.** A negative relationship is one for which higher values of the independent variable tend to coincide with lower values of the dependent variable.

In this example we have seen that the same theory can lead to a hypothesis of a positive or a negative relationship. The theory to be tested, together with the operationalization of the independent and the dependent variables, determines the direction of the hypothesized relationship. The best way to translate our theories into hypotheses is to draw a picture like Figure 1.3 or 1.5. The first step is to label the vertical axis with the variable label for the independent variable (as operationalized) and then label the low (left) and high (right) ends of the axis with appropriate value labels. The second step in this process is to label the vertical axis with the variable label for the dependent variable and then label the low and high ends of that axis with appropriate value labels. Once we have such a figure with the axes and low and high values for each properly labeled, we can determine what our expected value of our dependent variable should be if we observe both a low and a high value of the independent variable. And, once we have placed

the two resulting points on our figure, we can tell whether our hypothesized relationship is positive or negative.

Once we have figured out our hypothesized relationship, we can collect data from real-world cases and see how well these data reflect our expectations of a positive or negative relationship. This is a very important step that we can carry out fairly easily in the case of the theory of economic voting. Once we collect all of the data on economic performance and election outcomes, we will, however, still be a long way from confirming the theory that economic performance *causes* presidential election outcomes. Even if a graph like Figure 1.3 produces compelling visual evidence, we will need to see more rigorous evidence than that. Chapters 7–11 focus on the use of statistics to evaluate hypotheses. The basic logic of statistical hypothesis testing is that we assess the probability that the relationship we find could be due to random chance. The stronger the evidence that such a relationship *could not* be due to random chance, the more confident we would be in our hypothesis. The stronger the evidence that such a relationship *could* be due to random chance, the more confident we would be in the corresponding null hypothesis. This in turn reflects on our theory.

We also, at this point, need to be cautious about claiming that we have "confirmed" our theory, because social scientific phenomena (such as elections) are usually complex and cannot be explained completely with a single independent variable. Take a minute or two to think about what other variables, aside from economic performance, you believe might be causally related to U.S. presidential election outcomes. If you can come up with at least one, you are on your way to thinking like a political scientist. Because there are usually other variables that matter, we can continue to think about our theories two variables at a time, but we need to qualify our expectations to account for other variables. We will spend Chapters 3 and 4 expanding on these important issues.

1.4 MODELS OF POLITICS

When we think about the phenomena that we want to better understand as dependent variables and develop theories about the independent variables that causally influence them, we are constructing **theoretical models.** Political scientist James Rogers provides an excellent analogy between models and maps to explain how these abstractions from reality are useful to us as we try to understand the political world:

> The very unrealism of a model, if properly constructed, is what makes it useful. The models developed below are intended to serve much the same function as a street map of a city. If one compares a map of a city to the real topography of that city, it is certain that what is represented in the map

> is a highly unrealistic portrayal of what the city actually looks like. The map utterly distorts what is *really* there and leaves out numerous details about what a particular area looks like. But it is precisely *because* the map distorts reality – because it abstracts away from a host of details about what is really there – that it is a useful tool. A map that attempted to portray the full details of a particular area would be too cluttered to be useful in finding a particular location or would be too large to be conveniently stored. (2006, p. 276, emphasis in original)

The essential point is that models *are* simplifications. Whether or not they are useful to us depends on what we are trying to accomplish with the particular model. One of the remarkable aspects of models is that they are often more useful to us when they are inaccurate than when they are accurate. The process of thinking about the failure of a model to explain one or more cases can generate a new causal theory. Glaring inaccuracies often point us in the direction of fruitful theoretical progress.

1.5 RULES OF THE ROAD TO SCIENTIFIC KNOWLEDGE ABOUT POLITICS

In the chapters that follow, we will focus on particular tools of political science research. As we do this, try to keep in mind our larger purpose – trying to advance the state of scientific knowledge about politics. As scientists, we have a number of basic rules that should never be far from our thinking:

- Make your theories causal.
- Don't let data alone drive your theories.
- Consider only empirical evidence.
- Avoid normative statements.
- Pursue both generality and parsimony.

1.5.1 Make Your Theories Causal

All of Chapter 3 deals with the issue of causality and, specifically, how we identify causal relationships. When political scientists construct theories, it is critical that they always think in terms of the causal processes that drive the phenomena in which they are interested. For us to develop a better understanding of the political world, we need to think in terms of causes and not mere **covariation**. The term covariation is used to describe a situation in which two variables vary together (or **covary**). If we imagine two variables, A and B, then we would say that A and B covary if it is the case that, when we observe higher values of variable A, we generally also observe higher values of variable B. We would also say that A and B covary if it is the case that, when we observe higher values of variable A, we generally also observe lower values of variable B.[6] It is easy to assume that when we observe covariation we are also observing causality, but it is important not to fall into this trap.

1.5.2 Don't Let Data Alone Drive Your Theories

This rule of the road is closely linked to the first. A longer way of stating it is "try to develop theories before examining the data on which you will perform your tests." The importance of this rule is best illustrated by a silly example. Suppose that we are looking at data on the murder rate (number of murders per 1000 people) in the city of Houston, Texas, by months of the year. This is our dependent variable, and we want to explain why it is higher in some months and lower in others. If we were to take as many different independent variables as possible and simply see whether they had a relationship with our dependent variable, one variable that we might find to strongly covary with the murder rate is the amount of money spent per capita on ice cream. If we perform some verbal gymnastics, we might develop a "theory" about how heightened blood sugar levels in people who eat too much ice cream lead to murderous patterns of behavior. Of course, if we think about it further, we might realize that both ice cream sales and the number of murders committed go up when temperatures rise. Do we have a plausible explanation for why temperatures and murder rates might be causally related? It is pretty well known that people's tempers tend to fray when the temperature is higher. People also spend a lot more time outside during hotter weather, and these two factors might combine to produce a causally plausible relationship between temperatures and murder rates.

What this rather silly example illustrates is that we don't want our theories to be crafted based entirely on observations from real-world data. We are likely to be somewhat familiar with empirical patterns relating to the dependent variables for which we are developing causal theories. This is normal; we wouldn't be able to develop theories about phenomena about which we know nothing. But we need to be careful about how much we let what we see guide our development of our theories. One of the best ways to do this is to think about the underlying causal process as we develop our theories and to let this have much more influence on our thinking than patterns that we might have observed. Chapter 2 is all about strategies for developing theories. One of these strategies is to identify interesting variation in our

[6] A closely related term is **correlation**. For now we use these two terms interchangeably. In Chapter 7, you will see that there are precise statistical measures of covariance and correlation that are closely related to each other but produce different numbers for the same data.

dependent variable. Although this strategy for theory development relies on data, it should not be done without thinking about the underlying causal processes.

1.5.3 Consider Only Empirical Evidence

As we previously outlined, we need to always remain open to the possibility that new evidence will come along that will decrease our confidence in even a well-established theory. A closely related rule of the road is that, as scientists, we want to base what we know on what we see from *empirical* evidence, which, as we have said, is simply "evidence based on observing the real world." Strong logical arguments are a good start in favor of a theory, but before we can be convinced, we need to see results from rigorous hypothesis tests.[7]

1.5.4 Avoid Normative Statements

Normative statements are statements about how the world ought to be. Whereas politicians make and break their political careers with normative statements, political scientists need to avoid them at all costs. Most political scientists care about political issues and have opinions about how the world ought to be. On its own, this is not a problem. But when normative preferences about how the world "should" be structured creep into their scientific work, the results can become highly problematic. The best way to avoid such problems is to conduct research and report your findings in such a fashion that it is impossible for the reader to tell what are your normative preferences about the world.

This does not mean that good political science research cannot be used to change the world. To the contrary, advances in our scientific knowledge about phenomena enable policy makers to bring about changes in an effective manner. For instance, if we want to rid the world of wars (normative), we need to understand the systematic dynamics of the international system that produce wars in the first place (empirical and causal). If we want to rid America of homelessness (normative), we need to understand the pathways

[7] It is worth noting that some political scientists use data drawn from experimental settings to test their hypotheses. There is some debate about whether such data are, strictly speaking, empirical or not. We discuss political science experiments and their limitations in Chapter 4. In recent years some political scientists have also made clever use of simulated data to gain leverage on their phenomena of interest, and the empirical nature of such data can certainly be debated. In the context of this textbook we are not interested in weighing in on these debates about exactly what is and is not empirical data. Instead, we suggest that one should always consider the overall quality of data on which hypothesis tests have been performed when evaluating causal claims.

into and out of being homeless (empirical and causal). If we want to help our favored candidate win elections (normative), we need to understand what characteristics make people vote the way they do (empirical and causal).

1.5.5 Pursue Both Generality and Parsimony

Our final rule of the road is that we should always pursue generality and parsimony. These two goals can come into conflict. By "generality," we mean that we want our theories to be applied to as general a class of phenomena as possible. For instance, a theory that explains the causes of a phenomenon in only one country is less useful than a theory that explains the same phenomenon across multiple countries. Additionally, the more simple or **parsimonious** a theory is, the more appealing it becomes.[8]

In the real world, however, we often face trade-offs between generality and parsimony. This is the case because, to make a theory apply more generally, we need to add caveats. The more caveats that we add to a theory, the less parsimonious it becomes.

1.6 A QUICK LOOK AHEAD

You now know the rules of the road. As we go through the next 11 chapters, you will acquire an increasingly complicated set of tools for developing and testing scientific theories about politics, so it is crucial that, at every step along the way, you keep these rules in the back of your mind. The rest of this book can be divided into three different sections. The first section, which includes this chapter through Chapter 4, is focused on the development of theories and research designs to study causal relationships about politics. In Chapter 2, "The Art of Theory Building," we discuss a range of strategies for developing theories about political phenomena. In Chapter 3, "Evaluating Causal Relationships," we provide a detailed explanation of the logic for evaluating causal claims about relationships between an independent variable, which we call "X," and a dependent variable, which we call "Y." In Chapter 4, "Research Design," we discuss the research strategies that political scientists use to investigate causal relationships.

In the second section of this book, we expand on the basic tools that political scientists need to test their theories. Chapter 5, "Getting to Know Your Data: Evaluating Measurement and Variations," is a detailed discussion of how we measure (or operationalize) our variables, along with an

[8] The term "parsimonious" is often used in a relative sense. So, if we are comparing two theories, the theory that is simpler would be the more parsimonious. Indeed, this rule of the road might be phrased "pursue both generality and simplicity." We use the words "parsimony" and "parsimonious" because they are widely used to describe theories.

introduction to a set of tools that can be used to summarize the characteristics of variables one at a time. Chapter 6, "Probability and Statistical Inference," introduces both the basics of probability theory as well as the logic of statistical hypothesis testing. In Chapter 7, "Bivariate Hypothesis Testing," we begin to apply the lessons from Chapter 6 to a series of empirical tests of the relationship between pairs of variables.

The third and final section of this book introduces the critical concepts of the regression model. Chapter 8, "Bivariate Regression Models," introduces the two-variable regression model as an extension of the concepts from Chapter 7. In Chapter 9, "Multiple Regression: The Basics," we introduce the multiple regression model, with which researchers are able to look at the effects of independent variable X on dependent variable Y while controlling for the effects of other independent variables. Chapter 10, "Multiple Regression Model Specification," and Chapter 11, "Limited Dependent Variables and Time-Series Data," provide in-depth *discussions of* and *advice for* commonly encountered research scenarios involving multiple regression models. Lastly, in Chapter 12, "Putting It All Together to Produce Effective Research," we discuss how to apply the lessons learned in this book to begin to produce original research of your own.

CONCEPTS INTRODUCED IN THIS CHAPTER[9]

- causal – implying causality. A central focus of this book is on theories about "causal" relationships.
- correlation – a statistical measure of covariation which summarizes the direction (positive or negative) and strength of the linear relationship between two variables.
- covary (or covariation) – when two variables vary together, they are said to "covary." The term "covariation" is used to describe circumstances in which two variables covary.
- data – a collection of variable values for at least two observations.
- dependent variable – a variable for which at least some of the variation is theorized to be caused by one or more independent variables.
- empirical – based on real-world observation.
- hypothesis – a theory-based statement about what we would expect to observe if our theory is correct. A hypothesis is a more explicit statement of a theory in terms of the expected relationship between a measure of the independent variable and a measure of the dependent variable.
- hypothesis testing – the act of evaluating empirical evidence in order to determine the level of support for the hypothesis versus the null hypothesis.
- independent variable – a variable that is theorized to cause variation in the dependent variable.
- measure – a process by which abstract concepts are turned into real-world observations.
- negative relationship – higher values of the independent variable tend to coincide with lower values of the dependent variable.
- normal science – scientific research that is carried out under the shared set of assumptions and accepted theories of a paradigm.
- normative statements – statements about how the world ought to be.
- null hypothesis – a theory-based statement about what we would observe if there were no relationship between an independent variable and the dependent variable.
- operationalize – another word for measurement. When a variable moves from the concept-level in a theory to the real-world measure for a hypothesis test, it has been operationalized.
- paradigm – a shared set of assumptions and accepted theories in a particular scientific field.
- paradigm shift – when new findings challenge the conventional wisdom of a paradigm to the point where the set of shared assumptions and accepted theories in a scientific field is redefined.
- parsimonious – synonym for simple or succinct.
- positive relationship – higher values of the independent variable tend to coincide with higher values of the dependent variable.
- theoretical model – the combination of independent variables, the dependent variable, and the causal relationships that are theorized to exist between them.
- theory – a tentative conjecture about the causes of some phenomenon of interest.
- variable – a definable quantity that can take on two or more values.
- variable label – the label used to describe a particular variable.
- variable values – the values that a particular variable can take on.

[9] At the end of each chapter, we will provide short definitions of each bolded term that was introduced in that chapter. These short definitions are intended to help you get an initial grasp of the term when it is introduced. A full understanding of these concepts, of course, can only be gained through a thorough reading of the chapter.

EXERCISES

1. Pick another subject in which you have taken a course and heard mention of scientific theories. How is political science similar to and different from that subject?

2. Think about something in the political world that you would like to better understand. Try to think about this as a variable with high and low values. This is your dependent variable at the conceptual level. Now think about what might cause the values of your dependent variable to be higher or lower. Try to phrase this in terms of an independent variable, also at the conceptual level. Write a paragraph about these two variables and your theory about why they are causally related to each other.
3. Identify something in the world that you would like to see happen (normative). What scientific knowledge (empirical and causal) would help you to pursue this goal?
4. The 1992 U.S. presidential election, in which challenger Bill Clinton defeated incumbent George H. W. Bush, has often been remembered as the "It's the economy, stupid," election. How can we restate the causal statement that embodies this conventional wisdom – "Clinton beat Bush because the economy had performed poorly" – into a more general theoretical statement?

For Exercises 5 and 6, consider the following statement about the world: "If you care about economic success in a country, you should also care about the peoples' political rights in that country. In a society in which people have more political rights, the victims of corrupt business practices will work through the system to get things corrected. As a result, countries in which people have more political rights will have less corruption. In countries in which there is less corruption, there will be more economic investment and more economic success."

5. Identify at least two causal claims that have been made in the preceding statement. For each causal claim, identify which variable is the independent variable and which variable is the dependent variable. These causal claims should be stated in terms of one of the following types of phrases in which the first blank should be filled by the independent variable and the second blank should be filled by the dependent variable:

   ______________ causes ______________

   higher ______________ causes lower ______________

   higher ______________ causes higher ______________

6. Draw a graph like Figure 1.3 for each of the causal claims that you identified in Exercise 5. For each of your figures, do the following: Start on the left-hand side of the horizontal axis of the figure. This should represent a low value of the independent variable. What value of the dependent variable would you expect to find for such a case? Put a dot on your figure that represents this expected location. Now do the same for a case with a high value of the independent variable. Draw a line that connects these two points and write a couple of sentences that describe this picture.

7. Find an article in a political science journal that contains a model of politics. Provide the citation to the article, and answer the following questions:
   (a) What is the dependent variable?
   (b) What is one of the independent variables?
   (c) What is the causal theory that connects the independent variable to the dependent variable?
   (d) Does this seem reasonable?
8. For each of the following statements, identify which, if any, rule(s) of the road to scientific knowledge about politics has been violated:
   (a) This study of the relationship between economic development and the level of autocracy is important because dictatorships are bad and we need to understand how to get rid of them.
   (b) Did the European financial crisis of 2012 cause Nicolas Sarkozy to lose the subsequent French presidential election?
   (c) It's just logical that poverty causes crime.
   (d) This correlation supports the theory that bad weather drives down voter turnout.

2 The Art of Theory Building

OVERVIEW

In this chapter we discuss the art of theory building. Unfortunately there is no magical formula or cookbook for developing good theories about politics. But there are strategies that will help you to develop good theories. We discuss these strategies in this chapter.

2.1 GOOD THEORIES COME FROM GOOD THEORY-BUILDING STRATEGIES

In Chapter 1 we discussed the role of theories in developing scientific knowledge. From that discussion, it is clear that a "good" theory is one that, after going through the rigors of the evaluation process, makes a contribution to scientific knowledge. In other words, a good theory is one that changes the way that we think about some aspect of the political world. We also know from our discussion of the rules of the road that we want our theories to be causal, not driven by data alone, empirical, non-normative, general, and parsimonious. This is a tall order, and a logical question to ask at this point is "How do I come up with such a theory?"

Unfortunately, there is neither an easy answer nor a single answer. Instead, what we can offer you is a set of strategies. "Strategies?" you may ask. Imagine that you were given the following assignment: "Go out and get struck by lightning."[1] There is no cut-and-dried formula that will show you how to get struck by lightning, but certainly there are actions that you can take that will make it more likely. The first step is to look at a weather map and find an area where there is thunderstorm activity, and if you were to go to such an area, you would increase your likelihood of getting struck.

[1] Our lawyers have asked us to make clear that this is an illustrative analogy and that we are in no way encouraging you to go out and try to get struck by lightning.

You would be even more likely to get struck by lightning if, once in the area of thunderstorms, you climbed to the top of a tall barren hill. But you would be still more likely to get struck if you carried with you a nine iron and, once on top of the barren hill, in the middle of a thunderstorm, you held that nine iron up to the sky. The point here is that, although there are no magical formulae that make the development of a good theory (or getting hit by lightning) a certain event, there are strategies that you can follow to increase the likelihood of it happening.

2.2 PROMISING THEORIES OFFER ANSWERS TO INTERESTING RESEARCH QUESTIONS

In the sections that follow, we discuss a series of strategies for developing theories. A reasonable question to ask before we depart on this tour of theory-building strategies is, "How will I know when I have a good theory?" Another way that we might think about this is to ask "What do good theories do?" We know from Chapter 1 that theories get turned into hypothesis tests, and then, if they are supported by empirical tests, they contribute to our scientific knowledge about what causes what. So a reasonable place to begin to answer the question of how one evaluates a new theory is to think about how that theory, if supported in empirical testing, would contribute to scientific knowledge. One of the main ways in which theories can be evaluated is in terms of the questions that they answer. If the question being answered by a theory is interesting and important, then that theory has potential.

Most of the influential research in any scientific field can be distilled into a soundbite-sized statement about the question to which it offers an answer, or the puzzle for which it offers a solution. Consider, for example, the 10 most-cited articles published in the *American Political Science Review* between 1945 and 2005.[2] Table 2.1 lists these articles together with their research question. It is worth noting that, of these 10 articles, all but one has as its main motivation the answer to a question or the solution to a puzzle that is of interest to not just political science researchers.[3] This provides us with a valuable clue about what we should aim to do with our theories. It also provides a useful way of evaluating any theory that we are developing. If our theory doesn't propose an answer to an interesting question, it probably

[2] This list comes from an article (Sigelman et al., 2006) published by the editor of the journal in which well-known researchers and some of the original authors reflected on the influence of the 20 most-cited articles published in the journal during that time period.

[3] The Beck and Katz paper, which is one of the most influential technical papers in the history of political science, is the exception to this.

Table 2.1. Research Questions of the 10 most-cited papers in the *American Political Science Review*, 1945–2005

Article	Research Question
1) Bachrach & Baratz 1962	How is political power created?
2) Hibbs 1977	How do the interests of their core supporters effect governments' economic policies?
3) Walker 1969	How do innovations in governance spread across U.S. states?
4) Kramer 1971	How do economic conditions impact U.S. national elections?
5) Miller & Stokes 1963	How do constituent attitudes influence the votes of U.S. representatives?
6) March & Olsen 1984	How do institutions shape politics?
7) Lipset 1959	What are the necessary conditions for stable democratic politics?
8) Beck & Katz 1995	What models should researchers use when they have pooled time-series data?
9) Cameron 1978	Why has the government share of economic activity increased in some nations?
10) Deutsch 1961	How does social mobilization shape politics in developing nations?

needs to be redeveloped. As we consider different strategies for developing theories, we will refer back to this basic idea of answering questions.

2.3 IDENTIFYING INTERESTING VARIATION

A useful first step in theory building is to think about phenomena that vary and to focus on general patterns. Because theories are designed to explain variation in the dependent variable, identifying some variation that is of interest to you is a good jumping-off point. In Chapter 4 we present a discussion of two of the most common research designs – cross-sectional and time-series observational studies – in some detail. For now it is useful to give a brief description of each in terms of the types of variation in the dependent variable. These should help clarify the types of variation to consider as you begin to think about potential research ideas.

When we think about measuring our dependent variable, the first things that we need to identify are the time and spatial dimensions over which we would like to measure this variable. The **time dimension** identifies the point or points in time at which we would like to measure our variable. Depending on what we are measuring, typical time increments for political science data are annual, quarterly, monthly, or weekly measures. The **spatial dimension** identifies the physical units that we want to measure. There is a lot of variability in terms of the spatial units in political science data. If we are looking at survey data, the spatial unit will be the individual people who answered the survey (known as survey respondents). If we are looking at data on U.S. state governments, the typical spatial unit will be the 50 U.S. states. Data from international relations and comparative politics often take nations as their spatial units. Throughout this book, we think about measuring our dependent variable such that one of these two dimensions will be static (or constant). This means that our measures of our dependent variable will be of one of two types. The first is a **time-series measure**, in which the spatial dimension is the same for all cases and the dependent variable is measured at multiple points in time. The second is a **cross-sectional measure**, in which the time dimension is the same for all cases and the dependent variable is measured for multiple spatial units. Although it is possible for us to measure the same variable across both time and space, we strongly recommend thinking in terms of variation across only one of these two dimensions as you attempt to develop a theory about what causes this variation.[4] Let's consider an example of each type of dependent variable.

2.3.1 Time-Series Example

In Figure 2.1 we see the average monthly level of U.S. presidential approval displayed from 1995 to 2005. We can tell that this variable is measured as a time series because the spatial unit is the same (the United States), but the variable has been measured at multiple points in time (each month). This measure is comparable across the cases; for each month we are looking at the percentage of people who reported that they approved of the job that the president was doing. Once we have a measure like this that is comparable across cases, we can start to think about what independent variable might *cause* the level of the dependent variable to be higher or lower. In other words, we are looking for answers to the research question, "What causes presidential approval to go up and down?"

If you just had a mental alarm bell go off telling you that we seemed to be violating one of our rules of the road from Chapter 1, then congratulations – you are doing a good job paying attention. Our second rule of the road is "don't let data alone drive your theories." Remember that we also can phrase this rule as "try to develop theories before examining the data on which you will perform your tests." Note, however, that in this example

[4] As we mentioned in Chapter 1, we will eventually theorize about multiple independent variables simultaneously causing the same dependent variable to vary. Confining variation in the dependent variable to a single dimension helps to make such multivariate considerations tractable.

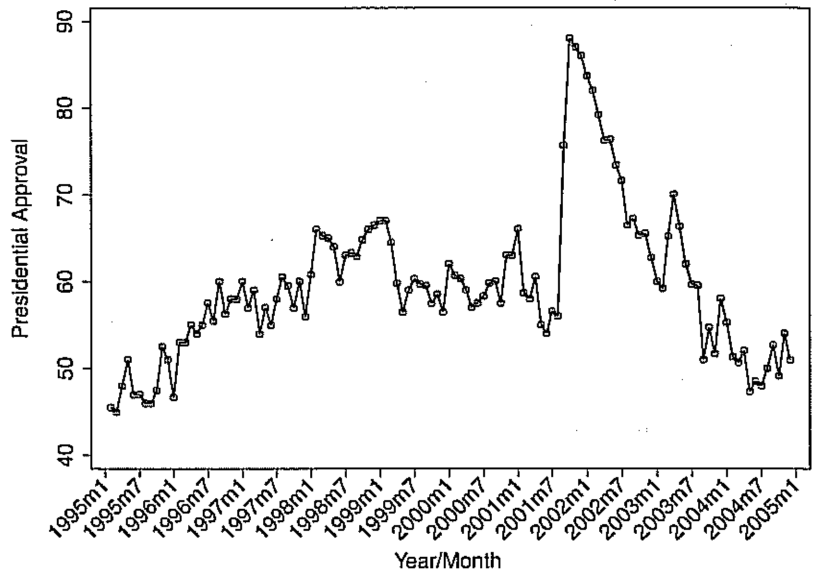

Figure 2.1. Presidential approval, 1995–2005.

we are only examining variation in one of our variables, in this case the dependent variable. We would start to get into real problems if we plotted pairs of variables and then developed a theory only once we observed a pair of variables that varied together. If this still seems like we are getting to close to our data before developing our theory, we could develop a theory about U.S. presidential approval using Figure 2.1, but then test that theory with a different set of data that may or may not contain the data depicted in Figure 2.1.

2.3.2 Cross-Sectional Example

In Figure 2.2 we see military spending as a percentage of gross domestic product (GDP) in 2005 for 22 randomly selected nations. We can tell that this variable is measured cross-sectionally, because it varies across spatial units (nations) but does not vary across time (it is measured for the year 2005 for each case). When we measure variables across spatial units like this, we have to be careful to choose appropriate measures that are comparable across spatial units. To better understand this, imagine that we had measured our dependent variable as the amount of money that each nation spent on its military. The problem would be that country currencies – the Albanian Lek, the Bangladeshi Taka, and Chilean Peso – do not take on the same value. We would need to know the currency exchange rates in order to make these comparable across nations. Using currency exchange rates, we would be able to convert the absolute amounts of money that

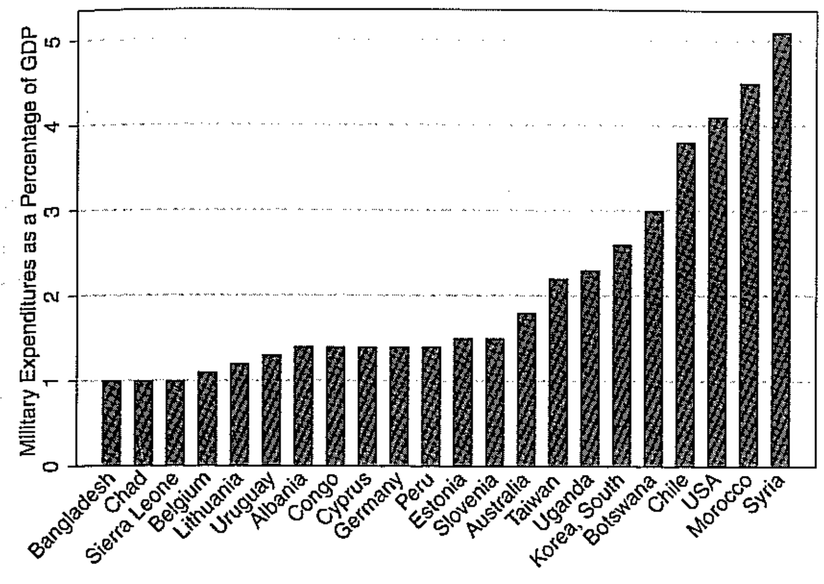

Figure 2.2. Military spending in 2005.

each nation had spent into a common measure. We could think of this particular measure as an operationalization of the concept of relative military "might." This would be a perfectly reasonable dependent variable for theories about what makes one nation more powerful than another. Why, you might ask, would we want to measure military spending as a percentage of GDP? The answer is that this comparison is our attempt to measure the percentage of the total budgetary effort available that a nation is putting into its armed forces. Some nations have larger economies than others, and this measure allows us to answer the question of how much of their total economic activity each nation is putting toward its military. With this variation in mind, we develop a theory to answer the question "What *causes* a nation to put more or less of its available economic resources toward military spending?"

2.4 LEARNING TO USE YOUR KNOWLEDGE

One of the common problems that people have when trying to develop a theory about a phenomenon of interest is that they can't get past a particular political event in time or a particular place about which they know a lot. It is helpful to know some specifics about politics, but it is also important to be able to distance yourself from the specifics of one case and to think more broadly about the underlying causal process. To use an analogy, it's fine to know something about trees, but we want to theorize about the forest.

Remember, one of our rules of the road is to try to make our theories general.

2.4.1 Moving from a Specific Event to More General Theories

For an example of this, return to Figure 2.1. What is the first thing that you think most people notice when they look at Figure 2.1? Once they have figured out what the dimensions are in this figure (U.S. presidential approval over time), many people look at the fall of 2001 and notice the sharp increase in presidential approval that followed the terrorist attacks on the United States on September 11, 2001. This is a period of recent history about which many people have detailed memories. In particular, they might remember how the nation rallied around President Bush in the aftermath of these attacks. There are few people who would doubt that there was a causal linkage between these terrorist attacks and the subsequent spike in presidential approval.

At first glance, this particular incident might strike us as a unique event from which general theoretical insights cannot be drawn. After all, terrorist attacks on U.S. soil are rare events, and attacks of this magnitude are even more rare. The challenge to the scientific mind when we have strong confidence about a causal relationship in one specific incident is to push the core concepts around in what we might call thought experiments: How might a less-effective terrorist attack affect public opinion? How might other types of international incidents shape public opinion? Do we think that terrorist attacks lead to similar reactions in public opinion toward leaders in other nations? Each of these questions is posed in general terms, taking the specific events of this one incident as a jumping-off point. The answers to these more general questions should lead us to general theories about the causal impact of international incidents on public opinion.

In the 1970s John Mueller moved from the specifics of particular international incidents and their influence on presidential approval toward a general theory of what causes rallies (or short-term increases) in presidential approval.[5] Mueller developed a theory that presidential approval would increase in the short term any time that there was international conflict. Mueller thought that this would occur because, in the face of international conflict, people would tend to put their partisan differences and other critiques that they may have of the president's handling of his job aside and support him as the commander in chief of the nation. In Mueller's statistical analysis of time-series data on presidential approval, he found that there was substantial support for his hypothesis that international conflicts would

[5] See Mueller (1973).

raise presidential approval rates, and this in turn gave him confidence in his theory of public opinion rallies.

2.4.2 Know Local, Think Global: Can You Drop the Proper Nouns?

Physicists don't have theories that apply only in France, and neither should we. Yet many political scientists write articles with one particular geographic context in mind. Among these, the articles that have the greatest impact are those that advance general theories from which the proper nouns have been removed.[6] An excellent example of this is Michael Lewis-Beck's "Who's the Chef?" Lewis-Beck, like many observers of French politics, had observed the particularly colorful period from 1986 to 1988 during which the president was a socialist named François Mitterand and the prime minister was Jacques Chirac, a right-wing politician from the Gaullist RPR party. The height of this political melodrama occurred when both leaders showed up to international summits of world leaders claiming to be the rightful representative of the French Republic. This led to a famous photo of the leaders of the G7 group of nations that contained eight people.[7] Although many people saw this as just another colorful anecdote about the ever-changing nature of the power relationship between presidents and prime ministers in Fifth Republic France, Lewis-Beck moved from the specifics of such events to develop and test a general theory about political control and public opinion.

His theory was that changing the political control of the economy would cause public opinion to shift in terms of who was held accountable for the economy. In France, during times of unified political control of the top offices, the president is dominant, and thus according to Lewis-Beck's theory the president should be held accountable for economic outcomes. However, during periods of divided control, Lewis-Beck's theory leads to the expectation that the prime minister, because of his or her control of economic management during such periods, should be held accountable for economic outcomes. Through careful analysis of time-series data on political control and economic accountability, Lewis-Beck found that his theory was indeed supported.

Although the results of this study are important for advancing our understanding of French politics, the theoretical contribution made by Lewis-Beck was much greater because he couched it in general terms and

[6] By "proper nouns," we mean specific names of people or countries. But this logic can and should be pushed further to include specific dates, as we subsequently argue.

[7] The G7, now the G8 with the inclusion of Russia, is an annual summit meeting of the heads of government from the world's most powerful nations.

without proper nouns. We also can use this logic to move from an understanding of a specific event to general theories that explain variation across multiple events. For example, although it might be tempting to think that every U.S. presidential election is entirely unique – with different candidates (proper names) and different historical circumstances – the better scientific theory does *not* explain only the outcome of the 2012 U.S. presidential election, but of U.S. presidential elections in general. That is, instead of asking "Why did Obama beat Romney in the 2012 election?" we should ask either "What causes the incumbent party to win or lose in U.S. presidential elections?" or "What causes Republican candidates to fare better or worse than Democratic candidates in U.S. presidential elections?"

2.5 EXAMINE PREVIOUS RESEARCH

Once you have identified an area in which you want to conduct research, it is often useful to look at what other work has been done that is related to your areas of interest. As we discussed in Chapter 1, part of taking a scientific approach is to be skeptical of research findings, whether they are our own or those of other researchers. By taking a skeptical look at the research of others, we can develop new research ideas of our own and thus develop new theories.

We therefore suggest looking at research that seems interesting to you and, as you examine what has been done, keep the following list of questions in mind:

- What (if any) other causes of the dependent variable did the previous researchers miss?
- Can their theory be applied elsewhere?
- If we believe their findings, are there further implications?
- How might this theory work at different levels of aggregation (micro⟺macro)?

2.5.1 What Did the Previous Researchers Miss?

Any time that we read the work of others, the first thing that we should do is break down their theory or theories in terms of the independent and dependent variables that they claim are causally related to each other. We cannot overstate the importance of this endeavor. We understand that this can be a difficult task for a beginning student, but it gets easier with practice. A good way to start this process is to look at the figures or tables in an article and ask yourself, "What is the dependent variable here?" Once we have done this and also identified the key independent variable, we should think about whether the causal arguments that other researchers have advanced seem reasonable. (In Chapter 3 we present a detailed four-step process for doing this.) We should also be in the habit of coming up with other independent variables that we think might be causally related to the same dependent variable. Going through this type of mental exercise can lead to new theories that are worth pursuing.

2.5.2 Can Their Theory Be Applied Elsewhere?

When we read about the empirical research that others have conducted, we should be sure that we understand which specific cases they were studying when they tested their theory. We should then proceed with a mental exercise in which we think about what we might find if we tested the same theory on other cases. In doing so, we will probably identify some cases for which we expect to get the same results, as well as other cases for which we might have different expectations. Of course, we would have to carry out our own empirical research to know whether our speculation along these lines is correct, but replicating research can lead to interesting findings. The most useful theoretical development comes when we can identify systematic patterns in the types of cases that will fit and those that will not fit the established theory. These systematic patterns are additional variables that determine whether a theory will work across an expanded set of cases. In this way we can think about developing new theories that will subsume the original established theory.

2.5.3 If We Believe Their Findings, Are There Further Implications?

Beginning researchers often find themselves intimidated when they read convincing accounts of the research carried out by more established scholars. After all, how can we ever expect to produce such innovative theories and find such convincingly supportive results from extensive empirical tests? Instead of being intimidated by such works, we need to learn to view them as opportunities – opportunities to carry their logic further and think about what other implications might be out there. If, for example, another researcher has produced a convincing theory about how voters behave, we could ask how might this new understanding alter the behavior of strategic politicians who understand that voters behave in this fashion?

One of the best examples of this type of research extension in political science comes from our previous example of John Mueller's research on rallies in presidential popularity. Because Mueller had found such convincingly supportive evidence of this "rally 'round the flag effect" in his empirical testing, other researchers were able to think through the strategic consequences of this phenomenon. This led to a new body of research on a phenomenon called "diversionary use of force" (Richards et al. 1993). The idea of this new research is that, because strategic politicians will be aware that international conflicts temporarily increase presidential popularity, they will choose to generate international conflicts at times when they need such a boost.

2.5.4 How Might This Theory Work at Different Levels of Aggregation (Micro⟺Macro)?

As a final way to use the research of others to generate new theories, we suggest considering how a theory might work differently at varying levels of aggregation. In political science research, the lowest level of aggregation is usually at the level of individual people in studies of public opinion. As we saw in Subsection 2.5.3, when we find a trend in terms of individual-level behavior, we can develop new theoretical insights by thinking about how strategic politicians might take advantage of such trends. Sometimes it is possible to gain these insights by simply changing the level of aggregation. As we have seen, political scientists have often studied trends in public opinion by examining data measured at the national level over time. This type of study is referred to as the study of macro politics. When we find trends in public opinion at higher (macro) levels of aggregation, it is always an interesting thought exercise to consider what types of patterns of individual-level or "micro-" level behavior are driving these aggregate-level findings.

As an example of this, return to the rally 'round the flag example and change the level of aggregation. We have evidence that, when there are international conflicts, public opinion toward the president becomes more positive. What types of individual-level forces might be driving this observed aggregate-level trend? It might be the case that there is a uniform shift across all types of individuals in their feelings about the president. It might also be the case that the shift is less uniform. Perhaps individuals who dislike the president's policy positions on domestic events are willing to put these differences aside in the face of international conflicts, whereas the opinions of the people who were already supporters of the president remain unchanged. Thinking about the individual-level dynamics that drive aggregate observations can be a fruitful source of new causal theories.

2.6 THINK FORMALLY ABOUT THE CAUSES THAT LEAD TO VARIATION IN YOUR DEPENDENT VARIABLE

Thus far in this book we have discussed thinking about the political world in an organized, systematic fashion. By now, we hope that you are starting to think about politics in terms of independent variables and dependent variables and are developing theories about the causal relationships between them. The theories that we have considered thus far have come from thinking rigorously about the phenomena that we want to explain and deducing plausible causal explanations. One extension of this type of rigorous thinking is labeled "**formal theory**" or "**rational choice.**"[8] Researchers have used this approach to develop answers to research questions about how people make strategic decisions. Put another way, if politics is a game, how do we explain the way that people play it?

To answer questions along these lines, the formal-theory approach to social science phenomena starts out with a fairly basic set of assumptions about human behavior and then uses game theory and other mathematical tools to build models of phenomena of interest. We can summarize these assumptions about human behavior by saying that formal theorists assume that all individuals are **rational utility maximizers** – that they attempt to maximize their self-interest. Individuals are faced with a variety of choices in political interactions, and those choices carry with them different consequences – some desirable, others undesirable. By thinking through the incentives faced by individuals, users of this approach begin with the strategic foundations of the decisions that individuals face. Formal theorists then deduce theoretical expectations of what individuals will do given their preferences and the strategic environment that they confront.

That sounds like a mouthful, we know. Let's begin with a simple example: If human beings are self-interested, then (by definition) members of a legislature are self-interested. This assumption suggests that members will place a high premium on reelection. Why is that? Because, first and foremost, a politician must be in office if she is going to achieve her political goals. And from this simple deduction flows a whole set of hypotheses about congressional organization and behavior.[9]

This approach to studying politics is a mathematically rigorous attempt to think through what it would be like to be in the place of different actors involved in a situation in which they have to choose how to act. In essence, formal theory is a lot like the saying that we should not judge a person until we have walked a mile in his or her shoes. We use the tools of formal theory to try to put ourselves in the position of imagining that we are in someone else's shoes and thinking about the different choices that he or she

[8] The terms "formal theory" and "rational choice" have been used fairly interchangeably to describe the application of game theory and other formal mathematical tools to puzzles of human behavior. We have a slight preference for the term "formal theory" because it is a more overarching term describing the enterprise of using these tools, whereas "rational choice" describes the most critical assumption that this approach makes.

[9] See Mayhew (1974) and Fiorina (1989).

has to make. In the following subsections we introduce the basic tools for doing this by using an **expected utility** approach and then provide a famous example of how researchers used this framework to develop theories about why people vote.

2.6.1 Utility and Expected Utility

Think about the choice that you have made to read this chapter of this book. What are your expected benefits and what are the costs that you expect to incur? One benefit may be that you are genuinely curious about how we build theories of politics. Another expected benefit may be that your professor is likely to test you on this material, and you expect that you will perform better if you have read this chapter. There are, no doubt, also costs to reading this book. What else might you be doing with your time? This is the way that formal theorists approach the world.

Formal theorists think about the world in terms of the outcome of a collection of individual-level decisions about what to do. In thinking about an individual's choices of actions, formal theorists put everything in terms of **utility**. Utility is an intentionally vague quantity. The utility from a particular action is equal to the sum of all benefits minus the sum of all costs from that action. If we consider an action Y, we can summarize the utility from Y for individual i with the following formula:

$$U_i(Y) = \sum B_i(Y) - \sum C_i(Y),$$

where $U_i(Y)$ is the utility for individual i from action Y, $\sum B_i(Y)$ is the sum of the benefits B_i from action Y for individual i, and $\sum C_i(Y)$ is the sum of the costs C_i from action Y for individual i. When choosing among a set of possible actions (including the decision not to act), a rational individual will choose that action that maximizes their utility. To put this formally,

$$\text{given a set of choices } Y = Y_1, Y_2, Y_3, \ldots, Y_n,$$
$$\text{individual } i \text{ will choose } Y_a \text{ such that } U_i(Y_a) > U_i(Y_b)\ \forall\ b \neq a,$$

which translates into, "given a set of choices of action Y_1 through Y_n, individual i will choose that action (Y_a) such that the utility to individual i from that action is greater than the utility to individual i from any action (Y_b) for all ($\forall$) actions b not equal to a." In more straightforward terms, we could translate this into the individual choosing that action that he deems best for himself.

At this point, it is reasonable to look around the real world and think about exceptions. Is this really the way that the world works? What about altruism? During the summer of 2006, the world's second-richest man, Warren Buffet, agreed to donate more than 30 billion dollars to the Bill and Melinda Gates Foundation. Could this possibly have been rational utility-maximizing behavior? What about suicide bombers? The answers to these types of questions show both the flexibility and a potential problem of the concept of utility. Note that, in the preceding formulae, there is always a subscripted i under each of the referenced utility components, (U_i, B_i, C_i). This is because different individuals have *different* evaluations of the benefits (B_i) and costs (C_i) associated with a particular action. When the critic of this approach says, "How can this possibly be utility-maximizing behavior?" the formal theorist responds, "Because this is just an individual with an unusual utility structure."

Think of it another way. Criticizing formal theory because it takes preferences as "given" – that is, as predetermined, rather than the focus of inquiry – strikes us as beside the point. Other parts of political science can and should study preference formation; think about political psychology and the study of public opinion. What formal theory does, and does well, is to say, "Okay, once an individual has her preferences – regardless of where they came from – how do those preferences interact with strategic opportunities and incentives to produce political outcomes?" Because formal theory takes those preferences as given does not mean that the preference-formation process is unimportant. It merely means that formal theory is here to explain a different portion of social reality.

From a scientific perspective, this is fairly unsettling. As we discussed in Chapter 1, we want to build scientific knowledge based on real-world observation. How do we observe people's utilities? Although we can ask people questions about what they like and don't like, and even their perceptions of costs and benefits, we can never truly observe utilities. Instead, the assumption of utility maximization is just that – an assumption. This assumption is, however, a fairly robust assumption, and we can do a lot if we are willing to make it and move forward while keeping the potential problems in the back of our minds.

Another potentially troubling aspect of the rational-actor utility-maximizing assumption that you may have thought of is the assumption of **complete information**. In other words, what if we don't know exactly what the costs and benefits will be from a particular action? In the preceding formulae, we were operating under the assumption of complete information, for which we knew exactly what would be the costs, benefits, and thus the utility from each possible action. When we relax this assumption, we move our discussion from utility to expected utility. We represent this change in the assumptions about information by putting an "E" and brackets around each term to which it applies. This type of transformation is known as "putting expectations" in front of all utilities. For example, the term $U_i(Y)$, which is read as "the utility for individual 'i' from action Y," becomes $E[U_i(Y)]$ under **incomplete information**, which is read as "the expected utility for individual 'i' from action Y." So, returning to our rational actor assumption, under incomplete information, for an individual action Y,

$$E[U_i(Y)] = \sum E[B_i(Y)] - \sum E[C_i(Y)],$$

and a rational actor will maximize his expected utility thus:

given a set of choices $Y = Y_1, Y_2, Y_3, \ldots, Y_n$,

individual i will choose Y_a such that $E[U_i(Y_a)] > E[U_i(Y_b)] \forall b \neq a$.

2.6.2 The Puzzle of Turnout

One of the oldest and most enduring applications of formal theory to politics is known as the "paradox of voting." William Riker and Peter Ordeshook set out the core arguments surrounding this application in their influential 1968 article in the *American Political Science Review* titled "A Theory of the Calculus of Voting." Their paper was written to weigh in on a lively debate over the rationality of voting. In particular, Riker and Ordershook presented a theory to answer the research question "Why do people vote?" In Riker and Ordeshook's notation (with subscripts added), the expected utility of voting was summarized as

$$R_i = (B_i P_i) - C_i,$$

where R_i is the reward that an individual receives from voting, B_i is the differential benefit that an individual voter receives "from the success of his more preferred candidate over his less preferred one" (Riker and Ordeshook 1968, p. 25), P_i is the probability that that voter will cast the deciding vote that makes his preferred candidate the winner, and C_i is the sum of the costs that the voter incurs from voting.[10] If R_i is positive, the individual votes; otherwise, he abstains.[11]

We'll work our way through the right-hand side of this formula and think about the likely values of each term in this equation for an individual eligible voter in a U.S. presidential election. The term B_i is likely to be greater than zero for most eligible voters in most U.S. presidential elections. The reasons for this vary widely from policy preferences to gut feelings about the relative character traits of the different candidates. Note, however, that the B_i term is multiplied by the P_i term. What is the likely value of P_i? Most observers of elections would argue that P_i is extremely small and effectively equal to zero for every voter in most elections. In the case of a U.S. presidential election, for one vote to be decisive, that voter must live in a state in which the popular vote total would be *exactly* tied if that individual did not vote, and this must be a presidential election for which that particular state would swing the outcome in the Electoral College to either candidate. Because P_i is effectively equal to zero, the entire term $(B_i P_i)$ is effectively equal to zero.

What about the costs of voting, C_i? Voting takes time for all voters. Even if a voter lives right next door to the polling place, he has to take some time to walk next door, perhaps stand in a line, and cast his ballot. The well-worn phrase "time is money" certainly applies here. Even if the voter in question is not working at the time that he votes, he could be doing something other than voting. Thus it is pretty clear that C_i is greater than zero. If C_i is greater than zero and $(B_i P_i)$ is effectively equal to zero, then R_i must be negative. How then, do we explain the millions of people that vote in U.S. presidential elections, or, indeed, elections around the world? Is this evidence that people are truly not rational? Or, perhaps, is it evidence that millions of people systematically overestimate P_i? Influential political economy scholars, including Anthony Downs and Gordon Tullock, posed these questions in the early years of formal theoretical analyses of politics.

Riker and Ordeshook's answer was that there must be some other benefit to voting that is not captured by the term $(B_i P_i)$. They proposed that the voting equation should be

$$R_i = (B_i P_i) - C_i + D_i,$$

where D_i is the satisfaction that individuals feel from participating in the democratic process, regardless of the impact of their participation on the final outcome of the election. Riker and Ordeshook argued that D_i could be made up of a variety of different efficacious feelings about the political system, ranging from fulfilling one's duties as a citizen to standing up and being counted.

Think of the contribution that Riker and Ordeshook made to political science, and that, more broadly, formal theory makes to political science, in the following way: Riker and Ordeshook's theory leads us to wonder why any individual will vote. And yet, empirically, we notice that close to half of the adult population votes in any given presidential election in recent history. What formal theory accomplishes for us is that it helps us to focus

10 For simplicity in this example, consider an election in which there are only two candidates competing. Adding more candidates makes the calculation of B_i more complicated, but does not change the basic result of this model.

11 For clarity, we follow Riker and Ordeshook's convention of using masculine pronouns.

in on exactly *why* people do bother, rather than to assert, normatively, that people *should*.[12]

2.7 THINK ABOUT THE INSTITUTIONS: THE RULES USUALLY MATTER

In the previous section we thought about individuals and developing theoretical insights by thinking about their utility calculations. In this section we extend this line of thinking to develop theories about how people will interact with each other in political situations. One particularly rich source for theoretical insights along these lines comes from formal thinking about institutional arrangements and the influence that they have in shaping political behavior and outcomes. In other words, researchers have developed theories about politics by thinking about the rules under which the political game is played. To fully understand these rules and their impact, we need to think through some counterfactual scenarios in which we imagine how outcomes would be altered if there were different rules in place. This type of exercise can lead to some valuable theoretical insights. In the subsections that follow, we consider two examples of thinking about the impact of institutions.

2.7.1 Legislative Rules

Considering the rules of the political game has yielded theoretical insights into the study of legislatures and other governmental decision-making bodies. This has typically involved thinking about the **preference orderings** of expected utility-maximizing actors. For example, let's imagine a legislature made up of three individual members, X, Y, and Z.[13] The task in front of X, Y, and Z is to choose between three alternatives A, B, and C. The

[12] Of course, Riker and Ordeshook did not have the final word in 1968. In fact, the debate over the rationality of turnout has been at the core of the debate over the usefulness of formal theory in general. In their 1994 book titled *Pathologies of Rational Choice Theory*, Donald Green and Ian Shapiro made it the first point of attack in their critique of the role that formal theory plays in political science. One of Green and Shapiro's major criticisms of this part of political science was that the linkages between formal theory and empirical hypothesis tests were too weak. In reaction to these and other critics, the National Science Foundation launched a new program titled "Empirical Implications of Theoretical Models" (EITM) that was designed to strengthen the linkage between formal theory and empirical hypothesis tests.

[13] We know that, in practice, legislatures tend to have many more members. Starting with this type of miniature-scaled legislature makes formal considerations much easier to carry out. Once we have arrived at conclusions based on calculations made on such a small scale, it is important to consider whether the conclusions that we have drawn would apply to more realistically larger-scaled scenarios.

preferences orderings for these three rational individuals are as follows:

$$X : ABC,$$
$$Y : BCA,$$
$$Z : CAB.$$

An additional assumption that is made under these circumstances is that the preferences of rational individuals are **transitive**. This means that if individual X likes A better than B and B better than C, then, for X's preferences to be transitive, he or she must also like A better than C. Why is this an important assumption to make? Consider the alternative. What if X liked A better than B and B better than C, but liked C better than A? Under these circumstances, it would be impossible to discuss what X wants in a meaningful fashion because X's preferences would produce an infinite cycle. To put this another way, no matter which of the three choices X chose, there would always be some other choice that X prefers. Under these circumstances, X could not make a rational choice.

In this scenario, what would the group prefer? This is not an easy question to answer. If they each voted for their first choice, each alternative would receive one vote. If these three individuals vote between pairs of alternatives, and they vote according to their preferences, we would observe the following results:

$$A \text{ vs. } B,\ X\&Z \text{ vs. } Y,\ A \text{ wins};$$
$$B \text{ vs. } C,\ X\&Y \text{ vs. } Z,\ B \text{ wins};$$
$$C \text{ vs. } A,\ Y\&Z \text{ vs. } X,\ C \text{ wins}.$$

Which of these three alternatives does the group collectively prefer? This is an impossible question to answer because the group's preferences cycle across the three alternatives. Another way of describing this group's preferences is to say that they are **intransitive** (despite the fact that, as you can see, each individual's preferences are transitive).

This result should be fairly troubling to people who are concerned with the fairness of democratic elections. One of the often-stated goals of elections is to "let the people speak." Yet, as we have just seen, it is possible that, even when the people involved are all rational actors, their collective preferences may not be rational. Under such circumstances, a lot of the normative concepts concerning the role of elections simply break down. This finding is at the heart of Arrow's theorem, which was developed by Kenneth Arrow in his 1951 book titled *Social Choice and Individual Values*. At the time of its publication, political scientists largely ignored this book. As formal theory became more popular in political science, Arrow's mathematical approach to these issues became increasingly recognized. In 1982 William Riker popularized Arrow's theorem in his book *Liberalism Against Populism*, in which he presented a more accessible version of Arrow's theorem and bolstered a number of Arrow's claims through mathematical expositions.

2.7.2 The Rules Matter!

Continuing to work with our example of three individuals, X, Y, and Z, with the previously described preferences, now imagine that the three individuals will choose among the alternatives in two different rounds of votes between pairs of choices. In the first round of voting, two of the alternatives will be pitted against each other. In the second round of voting, the alternative that won the first vote will be pitted against the alternative that was not among the choices in the first round. The winner of the second round of voting is the overall winning choice.

In our initial consideration of this scenario, we will assume that X, Y, and Z will vote according to their preferences. What if X got to decide on the order in which the alternatives got chosen? We know that X's preference ordering is ABC. Can X set things up so that A will win? What if X made the following rules:

1st round: B vs. C;

2nd round: 1st round winner vs. A.

What would happen under these rules? We know that both X and Y prefer B to C, so B would win the first round and then would be paired against A in the second round. We also know that X and Z prefer A to B, so alternative A would win and X would be happy with this outcome.

Does voting like this occur in the real world? Actually, the answer is "yes." This form of pairwise voting among alternatives is the way that legislatures typically conduct their voting. If we think of individuals X, Y, and Z as being members of a legislature, we can see that whoever controls the ordering of the voting (the rules) has substantial power. To explore these issues further, let's examine the situation of individual Y. Remember that Y's preference ordering is BCA. So Y would be particularly unhappy about the outcome of the voting according to X's rules, because it resulted in Y's least-favorite outcome. But remember that, for our initial consideration, we assumed that X, Y, and Z will vote according to their preferences. If we relax this assumption, what might Y do? In the first round of voting, Y could cast a **strategic vote** for C against B.[14] If both X and Z continued to vote (sincerely) according to their preferences, then C would win the first round. Because we know that both X and Z prefer C to A, C would win the second round and would be the chosen alternative. Under these circumstances, Y would be better off because Y prefers alternative C to A.

From the perspective of members of a legislature, it is clearly better to control the rules than to vote strategically to try to obtain a better outcome. When legislators face reelection, one of the common tactics of their opponents is to point to specific votes in which the incumbent appears to have voted contrary to the preferences of his constituents. It would seem reasonable to expect that legislator Y comes from a district with the same or similar preferences to those of Y. By casting a strategic vote for C over B, Y was able to obtain a better outcome but created an opportunity for an electoral challenger to tell voters that Y had voted against the preferences of his district.

In *Congressmen in Committees*, Richard Fenno's classic study of the U.S. House of Representatives, one of the findings was that the Rules Committee – along with the Ways and Means and the Appropriations Committees – was one of the most requested committee assignments from the individual members of Congress. At first glance, the latter two committees make sense as prominent committees and, indeed, receive much attention in the popular media. By contrast, the Rules Committee very rarely gets any media attention. Members of Congress certainly understand and appreciate the fact that the rules matter, and formal theoretical thought exercises like the preceding one help us to see why this is the case.

2.8 EXTENSIONS

These examples represent just the beginning of the uses of formal theory in political science. We have not even introduced two of the more important aspects of formal theory – spatial models and game theory – that are beyond the scope of this discussion. In ways that mirror applications in microeconomics, political scientists have used spatial models to study phenomena such as the placement of political parties along the ideological spectrum, much as economists have used spatial models to study the location of firms in a market. Likewise, game theory utilizes a highly structured sequence of moves by different players to show how any particular actor's utility depends not only on her own choices, but also on the choices made

[14] The concept of a "strategic" vote is often confusing. For our purposes, we define a strategic vote as a vote that is cast with the strategic context in mind. Note that for a particular individual in a particular circumstance, it might be the case that the best strategic decision for them is to vote according to their preferences. The casting of a strategic vote becomes particularly interesting, however, when the strategic context leads to the casting of a vote that is different from the individual's preferences.

by the other actors. It is easy to see hints about how game theory works in the preceding simple three-actor, two-stage voting examples: X's best vote in the first stage likely depends on which alternative Y and Z choose to support, and vice versa. Game theory, then, highlights how the strategic choices made in politics are interdependent.

2.9 HOW DO I KNOW IF I HAVE A "GOOD" THEORY?

Once you have gone through some or all of the suggested courses of action for building a theory, a reasonable question to ask is, "How do I know if I have a 'good' theory?" Unfortunately there is not a single succinct way of answering this question. Instead, we suggest that you answer a set of questions about your theory and consider your honest answers to these questions as you try to evaluate the overall quality of our theory. You will notice that some of these questions come directly from the "rules of the road" that we developed in Chapter 1:

- Does your theory offer an answer to an interesting research question?
- Is your theory causal?
- Can you test your theory on data that you have not yet observed?
- How general is your theory?
- How parsimonious is your theory?
- How new is your theory?
- How nonobvious is your theory?

2.9.1 Does Your Theory Offer an Answer to an Interesting Research Question?

As we discussed at the beginning of this chapter, promising theories offer answers to interesting research questions. Any time that you formulate a theory, it's worth turning it around and asking what is the research question for which it offers an answer. If you can't give a straightforward answer to this question, you probably need to rethink your theory. A related question that you should also ask is whether anyone would care if you found support for your theory. If the answer to this question is "no," then you probably need to rethink your theory as well.

2.9.2 Is Your Theory Causal?

Remember that our first rule of the road to scientific knowledge about politics is "Make your theories causal." If your answer to the question "Is

your theory causal?" is anything other than "yes," then you need to go back to the drawing board until the answer is an emphatic "yes."

As scientists studying politics, we want to know why things happen the way that they happen. As such, we will not be satisfied with mere correlations and we demand causal explanations. We know from Chapter 1 that one way initially to evaluate a particular theory is to think about the causal explanation behind it. The causal explanation behind a theory is the answer to the question "Why do you think that this independent variable is causally related to this dependent variable?" If the answer is reasonable, then you can answer this first question with a "yes."

2.9.3 Can You Test Your Theory on Data That You Have Not Yet Observed?

Our second rule of the road is "Don't let data alone drive your theories," which we restated in a slightly longer form as "Try to develop theories before examining the data on which you will perform your tests." If you have derived your theory from considering a set of empirical data, you need to be careful not to have observed all of the data on which you can test your theory. This can be a somewhat gray area, and only you know whether your theory is entirely data driven and whether you observed all of your testing data before you developed your theory.

2.9.4 How General Is Your Theory?

We could rephrase this question for evaluating your theory as "How widely does your theory apply?" To the extent that your theory is not limited to one particular time period or to one particular spatial unit, it is more general. Answers to this question vary along a continuum – it's not the end of the world to have a fairly specific theory, but, all else being equal, a more general theory is more desirable.

2.9.5 How Parsimonious Is Your Theory?

As with the question in the preceding subsection, answers to this question also vary along a continuum. In fact, it is often the case that we face a trade-off between parsimony and generality. In other words, to make a theory more general, we often have to give up parsimony, and to make a theory more parsimonious, we often have to give up generality. The important thing with both of these desirable aspects of a theory is that we have them in mind as we evaluate our theory. If we can make our theory more general or more parsimonious and without sacrifice, we should do so.

2.9.6 How New Is Your Theory?

At first it might seem that this is a pretty straightforward question to answer. The problem is that we cannot know about all of the work that has been done before our own work in any particular area of research. It also is often the case that we may think our theory is really new, and luckily we have not been able to find any other work that has put forward the same theory on the same political phenomenon. But then we discover a similar theory on a related phenomenon. There is no simple answer to this question. Rather, our scholarly peers usually answer this question of newness for us when they evaluate our work.

2.9.7 How Nonobvious Is Your Theory?

As with the question "How new is your theory?" the question "How nonobvious is your theory?" is best answered by our scholarly peers. If, when they are presented with your theory, they hit themselves in the head and say, "Wow, I never thought about it like that, but it makes a lot of sense!" then you have scored very well on this question.

Both of these last two questions illustrate an important part of the role of theory development in any science. It makes sense to think about theories as being like products and scientific fields as being very much like markets in which these products are bought and sold. Like other entrepreneurs in the marketplace, scientific entrepreneurs will succeed to the extent that their theories (products) are new and exciting (nonobvious). But, what makes a theory "new and exciting" is very much dependent on what has come before it.

2.10 CONCLUSION

We have presented a series of different strategies for developing theories of politics. Each of these strategies involves some type of thought exercise in which we arrange and rearrange our knowledge about the political world in hopes that doing so will lead to new causal theories. You have, we're certain, noticed that there is no simple formula for generating a new theory and hopefully, as a result, appreciate our description of theory building as an "art" in the chapter's title. Theoretical developments come from many places and being critically immersed in the ongoing literature that studies your phenomenon of choice is a good place to start.

CONCEPTS INTRODUCED IN THIS CHAPTER

- complete information – the situation in which each actor in a game knows the exact payoffs from each possible outcome.
- cross-sectional measure – a measure for which the time dimension is the same for all cases and the cases represent multiple spatial units.
- expected utility – a calculation equal to the sum of all expected benefits minus the sum of all expected costs from that action. Under this calculation, the exact benefits and costs are not known with certainty.
- formal theory – the application of game theory and other formal mathematical tools to puzzles of human behavior. (Used interchangeably with "rational choice.")
- incomplete information – the situation in which each actor in a game does not know the exact payoffs from each possible outcome.
- intransitive – an illogical mathematical relationship such that, despite the fact that A is greater than B and B is greater than C, C is greater than A.
- preference orderings – the ranking from greatest to least of an actor's preferred outcomes.
- rational choice – the application of game theory and other formal mathematical tools to puzzles of human behavior. (Used interchangeably with "formal theory.")
- rational utility maximizers – an assumption about human behavior that stipulates that individuals attempt to maximize their self-interest.
- spatial dimension – the physical units on which a variable is measured.
- strategic vote – a vote cast with a strategic context in mind.
- time dimension – the point or points in time at which a variable is measured.
- time-series measure – a measure for which the spatial dimension is the same for all cases and the cases represent multiple time units.
- transitive – a mathematical relationship such that if A is greater than B and B is greater than C, then A must also be greater than C.
- utility – a calculation equal to the sum of all benefits minus the sum of all costs from that action.

EXERCISES

1. Table 2.2 contains the 11th through 20th most-cited papers from the *American Political Science Review*. Obtain a copy of one of these articles and figure out what is the research question.

Table 2.2. The 11th through 20th most-cited papers in the *American Political Science Review*, 1945–2005

Article	Title
Riker & Ordeshook 1968	"A Theory of the Calculus of Voting"
Shapley & Shubik 1954	"A Method for Evaluating the Distribution of Power in a Committee System"
McClosky 1964	"Consensus and Ideology in American Politics"
Miller 1974	"Political Issues and Trust in Government: 1964–1970"
Axelrod 1986	"An Evolutionary Approach to Norms"
Doyle 1986	"Liberalism and World Politics"
Polsby 1968	"The Institutionalization of the U.S. House of Representatives"
Inglehart 1971	"The Silent Revolution in Europe: Intergenerational Change in Post-Industrial Societies"
Maoz & Russett 1993	"Normative and Structural Causes of Democratic Peace, 1946–1986"
Tufte 1975	"Determinants of the Outcome of Midterm Congressional Elections"

2. Figure 2.3 shows gross U.S. government debt as a percentage of GDP from 1960 to 2011. Can you think of a theory about what causes this variable to be higher or lower?
3. Figure 2.4 shows the percentage of a nation's members of parliament who were women for 20 randomly selected nations in 2004. Can you think of a theory about what causes this variable to be higher or lower?
4. Think about a political event with which you are familiar and follow these instructions:
   (a) Write a short description of the event.
   (b) What is your understanding of why this event happened the way that it happened?
   (c) *Moving from local to global*: Reformulate your answer to part (b) into a general causal theory without proper nouns.
5. Find a political science journal article of interest to you, and of which your instructor approves, and answer the following items:
   (a) What is the main dependent variable in the article?
   (b) What is the main independent variable in the article?
   (c) Briefly describe the causal theory that connects the independent and dependent variables.
   (d) Can you think of another independent variable that is not mentioned in the article that might be causally related to the dependent variable?

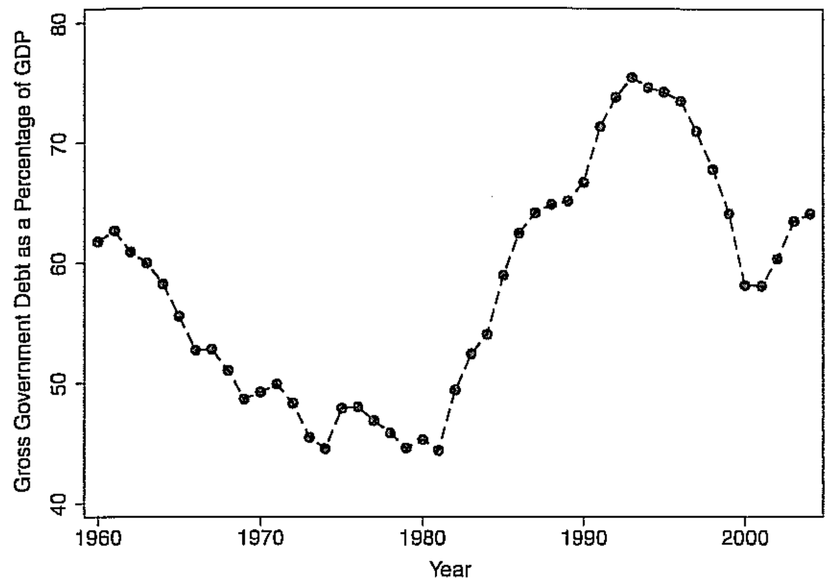

Figure 2.3. Gross U.S. government debt as a percentage of GDP, 1960–2011.

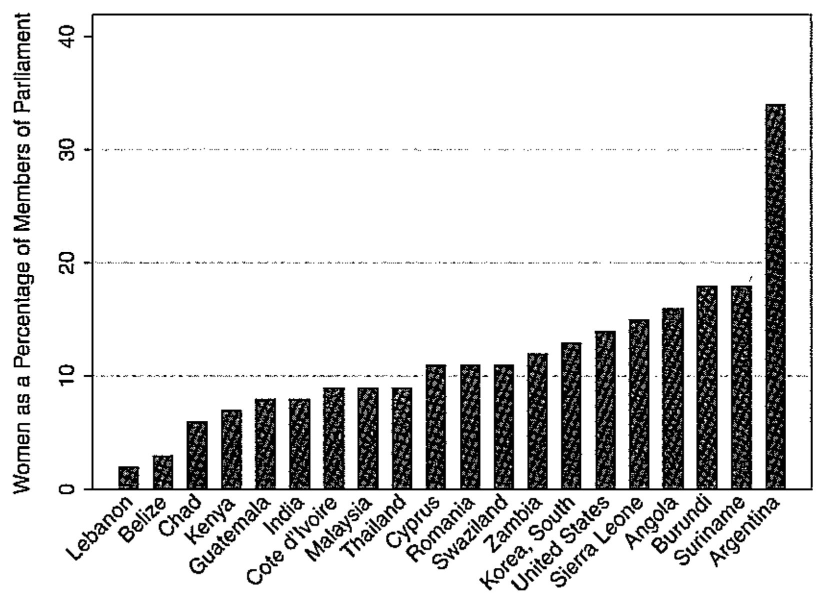

Figure 2.4. Women as a percentage of members of parliament, 2004.

Briefly explain why that variable might be causally related to the dependent variable.

6. Imagine that the way in which the U.S. House of Representatives is elected was changed from the current single-member district system to a system of national proportional representation in which any party that obtained at least 3% of

the vote nationally would get a proportionate share of the seats in the House. How many and what types of parties would you expect to see represented in the House of Representatives under this different electoral system? What theories of politics can you come up with from thinking about this hypothetical scenario?

7. *Applying formal theory to something in which you are interested.* Think about something in the political world that you would like to better understand. Try to think about the individual-level decisions that play a role in deciding the outcome of this phenomenon. What are the expected benefits and costs that the individual who is making this decision must weigh?

For exercises 8 through 11, read Robert Putnam's 1995 article "Tuning In, Tuning Out: The Strange Disappearance of Social Capital in America."

8. What is the dependent variable in Putnam's study?
9. What other possible causes of the dependent variable can you think of?
10. Can Putnam's theory be applied in other countries? Why or why not?
11. If we believe Putnam's findings, are there further implications?

3 Evaluating Causal Relationships

OVERVIEW

Modern political science fundamentally revolves around establishing whether there are *causal relationships* between important concepts. This is rarely straightforward, and serves as the basis for almost all scientific controversies. How do we know, for example, if economic development causes democratization, or if democratization causes economic development, or both, or neither? To speak more generally, if we wish to evaluate whether or not some X causes some Y, we need to cross four causal hurdles: (1) Is there a credible causal mechanism that connects X to Y? (2) Can we eliminate the possibility that Y causes X? (3) Is there covariation between X and Y? (4) Have we controlled for all confounding variables Z that might make the association between X and Y spurious? Many people, especially those in the media, make the mistake that crossing just the third causal hurdle – observing that X and Y covary – is tantamount to crossing all four. In short, finding a relationship is not the same as finding a *causal* relationship, and causality is what we care about as political scientists.

I would rather discover one causal law than be King of Persia.
– Democritus (quoted in Pearl 2000)

3.1 CAUSALITY AND EVERYDAY LANGUAGE

Like that of most sciences, the discipline of political science fundamentally revolves around evaluating causal claims. Our theories – which may be right or may be wrong – typically specify that some independent variable causes some dependent variable. We then endeavor to find appropriate empirical evidence to evaluate the degree to which this theory is or is not supported. But how do we go about evaluating causal claims? In this chapter and the next, we discuss some principles for doing this. We focus on the logic of