Academic social science writing is a unique form of non-fiction. To those not well versed in its style, academic articles in political science and other social sciences can be quite intimidating. We often make them out as much more work than they have to be. The goal of this essay is to de-mystify academic writing in political science. Articles can be separated by their goals, and we can use this to make generalizations about the purpose and content of articles. Most articles follow a similar format; knowing the format allows you to direct your attention to where it can be most useful and productive depending on your purpose for reading the article. Finally, there are three different methodological forms that are frequently seen in political science: formal modeling, case studies, and quantitative analysis. Each highlights a different facet of the question under consideration, and you should know to look for different things in articles written with each type of method.

This essay will consider each of those major issues in turn: goals and generalizations, format, and methods. In addition, a corollary goal of this article is to make even complex academic articles accessible to undergraduates in introductory courses. Throughout this essay are citations to various articles and associated questions and activities. You are strongly encouraged to get the articles and do the activities. Hands-on application of the techniques and information provided here will go a long way towards increasing your comfort level and familiarity with the genre and how to use it. If you do the activities in this essay, you should be comfortable finding and understanding the basic arguments and conclusions of almost any academic article in ten minutes or less.

**Taxonomy of Articles**

In general, we can sort articles into groups by the goal of the article. Is this an article to suggest or propose an idea or explanation? To demonstrate or support a theory? Or does it have some other purpose, like providing a review of the literature or making policy suggestions? Once we know what an article is trying to do, we can make certain generalizations about it. How do we establish an article’s goals? Three easy sources spring to mind. One is the sub-headings within the document, which often provide strong clues. The second is the authors cited within the body of the paper, often available in a works-cited or references list at the end of the article. Third, many journals or papers come with abstracts, paragraph-length summaries of the paper and its argument which are usually at the beginning of the article, or, on occasion, in the front of each journal volume. The presence or absence of each of these things can help determine if this is a theoretical article, an empirical paper, or something else entirely. Just a warning: these are not hard and fast divisions. Some papers may cross the boundaries, some may contain parts from two or more of the following categories. Some may fit none at all. But this is a useful classification scheme, or taxonomy, for making a first cut at an article.

**Theoretical Articles**

These articles are usually propositional in nature. They propose or suggest explanations or ways to understand certain events or certain classes of events. (An ‘event’ would be the Gulf War; a class of events is ‘wars.’) They often pose models, either verbal ones or formal ones, to help us explain or understand the causes of this event/class of events. Articles in this group include political theory, which discusses ideas of political organization and behavior. This group also includes those ‘applied theory’ articles which interpret a particular event or phenomena from the standpoint of a single theory or theoretical framework—for example, an explanation of the Gulf War from a realist standpoint, or the US-EU ‘banana dispute’ as an example of the internalization of democratic norms.
of peaceful conflict resolution and the rule of law. Third, it includes articles that propose a theory or explanation for an event/class of events, but do not test it (or try to demonstrate its validity). Many of this group of articles, and other theoretical articles especially in political economy and international relations, contain formal modeling, which involves the use of algebraic expressions to represent and evaluate specific behaviors.

What do we know about theoretical articles? How do we know one when we see one? Their purpose is to propose explanations or to propose the application of an explanation to a specific case. The most important part of an article proposing an explanation is its assumptions, because these are the bases on which all projections of behavior are built. The other important piece of a theoretical article is the ‘story’ that it proposes: the mechanism that links the actions together. Most theoretical articles outside the ‘applied theory’ group tell their stories without the use of proper nouns. Instead of talking about Iraq and Saudi Arabia, it talks about ‘states’; instead of John Smith and Jane Doe, it talks about ‘voters.’ They are intended to be broadly generalizeable, rather than confined to one or two specific instances. Modeling articles are identified by the presence of substantial algebra and hypotheses or propositions within the text, which are often set off from the rest of the text by indentation and/or a different font (italics, small caps, etc.). There are often references to ‘utility’ or ‘rational actors.’ (Be aware: some modeling articles proceed to test their hypotheses in the same article, thus crossing the boundary into empirical political science.)

Activity 1: Brainstorm a list of classes of events that are relevant for your subfield of political science (world politics, American politics, comparative politics, etc.). For three or four of these classes, identify several specific events that would be part of that class. Pick ONE of your classes of events and use JSTOR or another article database to find a theoretical article about it. (Turn in the full citation of the article and your brainstorm lists.)

Bonus 1: An election can represent both an event and a class of events. Can you figure out how?

Empirical Articles

Empirical articles often go by the name of ‘research report.’ The goal of an empirical article is to test or examine the support for hypotheses derived from some theory. In other words, they want to see if what the theorists suggested is what we actually see around us. The key item that distinguishes an empirical article from a theoretical one is that empirical articles try to establish or deny a causal inference—they try to explain why or how some class (or sub-class) of events occurred or turned out the way they did. The factors that the researcher thinks contribute to an explanation are called independent variables; the class of events being explained is known as the dependent variable since the author thinks that these outcomes were affected by the presence or absence of the independent variables. Variables are linked in a hypothesis, which is a specific statement of what the researcher thinks will happen to the dependent variable when the independent variables change in different directions.

Empirical articles sometimes use case studies of specific events, which look at the key variables in which the researcher is interested using in-depth investigations of a small number of cases. These are often referred to as ‘small-n’ studies: they usually use more than two cases, to get away from being simply an applied theory article, but rarely more than five. The investigator tries to provide support for his or her hypothesis by showing how the critical variables mattered in specific instances by weaving a story showing these variables in action, with an (implicit or explicit) argument that this theory can then be generalized to other cases meeting the same selection criteria. Such articles normally present qualitative evidence, or text-based arguments, rather than statistical support (see below). These are a common feature of comparative politics, since they have a major
advantage of flexibility in how variables are measured. To investigate the influence of political engagement on the success of anti-poverty programs, for example, we might look at social networks, newspaper readership and voting in one country (that is literate, democratic, but poor), and at church membership, party membership, and union membership in another country (that is Communist and poor). Voting and church membership don’t have the same meaning in both countries, but we might be able to argue that looking at all three of our indicators in both countries will give us a comparable measure of the same concept, political engagement.

Activity 2: Use JSTOR to locate Kate O’Neill, “Regulations as Arbiters of Risk: Great Britain, Germany, and the Hazardous Waste Trade in Western Europe,” *International Studies Quarterly* 41,4 (1997): 687-717. Identify the dependent variable, the independent variable(s), and the hypothesis/es. How were cases selected to be included in the analysis?

Another large group of empirical articles are distinguished by their use of statistical techniques to produce estimates of causality. Like theoretical modeling articles, these quantitative research articles frequently contain hypotheses (again often offset or in a different font), but they also include large tables in which various values are reported for different variables, ‘models,’ or parameters. The values in the table represent the output of complex statistical procedures and often tell ‘how much’ (in a specific kind of way) effect the various explanatory (independent) variables have on the outcome or dependent variable. These types of investigations are particularly common in world politics and in American politics research, where we can more easily create measurable and comparable sets of related variables for each case, no matter the case’s origin. A world politics independent variable could be ‘GNP of the country in the year the war was started,’ a value we could find for any country since about 1945. An American politics dependent variable could be, ‘voted Republican, voted Democrat, voted other, didn’t vote,’ a piece of information we could collect rather easily from survey respondents. Such data sets are often publicly available on the Internet, along with the codebook you’ll need to interpret the data values. They can be the results of surveys, with each case (or ‘event’) being an individual respondent, or they can be information collected from secondary sources on the specific events that make up a class of events. Since the data sets contain so many cases, rarely fewer than a hundred for world politics and a thousand or more for surveys, these are commonly referred to as ‘large-n’ studies.

Bonuses 2: The example above used a decision to vote Democratic or Republican as a dependent variable. Think of a potential research hypothesis in which voting Democratic or Republican is an independent variable. What would be your dependent variable? What kind of potential survey question would you need to ask or find data on to measure that dependent variable?

If you are unfamiliar with statistics, don’t worry. Despite the high number of statistically-researched articles in journals, many political scientists are not highly literate in statistics. Journal editors know this. Good statistics-using articles will be so well written that you can understand the argument and the findings without even looking at the tables. If you do indeed choose to look at the tables, which provide both a much more succinct summary and more detailed information on the results, the shortcut is to look for the asterisks, which indicate statistical significance, or how sure the author is (statistically speaking) that the answer he found was not just generated by random fluctuations in the data. In general, the more stars, the more significant (the more surely non-accidental) the value is. (A section below discusses reading and understanding these econometric articles in more depth.)
The important thing to look for in an empirical article is the causal connection, the explanation or theory, that the author proposes to link the explanatory and outcome variables. What’s the ‘story’ that the author argues for why these variables should be expected to be related? Is that story credible—does it make sense in light of other research and basic knowledge? Then, look for which variables the study actually finds to matter (i.e., are statistically significant or are well supported by the case studies). Do the variables the author was expecting to matter actually matter? If not, why not? Do the variables that other authors have commonly found to matter still matter? If not, why not? Is the researcher’s ‘story’ supported by the data?


A. What is the ‘story’ or theory that Binder proposes to link the dependent and independent variables? Is this story credible or reasonable, in your opinion? Why or why not?

B. What is the dependent variable in this article? What are the key independent variables related to Binder’s theory?

C. What does Binder expect to happen to her dependent variable as her key independent variables increase? In other words, what are her hypotheses?

D. Of the explanatory variables tested, which are statistically significant at the ‘$p < 0.05$’ level?

**Other Published Items**

Journals also publish other types of material, including literature reviews and book reviews. Literature reviews examine a large body of research on a specific issue, topic, concept, or class of events. They try to summarize the current state of knowledge about what matters in explaining or understanding that issue, and usually also attempt to indicate weaknesses in the literature and areas where more research is needed. Unlike theoretical articles and empirical articles, respectively, they do not usually try to propose or test explanations: they only discuss the potential explanations proposed or tested by others. Good literature reviews of ‘hot’ fields can be found in the *Annual Review of Political Science*, and many journals publish one or more in each issue. They can serve as excellent sources for research ideas, or can help you find initial sources to consult on a research project.

Book reviews serve a similar function. They usually look at a single book, though some journals publish short essays reviewing several books on a common theme. The book review author summarizes the book’s argument, approach, and findings, then address what shortcomings the review author thinks the book has, if any. Before you read an entire book for a research project or a class, a brief JSTOR search for book reviews can save you a lot of time by helping you eliminate irrelevant or less-relevant material. Both types of review can usually be identified by the word ‘review’ in the article title, listing in a special section of the table of contents, or most frequently for book reviews by the citation of the book at the top of the article.

Another type of article is frequently found in the semi-popular, semi-academic literature characterized by the journals *Foreign Affairs*, *Foreign Policy*, and sometimes *Political Studies Quarterly*. These articles are normative rather than empirical or theoretical: they argue should, rather than is or might. They are often written with policymakers in mind, giving suggestions for policy based on the author’s particular assumptions about the way the world works. Many times the suggested policy has its roots in some academic theory. We can say in general that these articles are characterized by the presence of a thesis, or central general argument, but they do not attempt to provide scientific academic support for it, only information based on the specific case they are discussing. These tend to be very similar to other articles in *Foreign Affairs*, *Foreign Policy*, and
often the *Bulletin of the Atomic Scientists* which are story-telling essays giving substantial background or detail about some event or controversy. They may make some references to theories or arguments in political science or present a lopsided or slanted view of the situation, but essentially they are factual accounts with no obvious thesis or argument of their own.

**Activity 4:** Locate Steven Sanderson’s article in *Foreign Affairs, The Future of Conservation.* (This is not available on JSTOR— you will actually need to use a paper edition; think about what other ways you have to find articles with incomplete citations.) What is the author’s normative argument, the ‘should’ statement that is suggested? Who might be the intended audience for this essay? What evidence or arguments does the author give to try to persuade the reader that the suggested policy direction is best?

One final group of researched articles defies easy categorization. Constructivist scholarship is based on the notion that social situations, where actors interact, are actually constructed by the beliefs and behaviors of the actors involved. If this is the case, there are really no structures which govern actor behavior, and this behavior can change over time if the beliefs of the actors change. Constructivist scholars sometimes write purely theoretical articles, though oftentimes published articles include both a theoretical argument for why some behavior should be construed or understood as socially constructed and some effort to provide empirical support (almost exclusively through case studies) for the idea of socially constructed behavior or that behavior was constructed in a certain way through certain specific actions. A specific strain of this scholarship has appeared recently in world politics scholarship, which often relies heavily on the writings of Alexander Wendt.¹

**Activity 5:** Using JSTOR, find Wendt’s article “Anarchy is What States Make of It,” in *International Organization.* What are some terms that appear to be key components of constructivist approaches? What evidence does Wendt offer for his argument that anarchy is socially constructed?

**Format of an Empirical Article**

In most political science programs, empirical books and articles will dominate the reading list for upper division classes, so it is worth your time to understand how these articles are organized and the structure of the arguments they make. While the sections of any given article may not necessarily named as listed below, most research articles follow this general format and almost all will include these parts. These parts correspond fairly closely to the categories on the Article Helper for Empirical Articles.

Almost all mainstream journals publish abstracts of their articles. Usually these are located at the top of the first page of the article, though in some journals they may take the form of an expanded table of contents at the front of the issue. Abstracts are paragraph-length summaries of the article’s main arguments, research design, and findings. When reading an article for a class, or considering an article for a research source, the abstract is a quick and easy way to gather the critical points and evaluate if the article is valuable for the purpose you intend. Sometimes the best-titled

¹ Of course, there are many other types of articles published each year. The *American Political Science Review* in particular often includes a methodological article or two in each issue. These articles look at how a specific statistical method or modeling concept or use of sources improves on past tools or methods. The goal of these articles is less about the substance, the what, of the phenomenon used to test the method as it is about the how of the testing.
articles, or ones that contain all your keywords, actually have very little to do with your argument—why waste two hours reading the entire article if you could have learned that from the abstract? When reading an article for a class, the abstract acts as a guide, telling a reader what the article is about in more detail than a title could, and it helps to prime the reader for what the rest of the article will argue.

The article’s introduction provides useful information about the question the article tries to answer and the approach the article will take to answering it. The purpose of the introduction is to inform the reader what the author is investigating, and to a certain extent to convince the reader that this topic (and more importantly this approach to answering it) matters for enhancing understanding of that topic. It will identify the broader research question or family of general themes that this specific investigation helps explain or explore, and it will usually give a summary explanation of the author’s theory, the story the author is proposing to explain the phenomenon under consideration. The introduction always closes with a structure sentence or sometimes an entire structure paragraph, which outlines the sections that will follow and usually says something about the research framework used to study the question.

The second major section of an empirical article is the literature review. In this part of the essay, the author tries to situate the specific question he or she is looking at in the context of broader questions being asked in the research community. It will discuss what other researchers working in this field on similar questions have found. The author will also try to bring in other relevant literatures from other disciplines like psychology, business, or history, and if relevant, why the author thinks these investigations were flawed or incomplete and how this investigation will remedy those flaws or weaknesses. The goal of this section is, in its shortest form, an effort to provide support from other research that the author’s theory is correct, and thus that the hypotheses proposed are reasonable given the other things that we know about how these variables are likely related.

The research design section is normally third, and is often broken up into subsections or sometimes two different major headings. This part of the article contains information about two major topics: the hypotheses and the variables. Where a theory tells us how the variables are connected, the causal mechanism assumed between them, a hypothesis tells us what relationship we should expect under the theory the author proposed. Some example hypotheses might be, “As tension in a dyadic relationship\(^2\) increases, military spending should also increase,” or “Declining salience of racial issues is expected to result in fewer pro- or anti-affirmative action efforts by a voter.” Each of those statements makes a specific expected relationship between some cause and some effect. As discussed briefly above, the cause is usually the explanatory or independent variable, and the effect is the thing we’re interested in studying, or the dependent variable. The author is interested in explaining changes in the dependent variable by looking at changes in the independent variable(s) he or she is interested in.

Having identified the expected relationships, an author is faced with another problem. How can “salience of racial issues” or “dyadic tension” be measured? If I want to be able to look at changes in them, I have to have some characteristic or criteria that I can look at across all the cases. Often, the hardest part of designing research is the measurement problem: how do I find something about my cases that actually measures the thing I’m interested in? This is a major issue no matter whether the author is using qualitative data or quantitative data, finding a specific thing to use as a proxy or measure for the abstract concept the author wants to demonstrate. This is often called ‘operationalizing’ the variables. One might argue that dyadic tension could be coded (coding is the process of turning information [facts] into data [numbers or other specific qualitative values such as high-medium-low] that we can compare) by looking at news articles in, say, The New York Times,

\(^2\) “Dyadic” means “pairwise”—dyadic studies look at pairs of countries as a unit. So one observation in this study might be the tension level in the United States-Canada level in 1998—a unit known as a ‘dyad year.’
by giving references to conflict or uncooperative behavior a negative value and references to cooperative behavior or good relationships a positive value. Add them up for each year and give a dyad-year a 1 (low tension- good relationship) if its final sum is positive, a –1 (high tension- bad relationship) if the final sum is negative, and a 0 if the sum was 0 (neutral dyadic behavior).

That sounds all well and good, and we’re ready to go on, right? Wrong. There are several major problems with the measurement strategy outlined in the previous paragraph. Is the coding strategy being used actually capturing the level of tension in the dyad, or is it capturing something else? Most scholars would say that it captures instead the *NYT*’s regional biases, and news biases in general. Africa, for example, does not get good coverage in pretty much any major paper; neither does Micronesia. Some countries aren’t mentioned more than once or twice in a year (Pelau or Lesotho, for example). Those countries might get final codes that are incorrect because we don’t have information about all of their dyadic relationships. When was the last time you saw a news article about Burkina Faso-Chile relations, or Belize-Kazakh relations? There would be a lot of 0’s in our dyad-year data set, simply because the *NYT* doesn’t publish that many articles about some of these dyads. Also, news articles very rarely focus on positive things. We’re more likely to see an article published about threats or attacks than we are treaties or agreements. So while counting news articles looks, at first, to be a reasonable way to ‘measure’ dyadic tension, it really might give us a lot of wrong values, which would then tilt or bias our analysis away from the ‘true’ relationship towards one that’s really just an artifact of how we measured the things we were interested in.

**Activity 6. Measurement**

**A.** How could we measure something like dyadic tension, the salience of racial issues, or the independence of judicial officials in different countries? Pick one and propose two measurement strategies, qualitative or quantitative, that would capture some aspect of it in a fair or relatively unbiased manner. You may need to defend your choice of sources.

**B.** Would counting the number of people at affirmative action rallies in four towns over a year be a good measure of ‘affirmative action’ actions taken by each of those towns that year? What actions might that measurement strategy be missing?

Because measurement is such a critical facet of empirical investigation, the research design section will almost always include information on the author’s measurement strategy as well as the sources the author used to collect his or her data. Some information, like gross national (or domestic) product (GNP or GDP), is publicly available from a variety of sources; data for other variables may have been taken from data sets compiled by other researchers and made publicly available through organizations like ICPSR, the Inter-University Consortium for Political and Social Research, which is a large data set depository housed at the University of Michigan. Sometimes authors will post data sets for their articles on their personal web pages, or include an email address for others to inquire about making use of the data. Collecting data is expensive, so many times authors will use information collected by someone else with a similar purpose or interest. Finally, this section may also contain information on case selection, or how countries, events, or people got picked to be part of the data set, and it will usually identify the mode of analysis. Will the author present case studies, use a regression to look at patterns in the data, or something else entirely? Often, the author will defend his or her choice of mode of analysis.

The fourth major section of a research report is where the author does the analysis and presents the results. If this is a quantitative study, this section will contain tables showing the results of the statistical analysis. If it is a more qualitative or case-based study, this is where the actual cases will be presented and their salient features identified. This is where to look to see if the author’s theory is supported by the data. The researcher will normally go through each hypothesis or
each major explanatory variable and discuss the results. Two important points to note, especially if you are going to be writing or talking about the articles you read. First, the word data is plural (its singular form is datum). Second, data go in, and results come out. In many articles, especially quantitative ones, you do not ever see the author’s data. All you see are the results of their analysis.

Finally, the conclusion of the article tends to contain a summary of the research question, the hypotheses, and the findings. It will usually contain brief statements about any surprises that the research turned up, any inexplicable cases, and/or weaknesses of the model or theory used. They also usually contain a paragraph or two at the end which discuss where research in this field should go, or further questions or potential hypotheses that this article suggests.

A few more general comments about reading articles are in order. First, many students of political science suggest that you approach articles for classes by reading first the abstract, the introduction, and the conclusion (with a quick skim of the references list), and then going back and reading straight through from the last paragraph of the introduction to the end of the conclusion. This way, your brain is primed for the argument the author is going to make before you begin your critical reading. Second, section headings and the references (works cited) list can tell you a lot about the article’s orientation to the question it’s trying to answer. A literature review titled “The Irrelevance of Money” gives a rather strong hint of what that section argues. At the beginning of your studies, the authors’ names in the reference list are largely meaningless to you, but this will change with time. In even your first courses, though, you should look for citations to any other authors you’re read for that course; by your second or third year of political science study you’ll have begun to pick up who the major scholars or researchers in your field are.

What to Look for and What It Means

Journal articles require active reading. If you just flip through them and absorb the facts the author presents, you’ll be missing the whole point of the article. Good readers will learn to engage themselves with the literature, reading and critiquing and commenting in an intelligent manner. Journal articles are most commonly read with a pen or pencil in hand for making marginal comments rather than a highlighter for indicating key facts. Many readers develop marking schemes for journal articles to help them locate critical information. I, for example, indicate assumptions with checkmarks and conclusions with asterisks, while important pieces of the theory or logic are marked with a vertical line on the side (more lines means more important).

This section is roughly arranged in order of increasing complexity, and covers only the most frequent types of articles assigned (case studies, quantitative empirical work, and formal modeling). After reading each segment, you should be comfortable reading critically, at least in a basic way, articles of that type. At the end of each segment is a box containing several citations to articles of that type (where possible representing the various subfields of political science); you should strongly consider locating one of these articles and reading it to check your skills. For additional guidance as you work your way through an article, try using a copy of the appropriate Article Helper. These articles may look intimidating, but all of them are truly accessible to freshmen in their first political science class.

Case Studies

In a case study or qualitative empirical article, authors present a small number of cases (2-5) in great textual detail. These articles are normally seen as ‘easiest’ to read and understand, since the whole argument relies on the author’s ability to present the material in plain English. Unfortunately,
undergraduate students tend to come away from these articles with pages of factual notes about the cases rather than any specific sense of what the author’s argument is. This is largely due to the fact that the dependent and independent variables and hypotheses are not often indicated in a prominent manner; the reader must infer from the discussion of the theory. Variables are usually identified by characteristics/facets of the case that are recurring between the cases. In qualitative research, variables take on values like ‘high, medium, low,’ ‘before, after,’ ‘deceitful, critical, ignorant, neutral, impressive,’ etc. – things that are not easily, or often appropriately, turned into numbers for statistical analysis.

When reading these articles, some key questions to think about might include:

• Do the facts the author presents to ‘measure’ the variables actually seem to be measuring what the author claims they are? Examining wastefulness of legislative office spending by tallying the amount of office paper recycled by the legislators’ offices might actually be getting at staff members’ tendencies toward environmentally friendly behavior rather than wasteful spending by legislators. Coding racial tension in a high school by looking for racial slurs in bathroom graffiti may overestimate by catching attitudes that no longer exist, or by catching instead the lack of interest students have in their classes.

• Are there other plausible explanations, grounded in other theories, which might produce the same set of facts and outcomes but for different reasons? Draw on material from other classes and other readings.

• Is there variation on the presumed dependent and independent variables? In other words, if the author is trying to explain cooperation by claiming it results from a certain interest configuration, does the author also examine cases of non-cooperation to see if those interest configurations were not present, or cases where that configuration was present and cooperation didn’t happen? Looking at only cases that support the theory is not normally a strong or rigorous test of that theory.

• Do the cases selected seem reasonable for the theory? Think about other cases where the theory should apply. Does the author’s argument seem to explain your new case, or does it have large holes or appear inapplicable?

• Is the overall argument believable? Do the cases presented support the author’s theory?

**Statistical Articles**

More formally, the research tool used in political science is a branch of statistics called **econometrics**. This kind of statistical analysis is designed to look at relationships between variables where the cases may or may not be randomly selected, or where the variables themselves might be related to each other. For example, age and gender are related in some types of survey analysis: at the higher end of the age spectrum, respondents are much more likely to be women than men since women live longer. The more people a country has, the higher its gross domestic product: a country of 20,000 people cannot plausibly earn as much as one with 200 million people, and a country of 200 million almost certainly earns more than many smaller ones.

The primary tool used in econometrics is the **regression**, or more particularly, the ordinary least squares (OLS) regression. (Other kinds of regression exist, but we can interpret the results in generally the same manner.) In its simplest form, a regression tries to predict the change in the dependent variable that we would see if the independent variable was increased by one unit. The values normally reported in the article concern the **coefficients**, or **beta** values, for each independent (or ‘right hand side’) variable. You can think of these coefficients as the slope of a line: for each independent variable, we multiply the coefficient by the value for our independent variable, add them up, and get a predicted dependent variable value. The coefficient tells us how much change in
our dependent variable we can expect, *on average given the data that went into the model*, for a one-unit change in that independent variable.⁴

Regression is a very useful tool for political scientists. We can use it to study everything from survey results about race and gender in politics to the density of union membership across countries to the effect of military spending on war involvement. To use econometric tools like regression, we have to have a substantial number of *observations* or cases to put in a data set, with a minimum of about 20 for most topics if we want reliable results. Each observation is one occurrence of the thing we want to study, sometimes known as the *unit of analysis*.

**Activity 7. Observations**
For each of the three examples given, surveys on race and gender, comparative union density, and military spending, what is the unit of analysis? Try to name three or four other potential hypotheses or theories, and name an appropriate unit of analysis for each.

When you read an econometrically-tested article, many of the technical terms will be foreign; most of the time, you really don’t need them. In the majority of instances, you are reading the article to grasp the author’s argument rather than absorb the details of their testing method. While reading, you might want to think about some of the following questions, which focus on how the data used for the test relate to the argument, and whether the theory and hypotheses make sense given other things you know or the author reports.

- Do the variables that the author includes actually seem reasonable to include? Is there a theoretical reason to include them in this analysis?

There are a number of variables that are related to or help predict the stock market indices’ fluctuation. For example, there is a statistically significant relationship between me eating cornflakes for breakfast and movement in the Dow Jones Industrial Average. When I start my day with cornflakes, the DJIA is very likely to go up. Statistical tests indicate that there is a very low probability that given the data I fed into the program, the relationship I found between my breakfast and the DJIA is just a fluke and that the true relationship is zero. However, stop and think about that for a moment. I am an insignificant nobody graduate student out in the middle of nowhere. Would it make any sense that what I eat has a real effect on the DJIA? I think not. In the research design portion of the article, the author should have given some type of theoretical justification for the inclusion of each variable.⁵ Do you believe it or agree that this variable might be a useful thing to include?

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⁴ Again, this method of interpretation works only for regression models. Coefficients for probit, logit, and other models require somewhat more complicated methods to convert them into dependent variable values. Probit and logit allow researchers to examine the effects of independent variables on the probability that some event will occur. Again, coefficients are best understood by looking first at the signs—the direction of the relationship—and then secondly at the relative magnitude of the coefficients.

⁵ Sometimes, justifications for what are known as ‘control variables’ are omitted. Control variables are ones that are generally agreed to have an effect, and moreover, are generally agreed to affect the dependent variable in a specific way. They are included in a statistical analysis to make sure that the things we’re interested in do not get reported as ‘explaining’ part of the story that we already know is explained by these other things. In survey analysis, these are often items like gender, race, income, partisan affiliation, etc. World politics might use GDP/GNP, being a ‘democracy,’ geographical contiguity, etc. Authors also use ‘dummy variables,’ which are on-off variables which can only have values of 0 or 1. These variables are trying to help examine the results of questions with ‘yes/no’ kinds of answers.
• What signs (+/-) does the author’s theory predict the coefficient of each variable should take? Is this what the analysis actually finds?

Variables are included in an analysis because the author thinks they are, or should be, related to or good predictors of the phenomenon of interest. The sign of the coefficient is actually the most important thing to take away from the article. For some variables, a **positive (or direct) relationship** is expected. As the value of the independent variable increases, we expect that the dependent variable increases as well. For example, the effect of age on likelihood of voting (in the United States) is normally expected to be positive: the older you are, the more likely you are to vote. Other variables have a **negative (or inverse) relationship**. We expect that as the independent variable gets larger, the dependent variable will decrease. A good example is the effect of democracy on going to war. The more democratic a country is, the less likely it is to start a war. (Use Figure 1 to visualize those relationships and be sure that you understand how they work.)

![Figure 1. Positive (a.) and Negative (b.) Relationships](image)

As the author discussed each variable, he/she should have made predictions about its expected behavior. For key variables of interest, these are often spelled out explicitly in formal hypotheses. When you read, it’s a good idea to jot down the variable names and predicted signs so you can compare them with the results. [The Article Helper has a section for this.]

• What variables are found to be statistically significant? What variables have substantive significance? Do the author’s key independent variables have significance?

The tables reported in an econometric article often have asterisks by certain values. Asterisks represent a kind of certainty that the effect we found is probably the value we found, or at least it’s not zero (no effect at all). If an entry in a table is starred, that normally means that we can be confident that the coefficient of that variable actually has the sign (+/-) (relationship) reported in the table. Most authors (rather incorrectly) interpret statistical significance as meaning “this variable is important for explaining the thing I’m interested in.” Going back again to the cornflakes and DJIA example, though, we can get all sorts of statistically significant relationships that mean nothing substantively. All statistical significance really means is that we’re fairly certain (normally 95% or better) that the coefficient’s sign is correct—that the variable’s true value isn’t zero. Think about the case of a statistically significant 0.0004 coefficient on the variable “average level of education in a country,” where we’re trying to explain a country’s level of economic development. What does the

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6 Note that this could also be interpreted as a negative direct relationship—as age goes down, likelihood of voting goes down. But since regression tells us the expected change in our dependent variable for a one unit increase in the independent variable, we normally rephrase the relationship to reflect increases in the independent variable.
effect of a change in the independent variable means for the dependent variable? In this case, increasing the average level of education in a country by one year results in a 0.0004 increase in a country’s level of economic development. Does 0.0004 matter much? At the level of a whole country and for a single year, probably not a lot—and almost certainly not enough to justify the cost of the education program (at least not in the short run).

- Do the findings of the article seem strong enough to support the argument the author is trying to make?

This is a summary question asking you to consider the article and its arguments and make your own assessment. Did the variables the author argued were important for his/her theory actually come out to be statistically and substantively significant? Does the analysis seem to account for other appropriate potential causes or arguments? Can you tell another theoretically grounded story, besides the author’s argument, using the same relationships the author finds? Are you convinced?

**Formal Modeling**

Some forms of formal modeling go under the name of rational choice analysis; others are social choice, game theory, spatial models, or other types. These articles all share a commitment to explicit discussion of their assumptions, normally through the precise and international language of mathematics. It is important to understand that these articles present models: they do not, and do not claim to, depict reality precisely. Formal modeling allows the researcher to focus on only those specific features or variables he or she is interested in, but normally at a much higher level of intensity or focus than is possible in quantitative studies. Quantitative studies say “variable x influences outcome y,” and by the way regression is constructed, the assumption is that this relationship is linear and additive. In formal models the researcher can delve into the exact relationship, and perhaps find that the relationship is multiplicative, exponential, a function of another variable, or anything else.

Achieving this level of focus and this intensity of exploration, however, comes at the cost of reality. The simplifications necessary to construct the model, often in the form of assumptions, can be so severe that the behavior predicted by the model may look nothing like behavior as we actually observe it. This is a primary criticism of rational choice modeling in particular, which makes stringent assumptions about actors’ levels of information and their decision-making processes. From the outset, you must know that the critics do have some validity. The contributions of formal modeling to how we think about problems, however, have been vast, and to many (though certainly not all) scholars these contributions to refining thinking are sufficient to justify the use of highly abstract models.

All a formal model is, then, is a simplified picture of an author’s idea of how the world (or some part of it he/she is interested in) works, intended to help him/her predict and explain certain behaviors or events of interest. The model fits into a larger research question, just as empirical articles do. The important part of the article is still the substance; never let the method overwhelm the argument in any type of article. Your first step is to identify that broader research question, that stream of literature, that this model intends to contribute to. What kinds of behavior is the model trying to predict? It might be a model of legislative coalition formation, a model of deterrence, or a model of the decision to vote in a specific election. [The Article Helper for Modeling Articles includes space for you to do all the steps identified here.]

Your second step is to identify the actors and choices involved in the model. A key reason many scholars use formal models is that such models allow them to consider strategic behavior, where one actor’s actions are conditioned on the choices and behaviors of another actor. This is the stage where the ‘story’ of the article is presented. What is the sequence of moves or choices made
by the actors? You might find it useful here to sketch a diagram of who picks when and from what. What factors are presented as being important for the actor’s choices or decisions? Again, these are normally a good thing to write down, along with their mathematical symbol-names (if used).

As the earlier paragraph suggested, the assumptions an author makes are critical for the conclusions, so the next step is to identify those assumptions and consider how they interact with the substantive topic the model addresses. I find it useful to separate these into substantive and technical categories, based on whether they are related to the argument’s contents or the tools used to find a solution to the model, respectively. So an assumption of a median voter rule or a restriction of choices to yes/no when gradations are available would normally be substantive, while assumptions of stationarity, a variable normalized from 0 to 1, or quadratic utility functions would be technical.\(^7\)

Once you’ve established what the author is trying to do and how he/she intends to do it, for most purposes you can skip over the math and the proofs (which traditionally end in “QED”—start reading again there).\(^8\) I do recommend trying to look at it, at least—it’s often surprising to many that almost all the math presented there is nothing worse than Algebra II, and at the absolute worst there will be one step of basic differentiation from Calculus I. It’s normally also worth looking at and trying to decipher the bottom line of any set of mathematical manipulations, since these are normally the important conclusions. Even if all you can get out of it is a general sense of the relationship expected between the variables (consult the list in your notes for their symbols, and look for things like greater than/less than signs), you’re several steps ahead of the game. These bits of math inside the article itself are usually related to any theorems the author is presenting. Theorems are logical findings of a model, statements of the logical relationship between two or more variables. Lemmas, which authors sometimes present, are intermediate findings on the way to a theorem that are of interest in and of themselves. Theorems (sometimes called propositions) are normally worth noting; lemmas sometimes less so.

The final important part of the model is the equilibrium (plural: equilibria). In many ways, finding the equilibrium is the whole goal of the model, and everything else was just preparatory. An equilibrium is a stable set of behaviors or choices, arising under specified circumstances, from which deviation by any actor is not logical. In other words, these are the predictions of behavior. The equilibria are often thought of as the ‘solution’ to the model and are normally the part of the model subjected to empirical tests. After reading a modeling article, you should come away with a sense of the logic-- the sequence of steps-- behind the equilibria, at least at an intuitive level. These predictions of behavior form the central basis for why we model: modelers argue we can overlook unrealistic assumptions in how the predictions are generated, really, if the model does a better job of explaining/predicting behavior than other forms of investigation.

When reading a modeling article you might want to think about some of the questions below, and/or using a copy of the Article Helper to guide your reading and note-taking. Don’t worry if you find it a challenge to follow the specifics; go for the big picture. If you begin to grasp some of the specifics so that your interest is piqued, or if you find even the big picture a substantial challenge, it may well be worth setting up an appointment or an office hours visit with your instructor for some one-on-one explanation and assistance. Modeling often looks much more intimidating than it actually is. Always remember not to let the method overwhelm the substance. A formal model is

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\(^7\) Of course, substantive assumptions have technical ramifications, and technical ones have substantive implications. I still find the categorization to be useful for thinking about the model without getting caught up in the modeling.

\(^8\) Earlier I mentioned that social scientists cannot prove any of their arguments. The nature of the world simply does not permit definitive proof of an argument; the most we can offer is support for or against a hypothesized relationship. The word here is used in the sense of a mathematical proof, in which the author gives a highly technical presentation of the necessary steps of logic to the effect that, if you accept the starting assumptions, the conclusion is the only logical outcome. Thus the proof is entirely an exercise in the logical and the hypothetical, not an exercise in demonstrating any relationship with reality. Proofs are increasingly relegated to technical appendices at the end of an article, rather than being embedded in the text.
really nothing but logic wrapped around substance, an argument in fancy packaging. The reaction “Oh no, there are Greek letters in my politics homework!” is a sign that you need to take a deep breath, step back and look for the forest instead of focusing on the trees and the dark, scary places beneath them.

- What variables, factors, or alternative explanations are omitted from this model? Does the author justify these choices? How does the author’s proposed explanation differ from/appear similar to other models or arguments in the literature?
- Does the ‘story’ the author presents in the model make sense, in light of your understanding of the phenomenon of interest? In other words, is the argument about how decisions occur (or events happen or choices are made) plausible?
- Do the equilibria of the model seem to correspond to behavior patterns observed in the real world? Does the author offer an analysis of how well the model predicts? Authors increasingly include at least a short empirical test or discussion to help make the case that their equilibria actually do reflect real-world processes.
- Are there any variables in the equilibrium whose values are critical to the eventual outcome? Are there any critical points in the range of values a variable can take on that dramatically affect the equilibria?
- If you are more comfortable with modeling, logical analysis, or other forms of research similar to formal models, you might want to consider thinking about the implications of the substantive assumptions. Does the argument hold for other possible assumptions? Or does a minor change of assumptions drastically change the model’s expected outcomes?
Reading and Understanding Political Science: The Check-Up

How much of the previous fifteen pages did you really understand?

1) Which of the following is not likely to be a research question or research program?
   a) Legislative behavior (how legislators choose to vote or campaign)
   b) The democratic peace (why democratically governed countries don’t fight each other)
   c) Electoral systems and representation (how election structures reflect voters’ interests)
   d) The role of Ross Perot in the 1992 US Presidential election (a third party candidate with an eclectic political platform)

2) The purpose of empirical research is __________.
   a) to propose explanations for events or behaviors.
   b) to provide detailed descriptions of events or behaviors.
   c) to test proposed explanations using data.
   d) to create an abstract model of behavior.
   e) to recommend or support a particular policy response.

3) Which of these is not a hypothesis?
   a) When education increases, birthrate declines.
   b) When social welfare spending decreases, trade union membership also decreases.
   c) When uncertainty decreases, the probability of cooperation increases.
   d) When civic engagement increases, clientelism goes down and voter turnout goes up.
   e) When the military budget increases, the probability of war can go up or down.

4) True or False: Empirical research always requires the use of fancy math. TRUE FALSE

5) Which of these is not a piece of information you should take away from a modeling article?
   a) Where the author is a professor.
   b) What the equilibrium/ia of the model is/are.
   c) The journal name in which the item was published.
   d) Key substantive assumptions related to the model.
   e) Who the actors are in the model.

6) Researchers must be careful that their methods of ______ do not introduce bias into their ______.
   a) research, measurement problem
   b) data, analysis
   c) measurement, data
   d) analysis, dependent variable

7) If a variable is statistically significant, it ________ substantively significant.
   a) is always
   b) is sometimes
   c) is rarely
   d) is never

8) True or False: Arguments about causality are about what independent variables influence the dependent variable. TRUE FALSE