Critical Reading or How to Make Sense of Published Research

"The difficulty you have in reading doesn't necessarily reflect on your mental ability. Serious reading is hard work."

SUSAN WISE BAUER

Professional writing in any discipline can be daunting to decipher. It's kind of like your first course in a foreign language. Remember how lost you felt at the beginning? That feeling is completely understandable. Addressing this issue for students, Schroeder et al. (1985) observe, "You are typically confronted with terminology and analytical techniques with which you are at best unfamiliar, or at worst totally ignorant. There is no reason for you to feel badly about this state of affairs; as a neophyte in the world of research, you cannot expect mastery of all phases of research from the start."

Research papers tend to be written in a formal style that is designed to provide clarity and precise meaning in as concise a way as possible. This implies, however, that authors may leave out descriptions of common steps in the research process. This adds to the difficulty for novice readers, who are not (yet) members of that particular research community.

Fortunately, like a foreign language, once you learn the basic vocabulary and syntax, professional economics writing will begin to make sense. In other words, once you learn the "code," you will find it much easier to decipher published research.
Making Sense of Published Research

There are at least two ways to think about how to make sense of published research. We can call them format and argument. Let's consider them in order.

Understanding Format

What's the difference between an essay you write for an English composition class on what you did on your summer vacation and a lab report for chemistry? The answer is: specific format. The scholarly writing for each discipline uses a somewhat different format, with the physical sciences using the most structure (e.g., the lab report), the humanities using relatively less structure, and the social sciences lying somewhere in between. Even within the social sciences formats vary, though relatively less than the formats of the sciences and the humanities differ.

Economics research papers tend to follow a common format that illustrates the scientific method. This specific format allows experts to look quickly at a paper to see if they want to spend the time to read it more closely. For example, Thomson (2001, 2) states:

A reader who has found your central point interesting and wants to know more about it but has little time to invest in your work...should be able to grasp the novel aspects of your [research] without actually reading the paper. A lot can be learned from a well-written argument by just glancing at the way it is structured.

In economics, there are three types of scholarly works. The first is a survey of the work of others. You can think of this as an entire paper devoted to reviewing the literature on a topic; its objective is to summarize for readers what is known on a subject to date. Survey papers, unlike the other two types, are secondary literature. We noted in Chapter 3 that the Journal of Economic Literature tends to publish survey articles. For example, the March 2002 JEL includes an article entitled "Looking Inside the Labor Market Review Article." The second type of scholarly work in economics is purely theoretical. It creates or modifies a theory and discusses its implications, but contains no empirical testing. An example of a purely theoretical article is Krugman's (1979) seminal article on the possibility of governments effectively practicing strategic trade policy. The third type of scholarly work in economics—and the one we will focus on—is the empirical study. The majority of research projects in economics are empirical studies. This type offers a particular advantage, especially for beginning researchers: when you do an empirical study, whether your empirical test confirms your hypothesis or rejects it, you have results that enable you to satisfactorily conclude your study. By contrast, when you attempt a purely theoretical project, if you can't get the theory to work the study has failed. For this reason, purely theoretical works are best left to experienced researchers.

Let's examine the format for the typical empirical research study. The typical study in economics has four essential components: an introduction, an analysis of the problem, an empirical test of the analysis, and a conclusion. An actual paper (or book) may have more formal sections, but to be credible to experts in the field the study, it must cover these four components. Let's examine each of these in turn.

The introduction should define the general topic and the specific research question, as well as explain the motivation for the research. The introduction should also include a review of the work of previous researchers on the topic, especially what is lacking in the existing literature and how the current study proposes to address that shortcoming. In a thesis or book, the literature review is usually placed in its own chapter, separate from the introduction. In a paper it is more often combined with the other introductory material.

The second section in an economic research report is the heart of any economics study: the application of economic analysis to shed light on the research question. It may be labeled "Theoretical Analysis" or "Theoretical Model." (Exactly how one applies economic analysis to a problem is the subject of Chapter 7.) This section develops the theoretical model used by the study, and derives the testable implications or hypotheses of the model.

The third section explains how the proposed analysis from section two is tested. (This will be the subject of Chapters 10 and 11.) This section would be labeled "Empirical Analysis," or "Empirical Model." It explicitly states what results would confirm the theory. It presents the results obtained from the testing procedures and interprets them. To what extent is the theory confirmed?

The concluding section in an economic research report explains the insights learned from the research. What answer did economic theory suggest for the research question? Was this answer confirmed by the empirical evidence? If not, why not?

Economics studies may also include several other parts, such as an abstract, references, and appendices, but these four components are the principal parts of the work.

Evaluating the Argument: Reading Critically

Once you realize how a research report is laid out, you are part way to understanding it. To complete that understanding, you will need to learn
how to read deeply and critically. And this requires that you understand the article’s argument.

Reading critically is challenging. The purpose of reading scholarly texts is not simply to get through the pages while recording the facts the author presents. Rather, the task is more complex one of discerning and evaluating the author’s argument. Mursell (1951, 58) describes this process as follows:

When you read properly [i.e., critically], you are not merely assimilating. You are not automatically transferring into your head what your eyes pick up on the page. What you see on the page sets your mind at work, collating, criticizing, interpreting, questioning, comprehending, comparing.

To this end, scholars don’t merely read texts; they study them. First, they may skim an article to see if it is going to be useful to them, paying particular attention to certain sections. For example, some scholars focus on the introduction and the conclusion; others focus on the introduction and the empirical results section. If they decide the article may be useful, they read it again more carefully, often several times. Scholars read slowly and try to discover the meaning. They attempt to interact with the text, essentially engaging in a “conversation” with the author. This conversation takes place partly in the reader’s mind, and partly through the notes the reader makes (e.g., in the margins of the text) as he or she works through the text. (How to take research notes effectively is the subject of the last section of this chapter.)

The text presents an argument. The reader responds by asking questions and expressing tentative ideas about meaning: “Is this what you mean?” “But what about this?” “Okay, I understand the previous part, but I’m not sure I fully understand this one yet.”

In Chapter 4, we explained how writers develop arguments through the process of composition. Readers analyze texts in the same way, by writing ideas down, rearranging them, thinking about them, and asking questions about the tentative meaning. The meaning becomes clear after you reread an article several times, sometimes over what may be an extended period.

Bean (1996, 156) asserts that readers play two opposing roles in the process: “the open-minded believer who can succumb to the text’s power and the skeptical doubter who can find weaknesses in the text.” Since every argument is an assertion rather than a fact, and since, as a consequence, “every author necessarily distorts his or her subject,” healthy skepticism is called for (Bean, 1996, 140). Careful reading of a text requires you to give adequate attention to both roles. Making sense of scholarly writing is a lot like peeling an onion: it has many layers. You shouldn’t expect to discern all the levels of meaning without reading the work many times.

Questions to Guide Critical Reading

Though reading scholarly writing is rarely easy, one’s ability to do it successfully does improve with practice. Critical reading is a learnable skill. Recall that we defined an argument as an assertion supported by logical or empirical evidence. Table 6.1 lists a series of questions to guide your reading and help you identify an author’s argument. Note that there may be more than one interpretation of the argument in a published work.

Several Important Distinctions for Critical Reading

Ruggiero (1998) suggests several important distinctions that are important for reading critically. The first distinction is between the person speaking and the idea he or she is expressing. (This is related to the ad hominem attacks we mentioned in Chapter 4.) Critical reading requires that you give a fair hearing to the ideas, even if you have a poor opinion of the author. The second distinction is between matters of taste (i.e., pure opinion) and matters of judgment. There are no grounds for criticizing the former but may be many for criticizing the latter. The third distinction is between fact and interpretation. Often, writers will present an interpretation as a fact so as to lend it more weight. Careful readers can distinguish between the two. The fourth is between literal and ironic statements. The latter are intended to provoke a strong reaction for rhetorical purposes. Fortunately, you are not likely to run into this very much in scientific writing. The last distinction is between an idea’s validity and the quality of its expression. In principle, you should evaluate the validity of an idea independently of how well or poorly it is expressed. In practice, however, the quality of written or oral expression almost certainly colors your impression of the validity of one’s thought. Note that this is a point raised by McCloskey (1968), as discussed in Chapter 1.
NOTES FOR NOVICE RESEARCHERS

Tips for Getting Through a Scholarly Journal Article

Novice researchers run into three common roadblocks that inhibit their ability to get through a scholarly journal article. These are: unfamiliar terminology or jargon, mathematical reasoning, and econometric issues and methods. Reading journal articles is difficult enough that the reader who confronts any of these roadblocks may be persuaded that he or she won’t be able to understand the article. Don’t let this happen to you.

When you run across terminology or concepts that you don’t understand, write them down. Locke et al. (1998, 69–70) observe, “It may sound unlikely to you but we find that there are few instances when a single unfamiliar technical term brings reading to a complete halt. Just remember that in reading a technical text that is not your own, it is inevitable that there will be problems of comprehension. You have to puzzle them out or, failing that, flag them and get on with the task.”

Sometimes the jargon is explained elsewhere in the paper. Alternatively, you should try to look up the terms. An obvious place to look is your research methodology or econometrics book. Another useful source is Peter B. Meyers’s “Online Glossary of Research Economics” terms, which is available at http://www.econterms.com. If all else fails, you should not hesitate to ask your instructor for help.

Unfamiliar mathematics or econometrics should not prevent you from getting the gist of an article. Mathematical methods are used to develop a conclusion. You can think of them as “proofs.” The mathematics shows the reader how the author arrived at the finding. But you don’t need to understand the proof to grasp what was being proven. Almost certainly, if the paper is published someone will have checked the math to ensure that the proof works, so you don’t need to worry about that. What you may not realize is that many readers, including professional researchers, bypass the mathematical details the first few times they read a paper.

These same points can be made about econometric issues. The purpose of statistical methods is to test hypotheses. Whether or not you understand the particular techniques used, you should be able to determine if the results confirm or refute the researcher’s hypothesis. Locke et al. (1998, 70) point out, “In any sound report, somewhere will be found a plain language description of anything found in the analysis that really mattered. ... In many cases, that bit of text should allow you to proceed with intelligent reading—even if not with full appreciation of the elegance (or appropriateness) of the researcher’s statistical analysis.”

Table 6.1: Identifying the Author’s Argument

1. What question is the author asking?
2. What answer does the author propose (i.e., what is the principal assertion of the study)?
3. In what ways does the study improve upon previous research?
4. How does the proposed answer compare with that provided by previous research?
5. What are the major logical or theoretical reasons for the author’s argument?
6. What empirical evidence does the author provide?
7. What assumptions is the author making in his or her reasoning?

Let’s work through a sample scholarly article from a professional economics journal. The article is David Romer’s “Do Students Go to Class? Should They?” (1993), which is reproduced on the following pages. Read the article through at least once.

Now, reread the article carefully. As you read, think about the questions in Table 6.1 and write down tentative answers as they come to you. (The answers that I provide for each question are exact quotations from the article to demonstrate where I found the answers. When you write your own answers to these questions, you should put them in your own words. For the reasoning behind this, see the section “Taking Research Notes and Writing Abstracts and Critical Reviews” later in this chapter.)
Do Students Go to Class? Should They?

David Romer

Lectures and other class meetings are a primary means of instruction in almost all undergraduate courses. Yet almost everyone who has taught an undergraduate course has probably noticed that attendance at these meetings is far from perfect. There is surprisingly little systematic evidence, however, about attendance and its effects. There are three natural questions. What is the extent of absenteeism? How much, if at all, does absenteeism affect learning? Should anything be done about absenteeism?

This article presents quantitative evidence on the first two of these questions, and speculative comments on the third. First, attendance counts in economics courses at three relatively elite universities indicate that absenteeism is rampant; usually about one-third of students are not at class. Second, regression estimates of the relation between attendance and performance in one large lecture course suggest that attendance may substantially affect learning: considering only students who do all of the problem sets and controlling for prior grade point average, the difference in performance between a student who attends regularly and one who attends sporadically is about a full letter grade. In light of these results, steps to increase attendance, including making attendance mandatory, may deserve serious consideration.1

1 I have been unable to find any previous investigations of the extent of absenteeism. There have been a few other studies of the relation between attendance and performance (for example, Schmidt, 1983; Park and Kerr, 1980), but these studies generally confirm the findings here that attendance and performance are related even when a variety of student characteristics are controlled for. The present study differs from this earlier work in focusing on the quantitative magnitude of the relationship and on the issue of the extent to which the relationship reflects a genuine effect of attendance.

[Diag: David Romer is Professor of Economics, University of California, Berkeley, California.]

Do Students Attend Class?

Counts were made of the number of students attending one meeting of every undergraduate economics class during a "typical" week of the spring 1992 semester at three schools. School A is a medium-sized (6000 undergraduates) private university; School B is a large (20,000 undergraduates) public university; and School C is a small (2500 undergraduates) liberal arts college. The schools are intended to be representative of the upper echelons of American colleges and universities. All three are classified by Barron's Profiles of American Colleges (1991 edition) as "highly competitive," the second highest of their six categories.2

The attendance counts were made a few weeks before the end of the semester at each school. This choice avoided both times when attendance is generally thought to be unusually low (such as just after exams and immediately before and after vacations) and times when it is generally thought to be unusually high (such as just before exams). Individuals at all three schools independently suggested that attendance a few weeks before the end of the semester was likely to be representative of average attendance. Attendance was taken at one meeting of each class during the sample week. Current enrollment figures were obtained from departmental offices.

Table 1 reports the results. The first row shows the overall absenteeism rates at each school. At School A, 34 percent of students were absent; at School B, 40 percent; and

2 A total of 127 schools, enrolling about 875,000 undergraduates, are classified by Barron's as "most competitive" or "highly competitive." Of these, 24 schools, with 140,000 undergraduates, are private universities with between 4000 and 10,000 undergraduates; 14, with 270,000 undergraduates, are public universities with over 10,000 undergraduates; and 56, with 100,000 undergraduates, are colleges or universities with minimal graduate programs and fewer than 3500 undergraduates. The remaining schools are small and medium-sized public colleges and universities (15 schools, with 70,000 undergraduates), large private universities (5 schools with 70,000 undergraduates), and small private universities (15 schools with 30,000 undergraduates).
Table 1: Absenteeism Rates in Economics Classes

<table>
<thead>
<tr>
<th>Category</th>
<th>School A</th>
<th>School B</th>
<th>School C</th>
</tr>
</thead>
<tbody>
<tr>
<td>All Economics Courses</td>
<td>34.0%</td>
<td>39.7%</td>
<td>24.8%</td>
</tr>
<tr>
<td>By Size of Course:</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Small (bottom 33%)</td>
<td>27.0</td>
<td>37.7</td>
<td>21.5</td>
</tr>
<tr>
<td>Large (top 33%)</td>
<td>38.8</td>
<td>42.9</td>
<td>30.4</td>
</tr>
<tr>
<td>By Mathematical Content:</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Mathematical</td>
<td>10.0</td>
<td>17.6</td>
<td>16.7</td>
</tr>
<tr>
<td>Non-Mathematical</td>
<td>34.3</td>
<td>41.5</td>
<td>25.5</td>
</tr>
<tr>
<td>By Type of Course:</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Principles &amp;</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Intermediate Theory</td>
<td>37.3</td>
<td>40.5</td>
<td>29.7</td>
</tr>
<tr>
<td>Upper Level, Only</td>
<td>26.4</td>
<td>41.1</td>
<td>17.7</td>
</tr>
<tr>
<td>Principles Required</td>
<td>33.3</td>
<td>35.2</td>
<td>20.7</td>
</tr>
<tr>
<td>Upper Level, Additional</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

at School C, 25 percent. In short, on a typical day at a typical elite American university, roughly one-third of the students in economics courses are not attending class.

The remaining rows of the table break down the overall figures along various dimensions. Course size appears to have an important effect on absenteeism. At all three schools, absenteeism is considerably lower in the smallest third of classes than in the largest third. In addition, average class size is lowest at School C and highest at School B, which is consistent with the fact that absenteeism is lowest at C and highest at B. Absenteeism is also lower in courses with a significant mathematical component (such as econometrics, honors sections of intermediate theory, and field courses in theory). This pattern holds at all three schools. Similarly, at all three schools absenteeism is somewhat higher in core courses than in field courses.

Finally, it is generally perceived, not surprisingly, that students attend class more often when the quality of instruction is higher. At School B, for example, absenteeism is 34 percent for courses taught by regular faculty and 47 percent for courses with other instructors. To investigate this issue more systematically, course evaluation data for all undergraduate economics courses for one term were obtained from a fourth school, School D. This school, like School B, is a large public university. The two variables of interest are students' average rating of the overall effectiveness of the instructor and the fraction of the students enrolled in the course who returned the course evaluation form (which is a reasonably good measure of attendance at one of the last class meetings of the term). The point estimates from a simple regression of the fraction of students attending the class on the average rating imply that raising the average rating from the 25th percentile to the 75th lowers absenteeism by 10 percentage points; the t-statistic on the rating variable is 3.4. Thus the quality of instruction (or at least students' perception of that quality) appears to have an important impact on attendance.

Other features of the data from School D generally confirm the findings for the other schools. Absenteeism is high (45 percent across all courses), and lower in small courses than in large (31 percent in the smallest third of courses and 54 percent in the largest third). Again, absenteeism is lower

---

3 Attendance counts were inadvertently not made in a handful of classes at School C. These classes do not appear to differ in any systematic way from the classes at which attendance was taken.

4 The figures for mathematical courses at School A are based on only one course. Thus this figure should be given little weight.

5 The data from School D are not strictly comparable with those from the other schools, because they reflect class meetings at the end of the term and because a few students are present but do not return the evaluation form. It seems unlikely that these differences have any substantial effect on the results.
in courses with a mathematical emphasis (39 percent, versus 47 percent for other courses), and higher in core courses (52 percent, versus 31 percent in field courses that only require principles and 37 percent in advanced field courses).

A straightforward regression confirms these patterns of differences in absenteeism across different types of courses. Specifically, using the data from all four schools, I ran a regression (across courses) with the fraction of students absent as the dependent variable, and a constant, the log of enrollment, and dummies for mathematical content, for the two types of upper level courses, and for three of the four schools as independent variables. The resulting estimates imply a doubling of enrollment is associated with a rise in absenteeism of 4 percentage points; that mathematical content is associated with a fall in absenteeism of 3 percentage points; and that moving from a core course to either type of field course is associated with a fall in absenteeism of 5 to 7 percentage points. The coefficient on the enrollment variable is highly statistically significant; those on the field course dummies are marginally so; and those on the dummy for mathematical content and the three school dummies are insignificant.

Should Students Attend Class?
These findings raise the question of whether absenteeism has a substantial effect on learning. It is possible that students do not attend class because they would learn relatively little if they did—because the instruction is of low quality, or because they have already mastered the material, or because they can learn the material better by spending the same time studying in other ways. Alternatively, it is possible that learning is severely adversely affected by absences, but that many students are absent anyway—because they have genuinely better uses of their time, or because they mistakenly believe that attendance is not important to learning, or because they attach relatively little importance to learning.

Because student attendance is not exogenous—students choose whether to attend class—it is not possible to isolate definitively the impact of attendance on learning.

But this section presents some suggestive evidence. In the fall 1990 semester, I took attendance at six meetings of my large intermediate macroeconomics course. The resulting data can be used to investigate the relation between attendance and performance.

As in other courses, overall absenteeism was high (25 percent). Twelve percent of the students missed four or more of the meetings where attendance was taken; 28 percent missed two or three; and 59 percent missed none or one. Thus, absenteeism appears to be a mixture of some students missing most classes and many students missing a smaller number of classes.

Student performance is measured as the overall score on the three exams in the course. For ease of interpretation, the scores are converted to the usual 4-point grading scale: 3.84 and above represents an A; 3.50 to 3.83 an A-; and so on down to 1.50 to 1.83 for a C-. Because no D 's or D- 's were assigned, 1.17-1.49 represents a D and 1.16 and below an F.

The first column of Table 2 reports the results of a simple regression of performance on the fraction of lectures attended. The regression reveals a statistically significant and quantitatively large relation between attendance and performance. The statistic on attendance is 6.2; the point estimates imply that a student who attends only a quarter of the lectures on average earns a 1.79 (C-), while a student who attends all of the lectures on average earns a 3.44 (B+). Attendance alone accounts for 31 percent of the variance in performance.

---

6 There is one econometric complication worth mentioning: because attendance was not taken at every class meeting, some of the variation across students in measured attendance is due to measurement error rather than to true differences in attendance over the whole semester. If the class meetings at which attendance was taken were a random sample of all the meetings—which appears to be a good approximation—it is straightforward to estimate the size of the measurement error. This procedure implies that 38 percent of the variation in measured attendance represents measurement error. This estimate can be used to correct the regression coefficients, standard errors, and R square for the bias that would otherwise be introduced by the measurement error. All of the results reported in Table 2 have been corrected in this way.
### Table 2: The Relationship Between Attendance and Performance

<table>
<thead>
<tr>
<th>Sample</th>
<th>Full</th>
<th>Restricted</th>
<th>Full</th>
<th>Restricted</th>
</tr>
</thead>
<tbody>
<tr>
<td>Constant</td>
<td>1.25</td>
<td>1.02</td>
<td>1.27</td>
<td>0.57</td>
</tr>
<tr>
<td>(0.27)</td>
<td>(0.20)</td>
<td>(0.22)</td>
<td>(0.20)</td>
<td>(0.23)</td>
</tr>
<tr>
<td>Fraction of</td>
<td>0.33</td>
<td>0.42</td>
<td>1.14</td>
<td>1.57</td>
</tr>
<tr>
<td>Lectures Attended</td>
<td>(0.35)</td>
<td>(0.40)</td>
<td>(0.32)</td>
<td>(0.51)</td>
</tr>
<tr>
<td>Fraction of</td>
<td>0.80</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Problem Sets Completed</td>
<td>(0.32)</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Students who are more interested in the material, or more skilled academically, or more focused on academics are almost certain to attend class more often than students who are less interested, less skilled, or less focused (other factors held constant). If this is the case, then the results in Column 1 of Table 2 to some extent reflect a general impact of motivation on performance rather than a true effect of attendance.

I attempt to address this problem in three ways. First, I restrict the sample to the 60 percent of the students who did all nine problem sets. It seems likely that most of the students who were not devoting serious effort to the course did not complete all of the problem sets. In addition, the lowest problem set score was dropped in computing the average grade; thus the students who completed all nine may have been especially motivated. On both grounds, this restricted sample may be more homogeneous in terms of general motivation than the full class. But as the second column of Table 2 shows, the relation between attendance and performance in this sample is actually slightly stronger than for the class as a whole.

Second, doing the problem sets is arguably as good a proxy as attending the lectures for motivation. But Column 3 shows that there is a much stronger relation between attendance and performance than between doing the problem sets and performance: when both variables are entered in the regression, the coefficient on the fraction of lectures attended is almost three times as large as the coefficient on the fraction of problem sets completed. Thus, either attendance is a much better proxy than completing the problem sets for motivation, or attendance has a large additional impact on performance.

Third, data were obtained on students’ grade point average as of the beginning of the semester. Including GPA as a control variable in the regression serves to control for some of the differences across students in general ability and motivation. In fact, because students’ academic performance in previous classes depends in part on their attendance in those classes, the coefficients on prior GPA will capture some of the effect of attendance on performance; as a result, including GPA as a control variable could cause the coefficient on attendance to underestimate the true impact of attendance on performance.

Column 4 of Table 2 shows the effects of including grade point average in the regression. Prior GPA has an extremely strong relation with performance. But the inclusion of GPA has little impact on the relation between attendance and performance. The coefficient on attendance is two-thirds as large as it is in the basic regression in Column 1, and it remains highly significant. The point estimates imply that a student with the mean prior GPA earns on average around 1.25 points per hour of lecture, or 0.37 (0.7) if he or she attends a quarter of the lectures but a 1.52 (0.8) if he or her attendance is perfect.

Finally, Column 5 shows the results of both restricting the sample to the students who did all nine problem sets and controlling for prior GPA. Even in this case, the
relation between attendance and performance remains large and significant. The estimates imply that a student with the mean prior GPA earns on average a C+ if he or she attends only a quarter of the classes, compared to a B+ if attendance is perfect.

None of these ways of attempting to address the problem that attendance is not exogenous is definitive. Nonetheless, they all give similar results: simple ways of controlling for motivations and other omitted factors have only a moderate impact on the relationship between attendance and performance. Thus, although the possibility that the relationship reflects the impact of omitted factors rather than a true effect cannot be ruled out, it seems likely that an important part of the relationship reflects a genuine effect of attendance.

Should Attendance Be Mandatory?

Absence is rampant in undergraduate economics courses at major American universities. In addition, there is a very strong statistical relationship between absenteeism and performance, and the evidence is consistent with the view that this relationship has an important causal component. These results raise the question of whether measures should be taken to combat absenteeism. At the very least, exhortations to attend class seem called for, and those exhortations can be backed up with data. But stronger measures might be preferable. A generation ago, both in principle and in practice, attendance at class was not optional. Today, often in principle and almost always in practice, it is. Perhaps a return to the old system would make a large difference in learning. There is no way to find out but to try. I believe that the results here both about the extent of absenteeism and its relation to performance are suggestive enough to warrant experimenting with making class attendance mandatory in some undergraduate lecture courses.

One could also use mandatory attendance to perform a genuine controlled experiment that could isolate the true impact of attendance on mastery of the material. Specifically, one could randomly divide the students in a course into two groups, an experimental group whose grading was based in part on attendance and a control group whose grading was not. By comparing the attendance and the performance of the two groups, one could learn both the impact of mandatory attendance on absenteeism and the impact of attendance on performance. Unless either the impact of mandatory attendance on absenteeism or the size of the class were very large, the results of carrying out this experiment for a single class would not allow one to estimate the impact of attendance on performance with much precision. But the pooled results from several such experiments could be

References


7 Such an experiment would presumably require appropriate approval. Students could be given the right to opt out of the experiment by being allowed to choose (before the class is divided into the experimental and control groups) to have their grade based on a formula that gave attendance half the weight used in the grading formula for the experimental group. Students could be ensured by assigning grades to all students using all three procedures (experimental, control, and opting out) and making the mean grade for the full class the same under all three procedures, before the allocation of the students in the three groups was known to the person assigning grades.
As you go through the Romer article, ask yourself what role each part of the text plays in the author's argument. For example, what is the author's principal assertion? What are the major pieces of evidence used to support the assertion? Note that, just as in many economics papers, the sections of Romer's paper are not labeled "Introduction," "Theory," "Empirical Testing," and "Conclusions," but those pieces are in the paper nonetheless.

1. What question is the author asking? This may be the most important question in Table 6.1. If you can't determine this, you are probably wasting your time reading the paper. The research question should be found in the introductory section of the paper. Romer's paper is a complex argument consisting of three assertions, each of which leads logically to the next. He summarizes his argument in the opening paragraph, where the key question is:

   "How much, if at all, does absenteeism affect learning?"

2. What answer does the author propose? The author's proposed answer, that is, the principal assertion of his or her argument, can often be found in the introduction to the paper. Romer states this in the second paragraph:

   "Regression estimates of the relation between attendance and performance in one large lecture class suggest that attendance may substantially affect learning."

   If the author's proposed answer isn't in the introduction, it should always be clearly stated in the concluding section of the paper. In the final section, Romer recapitulates:

   "There is a very strong statistical relationship between absenteeism and performance, and the evidence is consistent with the view that this relationship has an important causal component."

3. In what ways does the study improve on previous research? The introduction to the paper should indicate how the current research builds on or improves over its predecessors. In this case, the author notes:

   "The present study differs from . . . earlier work in focusing on the qualitative . . . magnitude of the relationship and on the issue of the extent to which the relationship reflects a genuine effect of attendance."

   Often, though not in this case, the distinctive features of the present research are also noted in the concluding section of the paper:

   "In the second part of Romer's empirical argument, he reports on a series of regressions to estimate the relationship between attendance
and performance in class when controlling for a number of other variables, including students’ prior GPA and student motivation.

"A simple regression of performance on the fraction of lectures attended... reveals a statistically significant and quantitatively large relation between attendance and performance... Simple ways of controlling for motivation and other omitted factors have only a moderate impact on the relationship between attendance and performance."

7. What assumptions is the author making in his reasoning? Roman's all researchers, makes a number of assumptions in his argument. These include that GPA is a good measure of student learning, that the findings are retestable across different samples, and that economics students are similar to other college students in their courses.

When you find it difficult to dissect a scholarly article, you may find it helpful to use the following observation by Treligon (2001):

"Why did it take so long to identify the arguments and to get clear about their premises and conclusions? The answer is that there is no mechanical procedure for doing this and that quite in general, reading—really reading—is a difficult art. We had to read carefully and analytically, and we had to do some serious thinking about the context and the structure of the passage we were examining."

An additional complication, as a number of commentators have noted, is that many scholarly works are not well written.

Evaluating Published Research

Once you've identified the arguments in a published work, the next step is to evaluate the argument, that is, to assess its validity and reliability. Is it a trivial task, so let's begin with the easy questions:

Does the author have an apparent conflict of interest? For example, was the research funded, sponsored, or published by an organization that might have an interest in the findings (e.g., research on smoking)? A somewhat milder version of this concern: does the author or the journal promote a particular point of view (e.g., liberal conservative views)? If so, you should factor this into your evaluation of the work.

Is the study published in a refereed journal? We noted in Chapter 6 that scholarly articles published in professional journals are likely to have undergone a formal review process. Multiple experts in the field review the articles blindly, that is, without being aware of the identities of the authors so as to keep their evaluations objective. The more prestigious the journal, the more rigorous the evaluation, and the more likely the author's argument is to be valid. Thus, articles published in The American Economic Review are likely to be of higher quality and greater importance than articles published in, for example, a local newspaper. A similar review process takes place for academic books before they are published. Thus, when a study is published, novice researchers can assume that it has a certain amount of validity.

Another thing to remember is that the usefulness of a published study depends on the extent to which it is reliable. For example, James Tobin (1978) published an important, widely cited article ("A Proposal for Monetary Reform") in the Eastern Economic Journal. It has relatively minor impact, while contrast, numerous articles have been published in top journals and were never cited again, or, if they were, they haven't stood the test of time. In short, the ultimate validity of a piece of research only comes after time, when many other researchers test that theory in different ways. Thus, when a scholar reads a research study, especially a recent one, he or she will need to critically evaluate it for himself or herself.

Table 6.2 Helpful questions to guide critical reading

<table>
<thead>
<tr>
<th>Table 6.2</th>
<th>Evaluating the Author’s Argument</th>
</tr>
</thead>
<tbody>
<tr>
<td>Does the theoretical analysis make sense?</td>
<td>Are the data used adequate to the task?</td>
</tr>
<tr>
<td>Does the empirical analysis adequately test the hypothesis?</td>
<td>Are the assumptions reasonable?</td>
</tr>
<tr>
<td>Is the analysis (theoretical and empirical) clearly explained?</td>
<td>Do the conclusions follow from the evidence presented?</td>
</tr>
<tr>
<td>Do evidence, is the author’s argument convincing to you?</td>
<td></td>
</tr>
</tbody>
</table>

3. Making Sense of Published Research
As we discuss these questions, let’s use them to assess Romer’s (1998) article.

1. **Does the theoretical analysis make sense?** Do the reasons adequately lead to and support the hypothesis? Is the argument deep enough? Is the argument broad enough to be convincing? Are there other reasons that need to be brought into the analysis? Is there an alternative explanation of the research problem that makes as much sense as that proposed by the author?

   We identified Romer’s argument in the answers to questions 2, 5, 6, and 7 in Table 6.1. Paraphrasing those answers gives us:

   “Lecture remains the primary pedagogical tool in undergraduate economics. Estimates of attendance in undergraduate economics courses at three top universities indicate that on average one-third of students are absent from class. Regression results on the effects of attendance on GPA, when controlling for motivation and student quality, indicate that attendance has a large and significant positive effect on student performance.”

   This reasoning makes sense, since each point leads to the next and ultimately to the conclusion. The theoretical foundation—that class attendance should be important to learning—is logical. (Note, however, that valid reasoning doesn’t rule out the possibility that there’s a contrary logical argument—for example, that students could use the textbook to substitute for class attendance.)

2. **Are the data used adequate to the task?** Are the data completely documented? Is the data set from an authoritative source? Are the data a representative sample or a special case? If the latter, are the results applicable to the situation you care about (e.g., does a study using Virginia data generalize to the United States as a whole)?

   The data on class attendance were taken during one meeting of a “typical” week in all undergraduate economics courses at three “elite” institutions. Though he did not identify the specific schools, Romer described one as a “medium sized private university,” the second as a “large public university,” and the last as a “small liberal arts college.” More detailed data were obtained from another “large public university.” Romer also pointed out several small shortcomings in the data.

   The data used to assess the relationship between class attendance and performance were obtained from Romer’s intermediate macro course.

   The data on attendance were taken from a sample of six class meetings.

   The data were adequately documented, but it is reasonable to question how representative they might be for undergraduate economics students at schools nationwide. On the other hand, it is important to recognize that data are never perfect.

3. **Does the empirical methodology adequately test the hypothesis?** If you obtain the best possible results, how confident are you that the hypothesis is correct? Does the methodology clearly discriminate between the hypothesis and alternative interpretations of the evidence?

   Subject to the possible shortcomings of the data just described, the regression analysis is a reasonable and commonly used methodology for testing questions such as the ones Romer posed. He attempts to control for motivation and student quality, which is an improvement over previous work. It is to his credit that Romer points out that his approach does not definitively deal with the problem that class attendance is not exogenous.

4. **Are the assumptions reasonable?** If the assumptions are factual, are they true? If they are empirical (e.g., perfect competition) how critical are they to reaching the author’s conclusion? If they are critical, are they reasonable? For example, are they commonly made in this literature? Do the data satisfy the assumptions of the testing methodology (e.g., if the author uses an ordinary least-squares (OLS) regression, are the requirements for OLS satisfied)?

   Most researchers would accept that GPA is a reasonable, if imperfect, measure of student learning. Romer’s sample of data is a special case, and thoughtful researchers will be concerned about how representative it is. However, lacking evidence to the contrary, most would accept it provisionally.

5. **Is the analysis clearly explained?** Does the description omit any steps that are necessary to reach the conclusion? (Recall that this may be a result of space limitations or instructions from the editors about omitting generally accepted warrants.) What is it that isn’t clear? Is it terminology? Are all tables and graphs discussed and explained? Ruggiero (1998, 65) indicates that well-written books or articles state their principal argument clearly and visibly. Then he observes, “Not every article or book, unfortunately, is well written.”

   Romer’s article is well written, and clearly organized, even though it does not use the typical format for a scholarly article. The main points in his argument are clearly explained; the tables serve to illustrate the argument.
chapter 6 • Critical Reading or How to Make Sense of Published Research

6. Do the conclusions follow from the evidence presented? Does the author correctly interpret the empirical results? How well do the empirical evidence support the conclusion? Does the author address conflicting evidence or views? Is there an alternative explanation that fits the evidence? How do the results of this study compare with previous ones? If they are compatible, that is a point in favor of this study. If they are not, are convincing reasons supplied for why this is so? Such reasons might include that the current study has better experimental controls, a different data set, or more complete otherwise better data.

This paper is more empirical than theoretical. The regression results strongly support the assertions that a significant portion of students do not attend class regularly and that class absences adversely affect student performance. The conclusion that faculty should seriously consider stronger measures to encourage class attendance follows directly from this evidence. Additionally, the findings are consistent with earlier studies.

7. On balance, is the author's argument convincing to you? In light of the reasons and evidence provided, is the argument persuasive? In other words, is the supporting evidence consistent with the hypothesis? If so, the argument may be considered valid. Does the study actually answer the research question(s)? For example, was there anything you expected to see, but didn't? Did the paper show signs of carelessness, such as failing to provide full references to all citations? Are there significant studies on this topic that the author does appear familiar with? Did the author identify limitations of the study?

Romer's argument is very well done. We can conclude that the article is convincing, subject to the limits of its methodology.

Though evaluating scholarly work requires that the reader make a judgment about its quality, Ruggiero (1998, 67) points out that it is not always necessary to agree or disagree in an author’s argument:

If you agree in part and disagree in part, explain exactly what your position is and support it carefully. . . . If some vagueness or ambiguity in the author’s argument prevents you from giving a flat answer, don’t attempt one. Rather, say, “it depends,” and go on to explain. If you must deal with conflicting testimony and cannot decide your position with certainty, identify the conflict and explain why you cannot be certain.

Evaluating published research is as much an art as a science, and we continue to discuss it in the remainder of this book. As Locke et al. (1971) clearly state, “To be honest, it takes years of experience to quickly discern flaws of logic and imperfections of analysis in a complicated investigation.” Undergraduates are sometimes reluctant to commit themselves definitively, especially when they feel they don’t fully understand something. You shouldn’t use either Ruggiero’s or Locke et al.’s points as an excuse to avoid drawing a conclusion about a published work.

Taking Research Notes and Writing Abstracts and Critical Reviews

Earlier in this chapter, we briefly discussed the note-taking process. Let’s consider it in more detail now. When you take notes on a reading you need it more carefully. The first time you read an article, you should focus on the big picture. Instead of taking notes on each paragraph, force yourself to read the entire section, then ask yourself: what did it say? Only after you can articulate the point of the section should you go back and take notes on the details.

This suggests a related point. Good readers vary their speed and depth of reading to match their purpose — whether they are interested in getting the main ideas or all the details. For example, as we noted previously, you don’t need to grasp all the nuances of the particular statistical technique an author uses to get a basic understanding of the results.

The notes you take while reading a scholarly article are really addressed to you. After you finish the article, it is a good idea to transcribe your notes into paper (e.g., index cards) or a computer file. Always start by recording the complete bibliographic information using the appropriate citation style. You will be amazed how much harder it is to track down an article to obtain citation information the night before a paper is due. Save yourself the trouble and get it right the first time.

Indeed, it is good practice to make copies of all articles (or chapters of books) that are important to your research project. Though this costs a bit duplicating or printing fees, it is a small price to pay to avoid time and aggravation later. This is especially true for those articles you need to read more than once. When you copy an article, make sure you include the whole article, including references and appendices. You should also include a copy of the title page of the journal, indicating journal title, volume and issue number, and date.

As a general rule, it is better to paraphrase what you read than to record verbatim. Notes that are collections of direct quotations suggest that you don’t understand what you read or you haven’t made the effort to understand. Paraphrasing requires you to process the information, which means you will learn it better. In addition, as you paraphrase you prepare the
ideas for inclusion in your own writing. If you use a highlighter when you read, and you find yourself highlighting a great deal of the text, it might be useful to make an effort to think more about what you’re reading and use the highlighter less—for example, only on the truly important aspects of the text. Finally, if you need help getting through an article, talk to your instructor.

You can make the notes you write on a scholarly work more formal by turning them into an abstract or a critical review. Both are natural products of the critical reading process. Most people think of an abstract as a summary of a scholarly article or book, but a better way to think of it is as the summary of the author’s argument (together with complete citation information). As such, as Cohen & Spencer (1993, 223) point out, an abstract may present the material in a different order than that of the original article. Scholarly works often include an abstract, but it is good practice to write your own. If you can do it well, you clearly understand the article or book.

Let’s write an abstract for Romer (1993), the article we read critically earlier. Every abstract begins with complete bibliographic information in the work. You should consult your instructor (if your paper is an assignment for a course) or the style guide (if it is a submission to a journal) to determine the correct citation style. The style used in Table 6.3 is Style of the Chicago Manual of Style, Fourteenth Edition.

Recall from Chapter 4 that an argument is a thesis supported by major theoretical and empirical reasons, which are themselves fleshed out by minor reasons and other details. In an abstract of one hundred to two hundred words, you only have enough space to state the thesis and the major reasons. Based on the answers to the questions in Table 6.1, it should be easy to identify these. The thesis of the article is the answer to question 1 in the table: What is the author’s proposed answer to the research question? The theoretical reasoning is the answer to question 5. The empirical evidence is the answer to question 6. Putting this all together and condensing it yields the sample abstract in Table 6.3.

A critical review is an abstract augmented with a critical evaluation of the work. Thus, it includes complete citation information, a summary of the author’s argument, and an assessment of that argument. Such an evaluation can be easily written by summarizing the answers to the questions in Table 6.2, as shown in Table 6.4.

A related research product is called an annotated bibliography. This is a list of references that includes a few sentences summarizing and evaluating each item. In other words, it is something like a collection of critical reviews on a single research topic. An annotated bibliography is a good way to determine how complete your literature review is. It is also very useful for preparing the written literature survey for a research report. The suggestions for Further Reading at the end of each chapter in this book provide examples of annotated bibliographies. See also the annotated list of articles in Appendix 6A.

The only way to learn how to read and understand scholarly research is to practice this important skill. Reading through this chapter is not
enough! The more you practice, the sooner you will become adept at reading critically. To that end, in addition to the paper reproduced later in this chapter, another paper is also included on the website for your review. Please be sure to read it as well.

**SUMMARY**

- Scholarly literature is challenging to read.
- Scholarly writing follows a specific format like a lab report.
- You must read critically to discern and evaluate an author's argument.
- Critical reading requires judgment on the reader's part.
- A research abstract is a summary of an author's argument.
- A critical review is an evaluation of an author's argument.

**NOTES**

1. There is another type of scholarly work, called a meta-analysis, that is similar to a survey paper but includes original research. A meta-analysis uses sophisticated statistical techniques to analyze the separate results of previous studies. It does this to discern insights that may not be apparent from any individual study, similar to the way a mathematical average provides a single measure that summarizes a broad sample of data. Meta-analyses are much more than mere averages, however, and lie outside the scope of this book.

2. Note, however, that not all journals have a peer-review process. If an article is peer-reviewed, it is probably of high quality. If an article is published in a non-peer-reviewed journal, it may still be of high quality, so you can't assume that as easily.

3. Note that since the answers to the questions from Table 6.1 were excerpted from quotations from the article, I also paraphrased to produce the abstract shown in Table 6.3.

**SUGGESTIONS FOR FURTHER READING**

*Boyer (2003)*—A guide to "the great books," the first four chapters provide an excellent discussion of how to read scholarly texts critically.

*Bean (1996)*—Chapter 8, "Helping Students Read Difficult Texts," is addressed to instructors teaching critical reading, but students can benefit from it as well.

*Wolfe (1988)*—Monograph on understanding scholarly writing. The best parts are Chapter 4 on reading research reports, Chapter 5 on taking notes, and Chapter 7 on critical reading per se.

*Puglisi (1998)*—Introduction to critical thinking. Chapter 4 provides thoughtful suggestions for critical reading.

*Schuster et al. (1985)*—Useful survey of how to understand scholarly articles in psychology, but applicable to studies in the social sciences more generally.

*Finlay (2001)*—Helpful web-based introduction to critical thinking and reading.

*Hornick (1994)*—Chapter 9, on the economic content of published research, is quite good though it emphasizes the format of economic writing, rather than the argument.

**EXERCISES**

Find a scholarly article on your research topic. Read it critically, and using the article write down answers to the questions in Tables 6.1 and 6.2.

Write an abstract for the article you used in Exercise 1.

Write a critical review of the article.

Choose two articles on the same topic but with conflicting conclusions. Write a critical review of the two articles, and explain which article's conclusion you found the most persuasive and why.

Prepare an annotated bibliography for your research topic. The bibliography should include at least three sources: an article from a scholarly journal, a book, and an article from the Internet. Each item should have the three elements required for a critical review:

- The complete bibliographic citation in the citation style required by your instructor;
- A brief summary of the argument; please note if the source is theoretical, empirical, or a survey; and
- An assessment of the quality of the item.
Reading and Evaluating a Theoretical Article

Reading and understanding a theoretical journal article is a little different than doing so for an empirical article. Typically, in a theoretical article, the analysis is more abstract or more in depth, which makes reading and understanding even more challenging. Before continuing, you may wish to read Chapter 7 for help in understanding theoretical analyses. Try reading the following theoretical articles, which I have annotated. In recent years, purely theoretical articles have become highly mathematical. For that reason, the following selections are taken from earlier decades.

**Sample Theoretical Journal Articles**


This article demonstrates that international trade can result from economies of scale, even when both countries have identical preferences and factor endowments. This article offers much to comment to researchers new to theoretical studies. First, it is well written; even analytical parts are clearly explained verbally. Second, though the details of the analysis require an understanding of constrained optimization using calculus, the analysis itself should be readily understandable to anyone who has taken intermediate theory. More precisely, the analysis consists of utility and profit maximization. Finally, the article is short, less than ten pages long.


This article established that maximizing behavior is sufficient but not necessary for obtaining downward-sloping demand curves. Indeed, several forms of irrational behavior also lead to downward-sloping demand curves as long as economic agents are subject to a budget constraint. The article uses graphs and logic but no higher math.


This classic article demonstrated that the transactions demand for money is a function of interest rates as well as income. Previously, only the speculative demand for money was thought to be interest sensitive.


This study makes a graphical and verbal argument for nontraditional effects of price on quantity demand—for example, that high prices can induce consumers to buy because of the snob effect, which is shown by a shift in the demand curve.