current subject of thinking critically about disciplinary insights: respect for different viewpoints. If you start out believing that those who agree with you are entirely correct and those who disagree with you are entirely incorrect, then you cannot engage in critical thinking. Interdisciplinarity requires you to recognize that there is likely some kernel of truth in opposing viewpoints. By carefully analyzing competing arguments, you give yourself the chance to identify common ground between apparent opposites. Such common ground is invisible to those who automatically discredit opposing viewpoints in their entirety.

Both critical thinking and interdisciplinarity encourage us to respect not just the arguments but also the motivations of people with whom we disagree. To be sure, there are times when others are guided by extreme selfishness, and you can anticipate at least some degree of self-interest in everyone. In most areas of disagreement in modern society, though, the choice is between competing societal "goods": Almost everyone wants a healthy economy, a healthy environment, and compassion for the unfortunate. We disagree, however, both on the relative weights we attach to different goals and on how and how well we think each can be achieved. Critical thinking and interdisciplinarity guide us to separate our disagreements over goals from our disagreements over means. An argument for decriminalization of marijuana might be grounded in a belief that there is nothing wrong with marijuana use or instead in a view that criminalization has not been an effective policy for reducing marijuana use. Our evaluation of such an argument will proceed quite differently depending on whether it is an argument about goals or means.

Categories of Statements

Developing appropriate attitudes sets the stage for critical evaluation of texts. This involves asking a set of critical thinking questions of every scholarly work that you read. In order to make the transition from being a passive recipient in the learning process to becoming an active participant, you should first ask "Are the conclusions reached justified by the supporting arguments and evidence?" Most of the time, this question is not easily answered. To answer it, you must be able to distinguish among several different categories of statements inherent in any scholarly work. To help you identify the categories, you need to ask these subsidiary questions: "What are the author's conclusions?" "What are the supporting arguments?" "What assumptions does the author make?" and "What evidence does the author marshal?" Only once these elements are identified can you analyze the connections among them. The sequence of thought proceeds as follows: Evidence and assumptions support arguments which support conclusions. We provide examples of this sort of evaluation in what follows.

No. 1: What Are the Author's Conclusions?

Some books and articles, especially in the natural sciences and certain social sciences, will close with a chapter or section titled “Conclusion” or perhaps “Concluding Remarks.” Sometimes such sections will contain clear statements of the author’s conclusions. Often, though, the reader is expected to carefully read much or all of the work in question in order to discern the author’s thinking. It is thus useful for you to develop the habit of asking, “What was the point?” upon finishing any work.

In the humanities, many authors believe that their purpose is not to arrive at a conclusion but to highlight certain facets of a work of art or literature for the reader’s deeper reflection. In such cases, you can still usefully try to identify what the author believes is important to communicate.

Interdisciplinary students face two particular challenges. As noted earlier, disciplines differ in both the clarity and positioning of concluding remarks. In order to identify conclusions across many disciplines, you need to appreciate a second challenge: that conclusions may take different forms as well. A conclusion may come in the form of a theoretical argument, a statement about a particular event or process, a mathematical proof, an empirical result, or in various other forms.

No. 2: What Are the Supporting Arguments?

A work in criminology, for example, might conclude that a particular change in the sentences imposed for certain crimes will have a certain impact on crime rates. Such a conclusion could be supported by arguments regarding the likelihood that a prisoner will commit a certain crime again or that other potential criminals will take the penalties into account when deciding whether to commit a crime. There could be more detailed arguments involving the decision-making process of criminals, the efficacy of prison rehabilitation programs, or the chances of criminals being caught.

The first challenge you face here is to distinguish conclusions from supporting arguments. This will be much easier for some works than others. And some works may build slowly toward a conclusion such that the arguments supporting the final conclusion are themselves miniconclusions supported by yet further arguments.

Once again, interdisciplinary students will face a special challenge. Students in a discipline may become accustomed to a particular mode of argumentation. Interdisciplinary students have a greater need to consciously pursue critical thinking strategies, for they will need to identify supporting arguments (and other types of statements) across quite different types of work. When students come to compare the *support* for conclusions from different disciplines, they often find they are comparing apples and oranges.

Earlier chapters in this book spoke of the “insights” generated by a particular work. We can

usefully clarify here the precise nature of such insights. *Conclusions*—both main conclusions and supporting arguments—that are supported by a work's arguments and evidence are the work's *insights*.

No. 3: What Assumptions Does the Author Make (and Are These Justified)?

Scholarship is an ongoing conversation. No book or article can be entirely self-contained. Authors cannot, in other words, justify every supporting argument that they make. They must necessarily assume certain things to be true. Unfortunately, authors are not always clear about what assumptions they are making or why they are making them: You as the reader must thus often strive to identify hidden assumptions. Whether assumptions are stated or hidden, you can distinguish between three categories of assumptions:

- **Assumptions supported by authors cited in the work.** This book cites many authors: That is, we provide direct quotes or paraphrases of important statements by other authors in the text followed by the author's name, publication date, and page number. You may have wondered why we have done this. Our purpose in citing other authors is to show that our assumption on a given point is supported by one or more other scholars. A scholarly work is necessarily built upon the work of other scholars. In more advanced course work, it is instructive to check an author's citations to probe the subject more deeply. Thinking critically about any work involves asking whether the assumption(s) on which it is based are supported by other scholars. (You could also, then, critically evaluate the justifications provided in other works in support of arguments now being employed as assumptions.)
- **Assumptions that characterize a particular disciplinary perspective.** We have established that disciplinary authors typically write from the perspective of their discipline. They also typically share their discipline's assumptions, which are often not made explicit. In a disciplinary course, students are generally not required to concern themselves with the assumptions of the discipline, though arguably they should be. But in an interdisciplinary course, assumptions become important and they can be challenging to uncover when they are implicit. This is why Chapter 5 is so important. In critically evaluating a disciplinary work, you want to ask to what extent the conclusions are guided by the assumptions associated with disciplinary perspective. The interdisciplinary reader may often appreciate that an author makes an assumption common in his or her discipline but that rules out the appreciation of insights from other disciplines.
- **Assumptions of convenience.** In the real world, almost every phenomenon is influenced by many others. Authors focused on one set of interactions will tend to assume that other interactions are unimportant. (Again, this is often done implicitly and perhaps unconsciously.) You can usefully ask if such an assumption is reasonable

in the context of the complex problem being investigated. If an argument is made as to why crime rates have risen or fallen, you can reasonably reflect on what other causes, assumed unimportant by the author, might have been at work.

Authors, it should be noted, do not always carefully distinguish assumptions from conclusions or supporting arguments. But there is a clear distinction between these: Conclusions or supporting arguments are justified by other arguments or evidence in the text, whereas assumptions are not. You as a critical reader should be especially aware of assumptions masquerading as conclusions.

No. 4: What Evidence Does the Author Marshal?

Scholarship involves presenting evidence or data to support the author's arguments. Regarding evidence, you need to focus on two things: the author's research method and the reliability of the data that the method produces. While it may seem presumptuous to suggest that entry-level students can or should question either the method or the data, you can if you use the right approach.

Data and methods are deemed *reliable* if it is likely that similar results would be found if the study were replicated or performed again under similar conditions. Data and methods are considered *valid* if the evidence generated is actually connected to the work's conclusions: A study of sunspots may have no validity for an exploration of criminal behavior, even if the results are reliable. As you will see in the examples below, even entry-level students can critique the evidence by wondering about reliability and validity. Your ability to do so will improve as you learn more about particular disciplinary research methods. We can note for now both that no scholarly method is perfect and that these are often applied imperfectly. (The strengths and limitations of different methods are discussed in detail in Repko & Szostak, 2016, *Interdisciplinary Research: Process and Theory*, 3rd ed.)

Other Types of Statements You Will Encounter

You have already seen that thinking critically about an author's work requires that you distinguish between conclusions, supporting arguments, assumptions, and evidence. In addition to these, a work contains many other types of statements that you must identify:

- **Statements of motivation.** Most works will contain statements as to why the author and/or reader should care about the subject being addressed: "A billion humans lack reliable access to clean water. This book thus investigates strategies for increasing the supply of clean water." You should be careful not to confuse statements of why a work might be important from justified conclusions. A statement of motivation by any one author provides clues about the values of that person and may also provide insight

into potential bias. For example, an author whose work is motivated by environmental concerns may draw different conclusions from the same evidence than does an author focused entirely on economic growth. Similarly, statements of motivation by several authors from the same discipline provide clues about the values of the discipline as a whole.

- **Statements of belief.** The same can be said for statements of belief. Authors will sometimes be explicit about what they believe to be true: "We believe that global warming is the greatest threat to humanity." You must be especially wary of interpreting such statements as insights justified by argument and evidence. You should of course be wary of authorial bias whether authors confess their point of view or not. Statements of belief by several authors in a discipline provide clues about the beliefs of that discipline.
- **Guiding questions.** "What was the impact of food shortages on the French Revolution?" You need to distinguish questions from answers and ask whether the conclusions reached in fact respond to the work's guiding questions.
- **Definitions of key concepts** *(such as "revolution" in the previous bullet).* Again, care must be taken not to confuse a definition with a conclusion. This caveat holds true for all disciplines. Note that authors often do not define the terms they use. You then need to try to figure out the author's understanding of the term and be especially alert to how the term colors the meaning of the text.
- **Statements of evidence or information.** Here is an example: "Twelve of 20 people interviewed agreed that ads regarding the dangers of impaired driving had changed their behavior." This statement may involve evidence developed within the work itself or in other works cited. In either case, you should ask whether the author's evidence is likely an accurate reflection of the phenomenon being studied. In other words, how good is the evidence?
- **Implications.** The author may move beyond conclusions regarding how the world works to make proposals for public policy, business practice, or individual behavior: "We should change the penalties for impaired driving." In this case, the implications of the conclusions are more speculative than the conclusions themselves. The interdisciplinary student should be especially careful of the tendency of disciplinary scholars to assume that only their discipline has important insights into a particular public policy challenge. Inner-city poverty is legitimately the province of (at least) economists, sociologists, political scientists, and psychologists, but scholars from each discipline may make policy suggestions that ignore the insights of the other disciplines.

Summary of This Discussion

An interdisciplinary approach to critical thinking about disciplinary work is fairly straightforward. It identifies statements of conclusions, arguments of support, assumptions, and evidence. And it distinguishes between statements of motivation, belief, guiding

questions, key concepts, and implications. But you should be wary of statements of unjustified assertions. Of any assertion, you should ask whether it is justified by the supporting arguments and evidence provided. An unjustified assertion should *not* be treated as an "insight" of the work.

You should be familiar with different types of statements for several reasons. First, it is essential that you not mistake as conclusions statements of belief, motivation, definition, or implications. Second, such statements can reveal authorial as well as disciplinary bias. Third, these statements provide valuable insight into why a particular audience might value the work: It might share the motivations or beliefs that guide the author or applaud the policy implications.

Critically Analyzing Disciplinary Insights

Disciplinarians have long questioned the ability of interdisciplinary scholars to fully understand the disciplinary literatures from which they draw. Certainly the interdisciplinarian cannot be expected to have the same depth of understanding as does the specialized disciplinary scholar. Perhaps the key insight of interdisciplinary scholarship is that this depth of expertise is not essential. The interdisciplinarian need not master an entire discipline in order to understand its perspective and critique its insights. "Mastering" means knowing the discipline well enough to practice it. This is not the goal of the interdisciplinarian in most cases. Rather, the interdisciplinarian wishes to draw upon the discipline for a limited purpose and thus needs only to understand the defining elements of those disciplines relevant to the problem as presented in Chapter 5. These elements are the keys to understanding a discipline's perspective and its insights into the problem you are studying.

A Distinctive Approach to Critically Analyzing Disciplinary Insights

We now address this key question: "Are there differences between disciplinary and interdisciplinary approaches to critical reading and thinking?" The simple answer is "There are." The interdisciplinarian brings a distinctive approach to critically analyzing disciplinary insights.

For one thing, the interdisciplinary reader can compare and contrast insights generated by different disciplines. You can then use the insights of one discipline to critique the insights of another. For instance, economists may not find it odd that another economist assumes that criminals rationally evaluate whether to commit a crime (and will thus take into account penalties and the objective probability of being caught), whereas if you have also read a work by a psychologist talking about how certain criminals act on impulse, you are

guided to question the economist's assumption.

Second, the interdisciplinary reader can ask to what extent the discipline's insights reflect the discipline's perspective. The disciplinarian who is not self-conscious of disciplinary perspective cannot ask such a question. Even as an entry-level student, you can usefully apply the brief sketches of disciplinary perspective provided in Chapter 5 when reading a work from any one of the disciplines covered in that chapter. Note that in so doing interdisciplinary students are encouraged to view as problematic the same disciplinary expertise that most disciplinary students are taught to respect. That is, you come to see disciplinary specialization as a two-edged sword: It is at once the source of an author's strength but also a source of limitations.

Third, while the disciplinarian may have more detailed knowledge of a particular theory or method, the interdisciplinary reader can bring an understanding of the relative strengths and limitations of different theories and methods. This may allow you to identify problems missed by the disciplinarian (because each discipline tends to downplay the limitations of its favored theories and methods). It also facilitates your identifying alternative theories and methods that might generate different conclusions. This sort of approach will become easier as you progress in your education and learn more about different theories and methods.

Fourth, by mapping the complex problem or system to reveal its disciplinary parts, the interdisciplinary reader can place any disciplinary insight in broad context. (Mapping is discussed later.) All too often, disciplinary researchers will examine a particular relationship—how B influences C—in detail, then draw a conclusion about how A influences D by simply assuming that A affects B and C affects D in a particular way. Often these assumptions are not made explicit. But by mapping the problem, the interdisciplinary reader may be able to draw on other disciplines that actually study these other relationships. Through mapping, you may find that these relationships do not always operate as the first discipline has casually assumed.

Fifth, the interdisciplinary reader can ask whether the disciplinary analysis has ignored critical variables studied by other disciplines and analyze how the discipline's conclusions would change if these were included (see examples that follow).

Finally, the evaluation provided by the interdisciplinary reader is *complementary* to the evaluation that would be provided by a disciplinary reader. Interdisciplinary readers should thus always want to know how a work has been received by experts in that discipline's theories and methods. By reading scholarly reviews of the work (especially books) in disciplinary journals, you can explore whether a work has been cited and, if so, whether it has been cited positively. (Note: Reviews of scholarly books that appear on many Internet sites, including Amazon.com, are not peer reviewed and are often unreliable.) This does not mean that a discipline's judgment should be accepted without question, for it might

reflect the biases inherent in disciplinary perspective. On the other hand, you should be careful of celebrating a work that is disdained in its discipline of origin.

How to Find What You Need in Disciplinary Insights

The challenge facing students new to interdisciplinary studies is how to find what they need to find in disciplinary insights and not settle for a superficial understanding of what they are reading. It is thus useful to have some standards by which you can evaluate the quality of the texts you are reading.

Clarity

The most important standard is *clarity.* If an author's statements are not clear, then the task of critical analysis is difficult, if not impossible. You should not demand perfection here, for philosophers of language have long noted that some degree of ambiguity is inevitable in human communication. Indeed, there are occasions when the author's lack of clarity is deliberate for artistic reasons, as in a poem when the author is speaking metaphorically or using other linguistic devices to elicit various emotions or images. A rule of thumb is whenever you confront lack of clarity in a work, ask why it is so.

There are several possible reasons why an author's work lacks clarity. One is the author's poor communication skills. Another may be the author's deliberate attempt to mislead. Indeed, political speeches are often filled with ambiguities in the hope that audiences will hear what they want to hear. A promise to "give everyone what they deserve" without any detail on how this will be done may be heard by everyone as "more for me." Whether the ambiguity is deliberate or not, you should be skeptical of lines of argument that lack clarity. You should ask whether the argument can be made clearer and, if so, whether the more clear argument makes sense.

Perhaps the most common reason for lack of clarity is the author's use of technical jargon, which is familiar to experts in the field but not to outsiders. All fields define certain concepts in particular ways. Doing so makes it easier for people within the field to communicate with each other. Yet while some fields define core concepts fairly clearly (such as "mass" and "force" in physics), other key concepts are much more ambiguous ("globalization" and "culture" are defined in many different ways). You have two tasks here. First, you need to make sure that you understand what is meant by these concepts when they are used. You should ask if the author—or the author's field—is clear about what is meant. An article about globalization that is not clear about what is meant by the term should be carefully evaluated: Precisely what arguments is the author making? Second, you need to ask if in using these concepts the author is making assumptions that are questionable. If an author uses "globalization" in a way that implies there is an international conspiracy of some sort, you can ask what evidence is provided for this.

One common mistake is to assume that a familiar concept in everyday speech necessarily has the same meaning inside a discipline. You need also to be aware that the same technical term will typically have different meanings in different disciplines. Instead of looking up key terms in the dictionary, you should look them up in key reference works of that discipline.

Depth and Breadth

Two other guidelines for critically analyzing a disciplinary work are its *depth* and *breadth.* These terms capture the essential tension between disciplinarity and interdisciplinarity. Disciplinarians emphasize the need to have a deep understanding of a particular subject matter, which we have called "disciplinary reductionism." Interdisciplinarians, by contrast, stress the importance of breadth of vision, broad context, and systemic thinking. Interdisciplinarians resolve this tension by seeing disciplinarity and interdisciplinarity as complementary enterprises. Interdisciplinarians propose a solution whereby the deep explorations and insights of disciplinary scholars are evaluated and integrated into a more comprehensive understanding. While interdisciplinary readers may naturally focus on breadth, they should not neglect depth: As noted earlier, if you know that a work is viewed skeptically in its home discipline, you should ask if this is merely because it runs against the discipline's prevailing perspective or instead because it involves inappropriate application of the discipline's theory or methods.

With regard to breadth, you need to ask yourself what has been left out in a disciplinary analysis of the subject: What phenomena (or theories or methods) studied by other disciplines should have been included in the analysis, and how might the results have changed if they had been included? When looking at an interdisciplinary analysis of a particular subject, a key question is whether the analysis has drawn from all relevant disciplines and evaluated disciplinary insights within the context of each disciplinary perspective. An interdisciplinary analysis of global warming that ignores the insights of natural sciences should be seen as incomplete. So should an interdisciplinary analysis of crime that cites only one sociologist whose insights seem at odds with the disciplinary perspective of sociology.

Logic

The most obvious standard for critically analyzing a disciplinary work is perhaps its logical integrity. Do arguments flow logically from the evidence, and do subsidiary arguments build to the overall conclusion? It is very useful to list the steps in an argument, and ask whether each flows from the previous argument. It is very easy for an argument to seem stronger than it is by simply omitting certain steps. For example, one can move easily from a lengthy list of abuses of the welfare system to a compelling conclusion that it should be scrapped if one does not also seek some measurement of the benefits of the system and

some attempt to compare costs and benefits. In this hypothetical case, the author has moved directly from a statement that “welfare is abused” to a conclusion that “the system should be scrapped.” You can recognize that such a conclusion requires a judgment that “the costs of the system outweigh the benefits.” Although the author has implicitly assumed this to be true, he or she has not established this. Note that the interdisciplinary reader should be particularly adept at spotting missing arguments, for these will often be arguments that are made in other disciplines.

Examples of Applying an Interdisciplinary Approach to Critically Analyzing Disciplinary Insights

We present three hypothetical examples of applying an interdisciplinary approach to critically analyzing disciplinary insights. These examples assume that the interdisciplinary reader has already distinguished conclusions and supporting arguments from other types of statements and thus answered the first two of the critical questions described earlier: “What are the conclusions?” and “What are the arguments supporting the conclusions?” As you read each example, notice the focus on the other two critical questions:

- What assumptions does the author make? (Note that these may be explicit—that is, stated by the author—or implicit.)
- What evidence does the author marshal? (Note: The primary issue regarding evidence for interdisciplinarians is *relevance* of evidence. Relevance will in turn depend on both the *reliability* and *validity* of the evidence [see the previous discussion]. Evidence that is relevant to the part of the problem of interest to that discipline is likely to be less compelling when applied to other parts [and thus to the complex problem as a whole]. Again, the interdisciplinarian can use insights from other disciplines to assess the relevance of evidence.)

In effect, these questions provide a handy checklist of questions you should ask of any disciplinary insight, starting with the following examples of hypothetical insights.

In the following examples we focus on how to critically read a disciplinary insight by itself. In a later section we show how critical thinking is further enhanced when insights from different disciplines or authors are compared and contrasted.

Example 1: An Analysis of Crime by an Economist

An economist calculates the potential burglar’s costs and benefits. The benefits are the money the burglar can receive by selling what he steals. The costs are the probability of being caught multiplied by the penalty imposed for burglary. The economist calculates the penalty that needs to be imposed in order for the costs to exceed the benefits and thus