INTRODUCING LOGIC AND CRITICAL THINKING

The Skills of Reasoning *and* the Virtues of Inquiry

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Contents

Preface for Instructors

It has become increasingly common for both Christian and non-Christian colleges and universities to offer and even require what we might call courses in "Logic *and*"—courses the formal titles of which typically begin with the words "Logic and" and end with something after the "and." Often what is included after the "and" is "Critical Thinking," though this is not universal. In any case, the expectation is that in courses of these kinds, students will learn about logic *and* they will learn about something else. What else they learn appears to vary widely from one institution to another and from one instructor to another.

When I have taught courses of this kind, I have thought that a very suitable subject to include for my students—in addition to logic—would be an introduction to intellectual virtues. The course would provide them both with the reasoning skills of formal logic and with an opportunity to reflect on, and even attempt to cultivate, virtues of inquiry. One problem I faced as an instructor, however, was that I could not find a single textbook that combined these subjects in the way I had in mind. That is why I've written *Introducing Logic and Critical Thinking*. My hope and expectation is that there are other instructors like me who would like to structure their courses in "Logic *and*" in this way and who would appreciate a single textbook that enables them to do so.

Some unique features of this textbook are designed to aid with instructional use. First, instructors should note that part 1 of the text, which significantly outstrips part 2 in length, intentionally includes a very substantial introduction to a wide range of techniques in deductive and inductive logic. It is my expectation that many instructors will use only sections of part 1. For some courses in "Logic *and*," a more thorough introduction to the methods of deductive and inductive logic is necessary, while for other courses a less thorough introduction is sufficient. I have attempted to write the text in such a way that instructors will not face significant difficulty in selecting sections from part 1 to cover at their discretion. For example, sections 2.4 and 2.5 might be considered too advanced for some introductory logic courses, as these sections introduce

methods utilized in symbolic logic. Since these sections deal with relatively discrete methods, instructors can skip these sections and focus instead on the other methods discussed in chapter 2. At the same time, some instructors might welcome having a brief introduction to symbolic logic that could be used in a course with philosophy majors or honors students who seek a more thorough introduction to the discipline than many introductory logic texts provide.

Second, instead of having a separate section on informal fallacies, as is often the case with introductory textbooks, the approach I have taken is to discuss many of the most common informal fallacies in the context of the discussion of virtues of inquiry. For example, in the section on the virtue of trust in others, I discuss the *ad hominem* fallacy; in the section on the virtue of interpretive charity, I discuss the *straw man* fallacy; in the section on the virtue of introspective vigilance, I discuss the *post hoc* and *slippery slope* fallacies; and in the sections on the virtues of communicative clarity and audience sensitivity, I discuss the fallacies of *equivocation*, *amphibole*, and *begging the question*. Thus rather than discussing these informal fallacies in isolation, which can make them seem abstract, I have situated my discussion of these fallacies within the context of a broader discussion of intellectual virtues. Discussing them within the context of intellectual virtues allows the explanation for why these fallacies are problematic to be more strikingly illuminated.

A third feature worth highlighting about the textbook is that part 2, concerned with the virtues of inquiry, contains *practice exercises*. These consist of vignettes that briefly describe the way in which a character or group of characters conducts an inquiry. Students are asked to reflect on whether the character or characters do or do not display a particular virtue, and to defend their answers. In some cases, they are asked to offer recommendations about how the character could have conducted her inquiry more virtuously. For some examples included in these exercises, reasonable disagreement about how to evaluate the example is to be expected. From my vantage point, the primary purpose of the exercises is to serve as valuable conversation starters that can prompt more in-depth, thoughtful classroom discussion about the exercise of intellectual virtue and vice.

A final unique feature of the textbook is that it has been written intentionally with Christian students in mind. In several places, I briefly discuss how the Christian tradition might illuminate our understanding of a skill in reasoning or a virtue of inquiry. For example, the section on the virtue of intellectual generosity discusses a way in which a Christian conception of intellectual generosity may be more demanding than a secular conception. Similarly, I have intentionally selected practice exercises that in many cases will be of special interest to Christian students and instructors. In this way, the book should be especially attractive for courses in "Logic *and*" taught at Christian colleges and universities.

Part 1

The Skills of Reasoning

The first part of this two-part book introduces some important skills that will help you to reason better. These are the skills taught in the discipline of logic as practiced within English-speaking institutions of higher education where this discipline focuses on identifying and evaluating arguments. Thus the chapters that compose the first part of this text explain certain widely used techniques that will assist you in identifying and evaluating arguments.

It is important that we do not confuse the skills of reasoning explained here with the virtues of inquiry that will be the focus of the second part of the text. There are various ways to distinguish between skills on the one hand and virtues on the other.[1] But perhaps the most important difference between the two is the following: a person is not deficient *as a person* for lacking any particular skills, but a person is deficient *as a person* for lacking virtues, including intellectual ones. By way of illustration, we would not say that a person was worse as a person for failing to have the basketball skills of LeBron James. Likewise, we would not say that LeBron James is better as a person for having the particular basketball skills he has. Of course, someone who doesn't have James's skills is worse *as a basketball player* than James. But the point here is that she is not worse *as a person* than James. However, a person who lacks virtues does lack something as a person. A person who is not courageous but is instead cowardly is worse off as a person than someone who is courageous. And the same goes for intellectual virtues and vices. A

person who is intellectually arrogant is worse off as a person than a person who is not intellectually arrogant.

The particular skills introduced in this first part of the book, then, are not necessary for making you better as a person. Learning to draw Venn diagrams and to construct formal proofs of arguments using the Proof Method does not make one a better human being. But this is not to say that acquiring these skills is not valuable at all. While having one particular skill does not make a person better as a person than other persons with different skills, it is nonetheless true that having *some* skill or other is of great value to us as persons. It would be bad for James if he had no skills at all—even bad for him as a person. To live excellent lives, we need some skills. And to lead intellectually excellent lives, we need some skills in reasoning. The skills in reasoning introduced here could be replaced by other skills—skills that don't require drawing overlapping circles to represent arguments or using arrows and wedges to symbolize premises in arguments. But without some skill set or other to aid one in reasoning, one does lack something as a person. It is important for our personal flourishing that we reason well, and having some skill set or other to help us with this makes a contribution to our flourishing.

While the particular skills of reasoning proposed here may be replaceable, they are nonetheless valuable for human flourishing. Moreover, they are skills that are widely (though not widely enough!) studied and acquired in English-speaking institutions of higher learning. By acquiring the skills of reasoning proposed in the first part of this text, you will have acquired a set of skills that makes a valuable contribution to living an excellent life as a person and that you can uniquely share with many other good reasoners educated in English-speaking institutions.

1

Introduction to Arguments

Reflect for a moment on all the many things that you believe. Perhaps you believe some things about yourself: something about who you are, where you are, what you are up to, what constitutes your calling in life. Perhaps you believe some things about the community in which you find yourself: the community of your classmates, the community of your educational institution more widely, or your church, city, county, state, or national community. You might believe some things about the past: whether you ate a bagel for breakfast, whether your decision to pick up this book was a good idea, whether certain events recorded in the Bible are historical, or whether the American Revolution inspired the French Revolution. You might believe some things about the future: who will be the next president, what the housing market will be like next spring, what you will need in your life to make you truly happy, or whether you will one day have a glorified body in heaven.

You may very well believe some of these things in a kind of direct way based on your experiences. You believe that you are reading this book because of the visual and tactile experiences you are currently having, for example. Your belief that you are reading the book is not, perhaps, based on some other *beliefs* you have. Your belief that you are reading this book isn't based on your belief that this book says you are reading it, for instance. Rather, the experiences you are having are directly producing this belief in you. Maybe the same goes for some other beliefs you have. You believe you ate a bagel for breakfast because you seem to remember having eaten one. You hold this belief about the bagel not because of some other belief you hold. Some of

your beliefs, then, may be held directly on the basis of your experiences and not on the basis of any other beliefs you hold.

Yet it remains the case that many of the beliefs you hold *are* held on the basis of other beliefs. You believe these things for certain *reasons*, we might say. Take, for instance, what you believe about who will be the next president. If you hold a belief about this matter, it will no doubt be one that is held on the basis of quite a number of reasons—reasons having to do with who you believe will be on the ballot, how you believe the country will fare between now and the next election, your views about what the American public believes about a wide range of important issues, and so on. You believe that so-and-so will be president *because of*, or *on the basis of*, these other beliefs you hold. And the same may go for many of the other beliefs you hold, such as your beliefs about what constitutes your calling in life, whose fault it was that your team lost, what the housing market will be like in the spring, and what will make for personal happiness.

An important feature of human life, then, is that many of the things we believe are things we believe on the basis of reasons.[1] Many Christian theologians have thought that our ability to hold beliefs on the basis of reasons—and to critically reflect on our reasons for belief—is an aspect of the image or likeness of God in us.[2] Certainly these rational capacities are part of what sets us apart from much of the rest of creation. Part of what it is to be a fully functioning human is to believe for reasons and to evaluate the reasons we have for belief.

An important additional observation about this key feature of human life—this fact that we believe many things on the basis of reasons—is that *reasons are often shareable*. If I believe something on the basis of a reason, and I am able to identify that reason, then I can share that reason with you. I can recommend it to you as a reason for you to believe what I believe. And you can do the same for me. You too can recommend that I believe some of the things you believe—for instance, what you believe about who will be the next president—by telling me your reasons for believing what you do about this. So the fact that humans believe many things on the basis of reasons—reasons that are often shareable—makes it possible for us to influence one another's beliefs by providing one another with reasons for belief.

How exactly do we do this? Our key mechanism is the presentation and defense of arguments. When we present an argument, we usually are interested in recommending that another person believe something on the basis of the claims made in that argument. We recommend that this person believe the conclusion of that argument on the basis of the premises of that argument. In section 1.1, we will more carefully define terminology like "argument," "premise," and "conclusion." For now, it is necessary only to understand that

arguments are a key mechanism that we can use to influence the beliefs of others and that others can use to influence our beliefs. Indeed, in a certain way we can even use arguments in internal dialogues with ourselves. Strange as it might sound, most of us provide arguments to ourselves in an attempt to recommend to ourselves that we believe certain claims on the basis of others. Arguments, then, whether used privately or publicly, are absolutely central to the formation of many of the beliefs we hold.

This important role for arguments in the private and public processes of belief formation is evident in Scripture. The Hebrew prophets frequently employ arguments attempting to persuade the people of Israel to turn from their wicked ways. In many of the psalms, the writer seems to argue with himself about how to understand God's providence in his life. Jesus is fond of using arguments from analogy to defend key theological claims. And Paul's letters are densely packed with arguments. (Just consider how many times the word "for" appears in Paul's writings.) We see here clearly that arguments play a key role in the process of individual and social belief formation.

Because arguments play this central role in both the individual and social dimensions of belief formation, and because it matters what we believe and why we do so, it is important that we attend to what makes for *good* arguments versus what makes for *bad* arguments. Most of us take for granted that some arguments are better than others and indeed that some arguments are good while others are bad. We think that when someone recommends to us that we believe a claim on the basis of certain reasons, these reasons are sometimes good and sometimes not so good. We believe, then, that there are *evaluative* claims to be made about arguments. We can evaluate arguments for goodness and badness, for example. And we would prefer that those beliefs we hold on the basis of arguments be held on the basis of good arguments rather than bad ones.

This is where the discipline of logic makes a unique contribution to living a life of excellence as a human. As we have seen, humans are uniquely gifted in that we hold many beliefs on the basis of reasons that are shareable. We hold many beliefs on the basis of arguments for those beliefs. It is clear that we live more excellent lives when we hold the beliefs we do on the basis of good arguments rather than bad ones, and when the arguments we recommend to others for our beliefs are good arguments rather than bad ones as well. The discipline of logic is of immense value for helping us to accomplish these tasks because it is uniquely concerned with the evaluation of arguments. Indeed, **logic**, as we will define it, is *the study of the methods used to evaluate arguments*. Logic is all about arguments. The skills one acquires through studying logic enable one to do a better job of believing what one does on the basis of good arguments rather than bad ones. They aid one in

recommending to others good arguments rather than bad ones in an attempt to influence others' beliefs. By studying logic, the student acquires skills that are important for flourishing as a human. By acquiring these logical skills in reasoning, we perhaps even display in fuller glory the image of God within us. We acquire skills that enable us to have a greater impact on our cultures for the kingdom of God, help us to navigate our own lives more wisely, and equip us for the pursuit of understanding. We neglect the discipline of logic at our peril.

1.1 Arguments vs. Nonarguments

We have said that logic is the study of the methods used to evaluate arguments and that arguments are often used for the purpose of convincing others (or ourselves) to hold certain beliefs on the basis of other beliefs. What we need now is a more precise definition of arguments that gets at their nature and not just one of their important functions. We need to explain what *makes* something an argument. By defining arguments and distinguishing them from important kinds of nonarguments, we will acquire our first important skill in logic.

For our purposes, we will define an **argument** as *a set of statements where one of those statements (the conclusion) is affirmed on the basis of the others (the premises)*. This way of defining the term "argument" obviously differs from our common understanding, where an argument might simply mean a shouting match. When Joe says, "Boo on you!" and Jim replies, "No, boo on your mom!" this is not an "argument" according to the above definition (though it may well count as an "argument" in the ordinary sense of that term). Our definition of "argument" focuses on the specific sense in which logicians use the term. Our definition tells us something about the component parts of arguments and the way these parts must be related if they are to constitute an argument. To use a construction analogy, both the building materials and how they are fastened together matter for whether we have constructed an argument. The component parts or building materials of an argument must be "statements," and for these to compose an argument they must be fastened together so that one of them is affirmed on the basis of the others. We will briefly examine both of these features of arguments—their components and their construction.

1.1.1 Statements: The Building Blocks of Arguments

The component parts or building materials of arguments are statements. For our purposes, a **statement** is *any sentence that is either true or false*. A

sentence that is true (for example, "There are computers") is a statement. A sentence that is false (for example, "There aren't any computers anywhere in the world") is also a statement, albeit a false one. Even sentences that are not *known* to be true or false can be statements. It is not required that a statement be known to be either true or false but only that it be either true or false. So, for example, the sentence "There is life in other galaxies" is a statement. It is either true or false, even if it is not (yet) known to be either true or false.

Some sentences and strings of symbols do not compose statements. Any sentence that is neither true nor false is not a statement. Typically sentences that are questions or commands will not be statements. "Go home!" or "Would you like to excuse yourself?" are not typically statements, since they are not typically used as sentences that are either true or false. It is important to point out that sentences that have the form of commands or questions can sometimes be used to *make* statements. For example, the sentence "Believe me when I tell you I will lower taxes" might be used by a political candidate to make a statement—the statement that he or she will lower taxes—even though the sentence is expressed in the form of a command. Rhetorical questions like "Wouldn't you agree that logic is fun?" may likewise be used to make statements. When commands or questions are used in this way, we will treat them as statements, which can thus be used as components of arguments.

It should also be clear from the definition of "statement" above that strings of symbols that fail to compose sentences are also not statements. Thus "sdf ekp eoppld" is not a statement. We might imagine some language in which this string of symbols does compose a sentence, but it does not compose a sentence in English. And for our purposes we will be evaluating English arguments composed of English statements. "Sdf ekp eoppld" is not an English sentence and so cannot be an English statement or a component of any English argument.

One final remark about the nature of statements is in order. There are some sentences whose status as statements is disputable. According to some philosophers and theologians, sentences using moral or religious terminology are not statements. These philosophers and theologians believe that sentences using moral or religious terminology are neither true nor false. The purpose of these sentences is not to make any claims about the way the world is or to recommend belief to others, but instead to do something akin to expressing one's emotions.[3] Although this view of moral and religious discourse has some prominent advocates, it is certainly extreme. It sure seems that moral and religious discourse is offered for the purpose of recommending belief to others and making claims about the way the world is. Indeed, it is difficult if not impossible to affirm otherwise while taking moral and religious discourse seriously. We will not exclude religious and moral discourse from our purview

here. For our purposes, the fact that a sentence uses moral or religious terminology will not disqualify that sentence from being a statement. Indeed, many of the examples we will examine in this book concern moral or religious claims, since some of the most hotly debated disagreements concern these claims. And we are interested here in aiding those who have a special interest in evaluating arguments about these matters.

1.1.2 The Construction of Arguments: Premise and Conclusion Indicators

We said above that arguments are composed of two or more statements, where a statement is a sentence that is either true or false. We must now say something about how these components or materials must be fastened together to form an argument. To have an argument, we need at least two statements, and we need one of them to be affirmed *on the basis of* or *because of* the others. The others need to be offered *as reasons for believing* the statement. In an argument, the statement that is affirmed on the basis of the others is called the "conclusion," and the statements on the basis of which the conclusion is affirmed are called the "premises."

With this understanding of the components and construction of arguments in view, consider the following examples of arguments:

1. Dr. Smith's grade distributions are exactly what the university is aiming for. So the complaints of Dr. Smith's students that Dr. Smith is not giving enough A's are wrong.
2. Planned Parenthood uses federal funds in a way that is not morally acceptable, for Planned Parenthood uses federal funds to perform abortions. And using federal funds to perform abortions is not morally acceptable.
3. You should vote for the Republican candidate for office because the Republican candidate will defend religious liberty.

In each example, we have an argument, because in each example we have a set of statements where one of these statements is affirmed on the basis of the other(s). In each of the examples, the hypothetical author of the passage attempts to supply a reason for believing one of the statements in the passage.

Some important features of these examples can help us to identify them as arguments. Each example includes either a premise indicator or a conclusion indicator. **Premise indicators** are *words or phrases indicating that what comes immediately after them is a premise on the basis of which a conclusion is affirmed*. Examples of premise indicators are "because" and "for." A fuller list of these indicators is included in figure 1.1. **Conclusion indicators**

are *words or phrases indicating that what comes immediately after them is a conclusion affirmed on the basis of premises supplied elsewhere in the argument*. Examples of conclusion indicators are "therefore" and "so." A fuller list of conclusion indicators is included in figure 1.2.

Figure 1.1
Premise Indicators

Because	Owing to
For	As
Inasmuch as	Since
After all	

Figure 1.2
Conclusion Indicators

Therefore	Accordingly
Consequently	It follows that
So	Hence
Thus	Whence
For this reason	

See if you can spot the premise and conclusion indicators in examples 1–3 above. In example 1, we have the conclusion indicator "So." This word indicates that what comes after it is a conclusion affirmed on the basis of what came before it. This conclusion indicator helps us to identify example 1 as an argument because it shows us that it is composed of statements where one (the second) is affirmed on the basis of the other (the first).

Example 2 uses the premise indicator "for." This premise indicator tells us that what comes after it is a premise on the basis of which the claim preceding the word "for" is affirmed. In this passage, we have an argument that begins with a conclusion and then supplies reasons for affirming that conclusion.

The conclusion also comes first in example 3, which uses the premise indicator "because." Here the claim that follows the word "because" is a premise on the basis of which the claim that precedes the word "because" is affirmed.

Notice that example 3 offers us an argument using only one sentence. We might ask how it composes an argument, since our definition of an argument requires at least two statements. The answer is that, strictly speaking, a statement need not be a sentence but can be a clause that *could* function on its own as a sentence that is either true or false. In example 3 we get two such clauses, one before the word "because" and one after it. So even though we don't get two sentences in example 3, we do get an argument because we get at least two clauses that can function alone as sentences that are either true or false, and one of them is affirmed on the basis of the other. Here the linking word "because" functions to indicate this very fact about their relationship.

While very many arguments employ premise or conclusion indicators like those used in 1–3, not all arguments do. Some arguments are presented without premise or conclusion indicators. For example, consider the following passage:

4. We should go to Busch Gardens this weekend. It's one of the last times it will be open this year, all of our friends are going, and it's a lot of fun.

In this argument, there is no word or phrase that indicates to the reader that the first sentence is the conclusion of the argument. The reader has to figure this out herself using her knowledge of the author of the passage and of the context in which it is offered. Sometimes the absence of premise and conclusion indicators can lead to interpretive confusions. It can be difficult to tell whether the author intended to provide an argument or not.

1.1.3 Arguments vs. Nonarguments

We have said quite a bit now about the nature of arguments, their components, and some tips for identifying them. We will conclude this section by identifying some types of passages that, though not arguments, are often confused with arguments. These types of passages are composed of sets of statements, but the statements are not related to one another in the right way to form arguments, because none of the statements is affirmed on the basis of the others. Some of these types of passages are more difficult to distinguish from arguments than others.

One common type of passage that does not form an argument is a report. A **report** is *a set of statements where none of the statements is affirmed on the basis of the others and where the statements are offered for the purpose of simply providing the reader with information*. The primary purpose of reports, then, is informational; no conclusion is drawn in a report. The following passage is an example of a report:

5. The study revealed that building the new stadium would cost around five billion dollars. To make a profit, the average ticket price per event would need to be around forty dollars. The city would also need to extend the light rail from the suburbs to the downtown area. It is estimated that 45 percent of the population would attend an event at the stadium at least once during its first year.

While example 5 is composed of many statements, these statements are not related to one another in the right way to form an argument. None of them is affirmed on the basis of any of the others. The primary purpose for which a passage like example 5 would be offered is simply to provide the reader with information.

Of course, it might be that by providing the reader with this information, the author hopes the reader will draw a particular conclusion—perhaps, for

example, that the building project is feasible. And it is clear that the information in a report may be highly relevant for the purpose of drawing such conclusions. This is indeed part of why reports can be confused with arguments. We can mistakenly think that a person is advocating a position when she makes a report because of the relevance that the report has for that position. But if no conclusion is affirmed in a passage, that passage does not compose an argument—no matter how relevant the information of the report is to one conclusion or another.

A second type of passage that is commonly mistaken for an argument is a mere conditional statement. A **mere conditional statement** is *an "if . . . then" statement that is not used to either affirm or deny either of its component clauses*. All "if . . . then" statements are conditional statements; they have two component clauses that could function as independent sentences but that are related in a conditional manner. So, for example, the sentence "If the star pitcher doesn't play, then the team will lose" is a conditional statement. It relates two clauses using an "if . . . then" construction. But what makes a conditional statement a *mere* conditional statement is that it is not used to affirm or deny either of the clauses that compose it. The conditional statement in the example just mentioned doesn't clearly affirm or deny either that the star pitcher won't play or that the team will lose. It states only that there is an "if . . . then" relationship between these claims and can thus be assumed to be a mere conditional statement.

Of course, in some conversational contexts, if someone were to make this conditional statement, we would reasonably interpret him as affirming or denying one of its components. For instance, imagine that you and I are sitting in the stands, and it is clear to us that the star pitcher is not playing. I ask you, "Will the team win?" and you respond by making the conditional statement above: "If the star pitcher doesn't play, then the team will lose." Here it seems that your assertion does function to affirm one of the component parts of the conditional statement—namely, that the team is going to lose. And the statement supplies a reason for this assertion as well—namely, that the star pitcher isn't playing. So in this conversational context, we should treat your utterance of this conditional statement as constituting an argument.

The foregoing highlights a certain complication in identifying whether a particular passage composes an argument. As interpreters of the passage, if we are to determine whether the passage composes an argument, we must know something about the context in which it is offered. Here is a rule of thumb: *If the context does not clearly indicate that a conditional claim is used in order to affirm or deny one of its component clauses, then treat the conditional statement as a mere conditional statement; if it is clear that the conditional*

statement does function to affirm or deny one of its component clauses, then treat the conditional statement as composing an argument.

A third type of passage that is commonly and mistakenly thought to compose an argument is an illustration. An **illustration** is *a set of statements where none of the statements is affirmed on the basis of the others, and where one of the statements is explained or clarified through the use of an example.* The primary purpose of the illustration is not to argue in favor of the statement or statements it illustrates but to clarify the statement or statements. Here is an example of an illustration:

6. Some claims are true simply because of the meaning of the words that compose them. So, for instance, the claim "All bachelors are males" is true because of the meaning of "bachelor" and "male."

The passage above provides us an example of an illustration. The first statement made in example 6 is illustrated by the second statement. The second statement provides one example of the phenomenon that is stated to exist in the first statement. The purpose of the illustration is not to defend the first statement or argue that it is true but simply to provide an example of it.

Illustrations can be easily confused with arguments for two reasons. First, as in example 6, they sometimes employ words or phrases that are often used as conclusion indicators. While example 6 uses the word "So," this word does not function as a conclusion indicator in this passage. It instead indicates that what comes after it is an illustration. The word "thus" is also sometimes used in this way. A second reason illustrations are commonly mistaken for arguments is that the illustrations could often be used to provide arguments for those claims they illustrate if this were deemed desirable. This is so in example 6. If the author deemed it desirable to *argue* for the first claim in her passage, she might do so by pointing to the second claim in her passage. In doing so she would appeal to the sentence "All bachelors are males" not as an illustration of her claim that some sentences are true simply because of the meaning of the words that compose them, but as a reason for affirming this claim. The word "So" would still not be functioning as a premise indicator in this instance, but the illustration indicated by the "So" would be employed to provide evidence of the claim that preceded it.

How can one distinguish between arguments and illustrations, if that which can be used for an illustration can also sometimes be used to provide a premise in an argument? Distinguishing between arguments and illustrations can require some interpretive sensitivity on the part of the reader. When we encounter a passage that includes an example that could be used to compose either an illustration or an argument, we must consider whether the statement

the example is about is controversial in the conversational context. If the statement is not controversial, then the example is likely offered merely as an illustration. This seems to be the case with example 6 above. If the statement is controversial, however, then the example may indeed be offered as a premise in defense of the statement. A rule of thumb here is this: *Assume that examples are used to provide illustrations of statements rather than arguments for them unless those statements the examples are about are controversial in the conversational context; if the statements the examples are about are controversial, then treat the passage as an argument.*

The final type of passage that is sometimes confused with an argument is an explanation. An **explanation** is *a set of statements where none of the statements is affirmed on the basis of the others and where some of the statements tell the reader why one of the other statements is true.* The primary purpose of explanations is not to defend or argue in favor of a statement but to provide the reader with an understanding of why the statement is true. Here is an example of an explanation:

7. The sidewalk is wet because the sprinklers have been on.

In example 7, the author is likely offering an explanation for why the sidewalk is wet. The explanation—namely, that the sprinklers have been on—provides the reader with an understanding of why the sidewalk is wet. Its purpose is not to convince the reader that the sidewalk is wet but to explain to the reader why this is so.

Explanations can be confused with arguments because they often employ words or phrases that can be used as premise indicators. Example 7 uses the premise indicator "because," for instance, but here the word "because" does not function as a premise indicator. Rather, the word "because" indicates that what comes after it will explain why what comes before it is true.

What we saw with illustrations is also the case with explanations: that which can be used to provide a good explanation can also often be used to provide a good argument. If, for instance, we needed to find an argument for thinking that the sidewalk is wet, then example 7 might serve that purpose. Why think the sidewalk is wet? Well, the sprinklers have been on. Whether a passage like example 7 composes an argument or an explanation depends once again on the conversational context. A first rule of thumb for discerning whether a passage composes an argument or an explanation is much like our rule for sorting out arguments and illustrations. *If the statement that is either explained or argued for is controversial in the conversational context, then treat the passage as an argument; if it is not controversial, treat the passage as an explanation.*

A second rule of thumb for distinguishing arguments and explanations can also be useful. When attempting to discern whether a passage is an argument or an explanation, we should also ask whether that which is offered as either an explanation or an argument is the sort of thing that would make sense of the claim for which it either explains or argues. If not, then the passage is probably an argument. Consider this example:

8. Jesus did many miracles other than those recorded in the Gospels, because the Gospel of John says he did.

That the Gospel of John says Jesus performed many miracles other than those recorded in the Gospels doesn't *make sense of why* Jesus performed many miracles not recorded in the Gospels. That John tells us this happened is not the sort of thing to explain why it happened. So example 8 is best understood as an argument rather than an explanation. Here, then, is a second rule of thumb: *If the potential premise or explanation is not the sort of thing to make sense of the statement that is either argued for or explained, then the passage is probably an argument; if the potential premise or explanation would indeed make sense of the statement that is either argued for or explained, then the passage is likely an explanation.*

1.1.4 Summary

In this section, we defined some key terms (argument, statement, premise indicator, and conclusion indicator) and offered some tips for identifying whether a passage composes an argument or some other type of statement that is not an argument (a report, a mere conditionals statement, an illustration, or an explanation). It should be clear from our discussion that determining whether a passage composes an argument requires some sensitivity to the interests of the author of the passage one is considering and to the context in which that passage is offered. The first step in acquiring the skills necessary for doing a good job evaluating arguments is to learn to identify them.

Exercise 1.1

A. Statement or Not a Statement? Identify whether each of the following composes a statement or does not compose a statement. If it does not compose a statement, explain why it doesn't.

1. Martin Luther King Jr. lived during the Revolutionary War.
2. It is good to honor one's father and mother.

Key Ideas for Review

Logic is the study of the methods used to evaluate arguments.

An **argument** is a set of statements where one of those statements (the conclusion) is affirmed on the basis of the others (the premises).

A **statement** is any sentence that is either true or false.

Premise indicators are words or phrases indicating that what comes immediately after them is a premise on the basis of which a conclusion is affirmed.

Conclusion indicators are words or phrases indicating that what comes immediately after them is a conclusion affirmed on the basis of premises supplied elsewhere in the argument.

A **report** is a set of statements where none of the statements is affirmed on the basis of the others and where the statements are offered for the purpose of simply providing the reader with information.

A **mere conditional statement** is an "if . . . then" statement that is not used to either affirm or deny either of its component clauses.

An **illustration** is a set of statements where none of the statements is affirmed on the basis of the others, and where one of the statements is explained or clarified through the use of an example.

An **explanation** is a set of statements where none of the statements is affirmed on the basis of the others and where some of the statements tell the reader why one of the other statements is true.

3. Table sit three hike hike balloon.
4. Bring it on!
5. The philosophers keep asking, "Why?"
6. I don't like hot pillows.
7. There is something in nature that can cure cancer.
8. Sally was so upset about missing the shot.
9. Science aims to discover truth.
10. So that we can be happy.

B. Argument or Nonargument? Identify whether each of the following quoted passages composes an argument. If a quoted passage does not compose an argument, identify whether it composes a report, a mere conditional statement, an illustration, or an explanation.

1. A furniture website states, "The table is made of a dark kind of wood. It stands well on its own and does not hobble. It is accompanied by four sturdy chairs made of the same material. The entire set can fit in the average dining room space quite easily."
2. One child says to another, "Go with me! There will be clowns and elephants and people swinging from the trapeze. It's going to be awesome."

3. A preacher says, "Sometimes a good person will allow someone he loves to suffer. Thus good fathers will permit their children to suffer so that their children will learn important life lessons."
4. A concerned consumer says, "That car company really should work on their product, shouldn't they? Customers almost never buy from them more than once."
5. A mother tells her daughter, "If you are going to get your license, you have to go through the driver's education course."
6. A wife tells her husband, "Going to the mailbox will only waste your time. After all, it's Sunday."
7. A political candidate says, "The leaders of that country are evil people, and we will not negotiate with evil people. So we will have no talks with them."
8. A student admits to his professor, "I didn't get a good grade because I didn't do enough practice exercises."
9. A book says, "We can be confident that the New Testament documents are a reliable source of historical information, since if they weren't, then no other ancient documents would be either."
10. A historian claims, "The framers of the Constitution were heavily influenced by European political philosophers. So, for instance, Thomas Jefferson was influenced by John Locke."

1.2 Evaluating Arguments

In section 1.1 we introduced key concepts that enable us to better identify arguments. The next step is to learn to evaluate the arguments we identify. After all, we hope that the arguments on the basis of which we believe things and the arguments that we employ to influence the beliefs of others are *good* arguments rather than *bad* arguments. Fulfilling this hope requires skills in evaluating arguments—skills that enable us to better ascertain what value an argument has.

In this section, our aim is to acquire some additional key concepts that will help us with this work of evaluating arguments. In particular, our concern will be to learn several distinct evaluative properties or features that arguments can have. Each evaluative feature we will learn is either a way an argument can be good or way an argument can fail to be good. Once we learn what these evaluative features are, our concern in the remainder of part 1 will be to learn methods we can use to identify when arguments possess these features.

1.2.1 Evaluating Arguments in Two Steps

The process involved in evaluating arguments can be conceived of as a two-step process. The first step is concerned with determining whether the premises of the argument are true. If one or more of the premises of an argument isn't true, then it would be a mistake to believe the conclusion of the argument on the basis of these premises. For example, consider the following argument:

1. All animals are omnivores. And all omnivores eat. So all animals eat.

Even if the conclusion of this argument is true, it would be a mistake to believe it on the basis of the argument's premises. This is because at least one of the premises—namely, the premise that all animals are omnivores—is false.

A second step in evaluating arguments involves identifying the relationship between the premises of the argument and its conclusion. In particular, it is important to identify in what way, if at all, the truth of the premises of an argument would support its conclusion. If an argument has only true premises, but the truth of its premises doesn't support its conclusion, then it is still a mistake to believe the conclusion on the basis of those premises, despite their truth. For example, consider the following argument:

2. Some animals are herbivores. And no herbivores eat meat. So no animals eat meat.

The premises of this argument are true. However, it would be a mistake to believe the conclusion on the basis of these premises. The reason for this is that the premises are not related in the right kind of way to the conclusion. Even though the premises of example 2 are true, they don't support its conclusion adequately for us to believe that conclusion on the basis of them.

The full process of evaluating an argument involves evaluating both the truth or falsity of its premises *and* the relationship between its premises and its conclusion. If we overlook either of these steps, we have not completed the process of evaluating an argument. In principle it doesn't matter in what order we complete these two steps. However, it can often be helpful to begin with the second step, since it is likely to be much easier to achieve agreement with others regarding this second step than it is to achieve agreement regarding the first step. Consider, for example, the following argument:

3. Either Jesus never really died or he did in fact rise from the dead. But Jesus really did die. So Jesus did in fact rise from the dead.

Arguments like the one presented in example 3 are hotly debated today, as they have been for centuries. But even those who strongly disagree about the truth of the premises of this argument can fairly easily reach agreement about the relationship between these premises and the conclusion of the argument. Both those who affirm that the premises of the argument are true and those who do not can fairly easily agree that *if* the premises of the argument are true, they would confirm its conclusion. *If* we assume that Jesus either didn't die or did rise, and *if* we assume that Jesus did die, then it has to be true that Jesus did rise. The only remaining question regards the truth of these assumptions.

Example 3 illustrates how agreement can often be reached concerning the relationship between the premises of an argument and its conclusion, even if agreement can't be reached so easily regarding the truthfulness of the argument's premises. The example also illustrates how we can often make progress in a conversation with others with whom we disagree by focusing first on evaluating the relationship between the premises of an argument and its conclusion. Specifically, we make progress by identifying more clearly where our disagreement originates. Those who disagree about the conclusion of the argument presented in example 3 are unlikely to disagree about whether the premises of example 3, if true, would support its conclusion. This means that their disagreement is likely instead to be concerned with the truth of one or both of the premises. And this is where their future discussion should focus.

In this way, beginning with the second step of our two-step evaluative process can be quite helpful. And as it turns out, the skills of reasoning we will discuss in the next two chapters are concerned precisely with this step of the process of evaluating arguments. These skills will enable us to methodically identify whether the premises of arguments adequately support their conclusions, and by doing so they will help us to make progress in dialogue with others by directing our attention to the origins of our disagreements.

1.2.2 Key Evaluative Features: Validity, Invalidity, Soundness, Unsoundness

The skills we will learn in the next two chapters will help us to discern the relationship between the premises of arguments and their conclusions, and will thereby help us to determine which key evaluative features arguments possess. It is now time that we introduce the key features that we will identify with these skills.

The first key evaluative feature is validity. A **valid** argument is *an argument in which the truth of the premises absolutely guarantees the truth of the conclusion—an argument in which it is impossible for the premises to be true and the conclusion false*. An argument is valid if and only if the truth of

its premises would guarantee the truth of its conclusion. If the premises are true, the conclusion has to be true also. If there were a scale that measured the extent to which the premises of an argument can confirm the conclusion of an argument, validity would lie at the very peak of this scale.

We've seen some examples of valid arguments already. Example 3 above, for instance, is a valid argument: *if* it is true that either Jesus never really died or he did in fact rise from the dead, and *if* it is true that Jesus really did die, then it has to be true that Jesus rose from the dead.

Example 1 is also a valid argument: *if* all animals are omnivores, and *if* all omnivores are things that eat, then this would guarantee that all animals are things that eat. It is impossible for it to be the case that all animals are omnivores, and that all omnivores eat, but *not* that all animals eat.

Notably, example 1 is valid even though one of its premises is clearly false. This illustrates an important fact: the validity of an argument does not directly relate to the truth or falsity of its premises. Nor does the validity of an argument have direct implications for the truth or falsity of its conclusion. Rather, the validity of an argument is concerned with the *relationship* between the truth of the argument's premises and the truth of its conclusion. The argument is valid if and only if the following relationship obtains: the truth of the argument's premises (whether they are true or not) would guarantee the truth of its conclusion (whether it is true or not). Accordingly, there can be valid arguments with true premises and a true conclusion, false premises and a false conclusion, or false premises and a true conclusion. The only kind of argument that cannot be valid is an argument that has all true premises and yet a false conclusion.

Look back now at example 2. The argument in example 2 is not valid but is rather what we will call invalid. An **invalid** argument is *an argument in which the truth of the premises does not absolutely guarantee the truth of the conclusion—an argument in which it is possible for the premises to be true and the conclusion false*. We can tell that the argument in example 2 is invalid because the premises are true while the conclusion is false. Thus the truth of its premises do not guarantee the truth of its conclusion. Given our definition of what it is for an argument to be valid, example 2 is not a valid argument. Any argument that is not valid is invalid. So example 2 is an invalid argument. It is an argument in which the truth of the premises does not guarantee the truth of the conclusion, an argument in which it *is* possible for the premises to be true and the conclusion false.

Being valid is one way an argument can be good, while being invalid is one way an argument can fail to be good. However, the fact that an argument is valid doesn't imply that it is good in every respect. Nor does the fact that an argument is invalid imply that it is bad in every respect. This is because there

are additional ways arguments can be good or fail to be good other than by being valid or invalid.

As we saw earlier in this section, a different way for an argument to be good is to have only true premises. When an argument has only true premises *and* is valid, we call it a sound argument. A **sound argument** is *a valid argument with only true premises*. An argument is sound if and only if it has both features—it is both valid and has only true premises. An interesting fact necessarily follows—namely, that every sound argument has a true conclusion. This is guaranteed by the two features of sound arguments. Given that an argument is valid (the first feature of sound arguments), the truth of its premises would guarantee the truth of its conclusion. And the second feature of sound arguments is that their premises *are* true. So it follows that the conclusion of any sound argument is true as well.

By contrast, an **unsound argument** is *an argument that is not sound*. There are two ways for an argument to be unsound. An argument can be unsound by failing to be valid or by failing to have only true premises. Of course, some arguments fail in both respects: they are both invalid and have at least one false premise. These arguments, we might say, are doubly unsound.

In chapter 2 we will study deductive logic. **Deductive logic** is *the study of the methods used to evaluate arguments for validity or invalidity*. Whereas logic in general is the study of the methods used to evaluate arguments, deductive logic is a particular branch of logic that studies the methods used to evaluate arguments for the specific evaluative properties of validity or invalidity. But before turning to deductive logic, we must introduce some further key evaluative features.

1.2.3 Key Evaluative Features: Strength, Weakness, Cogency, Uncogency

In discussing validity in the previous subsection, we imagined a scale that measures the extent to which the premises of an argument confirm its conclusion. Validity sits at the very peak of this scale. In valid arguments, the truth of the premises absolutely guarantees the truth of the conclusion. It's impossible for the premises to be true and the conclusion false.

There are cases, however, in which the truth of an argument's premises would support the truth of its conclusion without supporting it to *this* extent. In these cases, it's *possible* for the premises to be true and the conclusion false, but this is *unlikely*. The premises don't guarantee the truth of the conclusion, but they make it more likely than not. We will call arguments with this feature strong arguments. A **strong** argument is *an argument in which the truth of the premises makes the conclusion more likely than not without absolutely guaranteeing the conclusion*. Here's an example of a strong argument:

4. Most students who took the logic quiz scored below 95 percent. So Sam, who took the quiz, scored below 95 percent.

In example 4, the truth of the premise doesn't guarantee the truth of the conclusion. It's *possible* for the premise to be true and the conclusion false. After all, Sam might be an especially strong student—the exception rather than the rule. Nonetheless, the truth of the premise does make it more likely than not that the conclusion is true. If all you had to go on concerning Sam's score was that most students scored below 95 percent, and you didn't know anything about Sam's relative standing in the class, the safe bet to make (if you had to) would be that he scored lower than 95 percent. In this way, the argument is one in which the premises make the conclusion likely to be true without guaranteeing it.

We have defined strong arguments using the language of likelihood. It is also possible to define strong arguments using the language of probability. Using probabilistic language, a strong argument is one in which the probability of the conclusion given the premises is greater than 50 percent and less than 100 percent. Saying that the probability is greater than 50 percent is a different way to say that the conclusion is more likely than not given the premises, while saying that the probability is less than 100 percent is a different way to say that the conclusion is not guaranteed by the premises.

In contrast to strong arguments, there are weak arguments. A **weak** argument is *an argument in which the truth of the premises does not make the truth of the conclusion more likely than not*. To use probabilistic language, they are arguments in which the probability of the conclusion given the premises is 50 percent or less.

Imagine that we tweak the conclusion of example 4 to get the following:

5. Most students who took the logic quiz scored below 95 percent. So Sam, who took the quiz, scored above 95 percent.

In example 5, the conclusion is more likely to be false than true, given the premise. So example 5 is a weak argument.

The final two key evaluative concepts we need to introduce are those of cogency and uncogency. A **cogent** argument is *a strong argument with only true premises*. Like a sound argument, a cogent argument has two and only two required features. To be cogent, an argument must be strong, and it must have only true premises. If we supposed that the premise in example 4 were indeed true, then example 4 would be a cogent argument. Any argument that is both strong and has only true premises is cogent.

By contrast with cogent arguments, there are uncogent arguments. An **uncogent** argument is *an argument that is not cogent*. It is either a weak

argument or an argument that is strong but has at least one false premise. Of course, some arguments are both weak and have at least one false premise. Such arguments, we might say, are doubly uncogent. If the premise in example 5 were false, for instance, it would be a doubly uncogent argument.

Whereas deductive logic is the branch of logic concerned with evaluating arguments for validity or invalidity, **inductive logic** is *the study of the methods used to evaluate arguments for strength or weakness*. In chapter 3 we will study inductive logic, looking at several methods used to test whether arguments are strong or weak.

1.2.4 Relationships between Key Evaluative Features

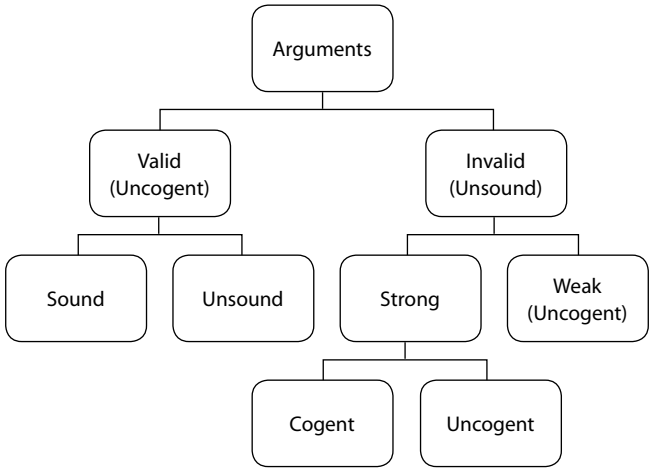
Putting the information from the two previous subsections together, we can draw some interesting conclusions about the relationships between these key evaluative features of arguments. For example, we can determine that some invalid arguments are strong arguments. This is because for an argument to be invalid, all that is required is that the truth of its premises doesn't guarantee the truth of its conclusion. But strong arguments have this feature. The truth of their premises makes the truth of their conclusion more likely than not but doesn't guarantee its truth.

Many relationships of this kind can be discerned. As an aid to discerning them, take a look at the Argument Evaluation Tree in figure 1.3. In this figure, the lower-level categories represent what we call "mutually exclusive" and "jointly exhaustive" subcategories of the upper-level categories. For example, within the category of the arguments, there are the subcategories of valid arguments and invalid arguments. No arguments are both valid and invalid (that is, validity and invalidity are mutually exclusive), and all arguments belong to either the valid category or the invalid category (that is, these categories are jointly exhaustive). With this background, try to use figure 1.3 to answer the following question: Can cogent arguments be valid?

It turns out the answer is no. This is because all cogent arguments must be strong, but all strong arguments are invalid. No invalid arguments are valid, of course, so no cogent arguments are valid arguments.

This conclusion—and others that can be drawn using figure 1.3—may initially seem strange, since in our everyday speech we use some of our key vocabulary from this section in ways that differ from how that vocabulary has been defined here. For example, in ordinary English it is often the case that calling an argument "strong" does not imply that the truth of the argument's premises do not guarantee its conclusion. Recall that we saw something similar to be true of the key term "argument": it too has uses in ordinary English that differ from the technical meaning it is given in the discipline of logic.

Figure 1.3
Argument Evaluation Tree



Because we often employ this chapter's key terminology in ways that depart from how that terminology is defined here, it is important that we acquire a working understanding of these terms and their definitions and continue to use them consistently for class purposes. If the vocabulary isn't acquired and used consistently as we have defined it, our study of logic will not help us to inculcate skills of reasoning. It will only confuse us. With this in mind, the section exercises below are designed to further strengthen your acquisition of this key vocabulary.

1.2.5 Summary

This section has introduced several evaluative properties of arguments that will help enable us to determine the value that arguments have. The key evaluative properties of validity, invalidity, soundness, unsoundness, strength, weakness, cogency, and uncogency have been defined, and their relationships have been illustrated. The subdisciplines of deductive and inductive logic, which will be studied in more detail in the next two chapters, have also been introduced.

Exercise 1.2

A. True or False? Using your knowledge of the key vocabulary introduced in this section, determine whether the following statements are true or false.

1. A valid argument can have a false conclusion.
2. A strong argument can be uncogent.

Key Ideas for Review

A **valid** argument is an argument in which the truth of the premises absolutely guarantees the truth of the conclusion—an argument in which it is impossible for the premises to be true and the conclusion false.

An **invalid** argument is an argument in which the truth of the premises does not absolutely guarantee the truth of the conclusion—an argument in which it is possible for the premises to be true and the conclusion false.

A **sound** argument is a valid argument with only true premises.

An **unsound** argument is an argument that is not sound.

Deductive logic is the study of the methods used to evaluate arguments for validity or invalidity.

A **strong** argument is an argument in which the truth of the premises makes the conclusion more likely than not without absolutely guaranteeing the conclusion.

A **weak** argument is an argument in which the truth of the premises does not make the truth of the conclusion more likely than not.

A **cogent** argument is a strong argument with only true premises.

An **uncogent** argument is an argument that is not cogent.

Inductive logic is the study of the methods used to evaluate arguments for strength or weakness.

3. If a strong argument has only true premises, it is valid.
4. If a valid argument has a false premise, it is unsound.
5. Any argument with a false premise is invalid.
6. An argument with only true premises and a true conclusion can be uncogent.
7. Deductive logic is the study of the methods used to evaluate arguments for strength or weakness.
8. Some valid arguments are weak.
9. All sound arguments are uncogent.
10. If a valid argument has a false conclusion, it must have at least one false premise.

B. Practice with Arguments. Using your knowledge of key vocabulary introduced in this section, attempt to construct arguments with the features listed below.

1. A valid argument with a false conclusion.
2. A weak argument with only true premises.
3. A sound argument.
4. A cogent argument.
5. A strong argument with a true conclusion but at least one false premise.