

Being Logical

A
GUIDE
to
GOOD
THINKING

D. Q. McNerny

RANDOM HOUSE  NEW YORK



IN MEMORIAM

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and

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Preface

LOGIC IS ABOUT clear and effective thinking. It is a science and an art. This book is intended to introduce readers to the rudiments of the science as well as to the basic skills associated with the art.

We all know people who are very bright but who do not always shine when it comes to being logical. They have the ability to think logically—that is, clearly and effectively—but that ability does not habitually manifest itself. The likelihood is that it has never been properly developed, pointing to a deficiency in their education. Indeed, logic is the very backbone of a true education, and yet it is seldom taught as such in American schools. To my mind, logic is the missing piece of the American educational system, the subject that informs every other subject from English to history to science and math.

Some readers, especially if this book represents their first serious encounter with logic, might react skittishly to what appears to be an overly technical vocabulary, or to the

symbolic notation that logic makes frequent use of. Don't be scared off by initial impressions. I have made a concerted effort to present whatever technical matters I deal with here (which in any event are not all that trying) in as simple and uncomplicated a way as possible. At the same time, however, I have tried to avoid lapsing into the simplistic. A dumbed-down logic is not logic at all. Other readers might be put off by what they perceive to be an emphasis upon the obvious. I do, in fact, place a good deal of stress on the obvious in this book, and that is quite deliberate. In logic, as in life, it is the obvious that most often bears emphasizing, because it so easily escapes our notice. If I have belabored certain points, and regularly opted for the explicit over the implicit, it is because I adhere to the time-honored pedagogic principle that it is always safest to assume as little as possible.

Logic, taken as a whole, is a wide, deep, and wonderfully varied field, and I would be pleased if my readers, as a result of their encounter with this little book, were moved to become more familiar with it. However, my aim here is very modest. This is neither a treatise in logical theory nor a textbook in logic—though I would not be disappointed to learn that it proves useful in the classroom. My governing purpose was to write a practical guidebook, presenting the basic principles of logic in a way that is accessible to those who are encountering the subject for the first time. *Being Logical* seeks to produce practitioners, not theoreticians—people for whom knowing the principles of logic is in the service of being logical.

In the hope of better serving the practical ends of the book, I have adopted a somewhat informal style, often addressing the reader directly, and, in the manner of a tutor or coach, sometimes assuming a distinctively directive tone. I treat logic in five stages, represented by the five parts of the book, each successive stage building upon the one that preceded it. Part One is preparatory, and deals with the proper frame of mind that must be established if logical thinking is to take place at all. In Parts Two and Three, the heart of the book, we pass into the realm of logic proper. Part Two explains the foundational truths that govern logical thinking, while Part Three focuses on argument—the public expression of logical thinking. In Part Four, I discuss attitudes and frames of mind that promote illogical thinking. Finally, Part Five concentrates on the particulars of illogical thinking—the fallacies.

A final word, of admiration and appreciation, for a sparkling little book called *The Elements of Style*, by William Strunk, Jr., and E. B. White, which was the inspiration for *Being Logical*. What I have managed to accomplish here is no match for the unique achievement of Strunk and White, but I hope that *Being Logical* might to some degree succeed in doing for the cause of good thinking what *The Elements of Style* has done for that of good writing. My earnest wish is that this book may succeed in convincing its readers of the intrinsic importance of logic—and that it engender in them an appreciation for the priceless satisfaction which inevitably accompanies the happy state of being logical.

Contents

<i>Preface</i>	ix
PART ONE—PREPARING THE MIND FOR LOGIC	1
1. <i>Be Attentive</i>	3
2. <i>Get the Facts Straight</i>	4
3. <i>Ideas and the Objects of Ideas</i>	7
4. <i>Be Mindful of the Origins of Ideas</i>	7
5. <i>Match Ideas to Facts</i>	9
6. <i>Match Words to Ideas</i>	11
7. <i>Effective Communication</i>	12
8. <i>Avoid Vague and Ambiguous Language</i>	16
9. <i>Avoid Evasive Language</i>	18
10. <i>Truth</i>	19
PART TWO—THE BASIC PRINCIPLES OF LOGIC	23
1. <i>First Principles</i>	25
2. <i>Real Gray Areas, Manufactured Gray Areas</i>	30
3. <i>There's an Explanation for Everything, Eventually</i>	32

4. <i>Don't Stop Short in the Search for Causes</i>	33
5. <i>Distinguish Among Causes</i>	35
6. <i>Define Your Terms</i>	37
7. <i>The Categorical Statement</i>	41
8. <i>Generalizing</i>	42
PART THREE—ARGUMENT: THE LANGUAGE OF LOGIC	45
1. <i>Founding an Argument</i>	47
2. <i>The Move from Universal to Particular</i>	49
3. <i>The Move from Particular to Universal</i>	50
4. <i>Predication</i>	51
5. <i>Negative Statements</i>	52
6. <i>Making Comparisons</i>	55
7. <i>Comparison and Argument</i>	58
8. <i>Sound Argument</i>	59
9. <i>Conditional Argument</i>	63
10. <i>Syllogistic Argument</i>	67
11. <i>The Truth of Premises</i>	70
12. <i>The Relevancy of Premises</i>	70
13. <i>Statements of Fact, Statements of Value</i>	72
14. <i>Argumentative Form</i>	73
15. <i>Conclusions Must Reflect Quantity of Premises</i>	77
16. <i>Conclusions Must Reflect Quality of Premises</i>	79
17. <i>Inductive Argument</i>	81
18. <i>Assessing Argument</i>	84
19. <i>Constructing an Argument</i>	86
PART FOUR—THE SOURCES OF ILLOGICAL THINKING	89
1. <i>Skepticism</i>	91
2. <i>Evasive Agnosticism</i>	92
3. <i>Cynicism and Naïve Optimism</i>	93
4. <i>Narrow-Mindedness</i>	94

5. <i>Emotion and Argument</i>	95
6. <i>The Reason for Reasoning</i>	96
7. <i>Argumentation Is Not Quarreling</i>	97
8. <i>The Limits of Sincerity</i>	98
9. <i>Common Sense</i>	98
PART FIVE—THE PRINCIPAL FORMS OF ILLOGICAL THINKING	101
1. <i>Denying the Antecedent</i>	104
2. <i>Affirming the Consequent</i>	105
3. <i>The Undistributed Middle Term</i>	106
4. <i>Equivocation</i>	106
5. <i>Begging the Question</i>	109
6. <i>False Assumptions</i>	111
7. <i>The Straw-Man Fallacy</i>	112
8. <i>Using and Abusing Tradition</i>	112
9. <i>Two Wrongs Don't Make a Right</i>	113
10. <i>The Democratic Fallacy</i>	114
11. <i>The Ad Hominem Fallacy</i>	115
12. <i>Substituting for the Force of Reason</i>	115
13. <i>The Uses and Abuses of Expertise</i>	116
14. <i>The Quantifying of Quality</i>	117
15. <i>Consider More Than the Source</i>	119
16. <i>Stopping Short at Analysis</i>	120
17. <i>Reductionism</i>	120
18. <i>Misclassification</i>	121
19. <i>The Red Herring</i>	121
20. <i>Laughter as Diversionary Tactic</i>	122
21. <i>Tears as Diversionary Tactic</i>	123
22. <i>An Inability to Disprove Does Not Prove</i>	124
23. <i>The False Dilemma</i>	125
24. <i>Post Hoc Ergo Propter Hoc</i>	125

<i>25. Special Pleading</i>	127
<i>26. The Fallacy of Expediency</i>	127
<i>27. Avoiding Conclusions</i>	128
<i>28. Simplistic Reasoning</i>	128
 <i>Afterword</i>	 131

PART ONE

*Preparing the Mind
for Logic*

Being logical presupposes our having a sensitivity to language and a knack for its effective use, for logic and language are inseparable. It also presupposes our having a healthy respect for the firm factualness of the world in which we live, for logic is about reality. Finally, being logical presupposes a lively awareness of how the facts that are our ideas relate to the facts that are the objects in the world, for logic is about truth. In this first part of the book I will discuss those attitudes, points of view, and practical procedures whose adoption prepares the mind for a successful engagement with logic.

1. Be Attentive

Many mistakes in reasoning are explained by the fact that we are not paying sufficient attention to the situation in which we find ourselves. This is especially true in familiar situations. That very familiarity causes us to make careless judgments about facts right before our eyes. We misread a situation because we are skimming it, when what we should be doing is perusing it. Often, we assume that a familiar situation will be but a repeat performance of a similar situation we've experienced before. But, in the strictest sense, there are no repeat performances. Every situation is unique, and we must be alert to its uniqueness.

The phrase "to pay attention" is telling. It reminds us

that attention costs something. Attention demands an active, energetic response to every situation, to the persons, places, and things that make up the situation. It is impossible to be truly attentive and passive at the same time. Don't just look, see. Don't just hear, listen. Train yourself to focus on details. The little things are not to be ignored, for it is just the little things that lead us to the big things.

2. *Get the Facts Straight*

A fact is something made or done. It has clear objective status. It is something we respond to as having an independent status all its own. It is naggingly persistent, demands recognition, and can be nasty if ignored.

There are two basic types of objective facts, things and events. A "thing" is an actually existing entity, animal, vegetable, or mineral. The White House is an example of the first type of fact, and the assassination of Abraham Lincoln of the second. The first type is more basic than the second because events are made up of things or of the actions of things. A state dinner is to be held at the White House. Such an event could not take place were it not for the existence, first and foremost, of the fact that is the White House, and countless other facts as well. In order to establish the factualness of an event, any number of concrete things need to be appealed to.

To determine the reality of a fact that is a thing, all you need do is pay it a visit. If it actually exists it must be somewhere, and, assuming its place to be accessible to you, you can verify its factualness by direct observation. Take the

case of the White House. To ascertain its being a fact, rather than purely imaginary, you can travel to Washington, D.C., and there see the White House with your own eyes. That is the most direct and reliable way to establish its factualness. But you could also rely on indirect evidence: For example, by taking the word of a trustworthy eyewitness that the White House is indeed in Washington, D.C. Or you could decide that photographic evidence is sufficient to establish factualness.

But what about an event like Lincoln's assassination? We say that is a fact. What is the justification for that claim? It is an event that is over and done with, and there are no living witnesses to the event whom we might consult. Obviously, we did not ourselves witness the event, so direct evidence is out of the question. In this case our approach will be to acquaint ourselves with a variety of things that serve as indirect evidence of the event. For example, we would consult official documents (police reports, the death certificate, etc.), newspaper accounts, photographs, memoirs, diaries, and items in the *Congressional Record*, all of which are facts in their own right and whose only reasonable explanation is the factualness of Lincoln's assassination. On the basis of the factualness of these things, we establish the factualness of the event. And we thus establish a historical fact.

Facts can also be thought of as objective or subjective. Both things and events are objective facts. They exist in the public domain and are in principle accessible to all. A subjective fact is one that is limited to the subject experiencing it. A headache would be an example of a subjective fact. If I

am the one experiencing the headache, then I have direct evidence of its factualness. But if it is you experiencing the headache, I can establish its factualness only indirectly. I must take your word that you have a headache. Establishing the reality of subjective facts depends entirely on the trustworthiness of those who claim to be experiencing them.

To sum up how we get the facts straight: If a given fact is an actually existing thing to which we have access, then the surest way to establish its factualness is to put ourselves in its presence. We then have direct evidence of it. If we cannot establish factualness by direct evidence, we must rigorously test the authenticity and reliability of whatever indirect evidence we rely upon so that, on the basis of that evidence, we can confidently establish the factualness of the thing.

There are only a very limited number of significant public events which we can experience directly. This means that, in almost every case, we must rely on indirect evidence. In establishing the factualness of events by indirect evidence, we must exercise the same kind of care we do in establishing the factualness of "things" by indirect evidence. It all comes down to the authenticity and reliability of our sources.

A subjective fact, to the subject experiencing it, is self-evident under normal circumstance. However, through such mechanisms as self-delusion or rationalization, a person could fail to get straight a fact even about himself.

Because the establishment of the factualness of a subjective fact pertaining to another person depends entirely on the trustworthiness of that person, you must first, insofar

as it is possible, establish the trustworthiness of the person in question.

3. Ideas and the Objects of Ideas

Every idea in the mind is ultimately traceable to a thing, or things, actually existing in a world that is independent of and apart from the mind. An idea is the subjective evocation of an objective fact. Clear ideas, then, are ideas that faithfully reflect the objective order from which they derive. Unclear ideas, conversely, are those that give us a distorted representation of the objective world.

Though the control we have over our ideas is not absolute, it is real. This means that we are not helpless in the face of unclear ideas. To ensure that our ideas are clear, we must vigilantly attend to the relationship between any given idea and its object. If it is a strained relationship, if the connection between the idea and its object is tenuous, then we are dealing with an unclear idea.

It is wrong to suppose that because we know things in the world only through our ideas, it is only our ideas which we really know. Our ideas are the means, not the ends, of our knowledge. They link us to the world. If they are clear ideas, the links are strong. The most efficient way to clarify our ideas is to look *through* them to the objects they represent.

4. Be Mindful of the Origins of Ideas

We all tend to favor our own ideas, which is natural enough. They are, after all, in a sense our very own babies, the con-

ceptions of our minds. But conception is possible in the thinking subject only because of the subject's encounter with the world. Our ideas owe their existence, ultimately, to things outside and independent of the mind, to which they refer: objective facts.

Our ideas are clear, and our understanding of them is clear, only to the extent that we keep constant tabs on the things to which they refer. The focus must always be on the originating sources of our ideas in the objective world. We do not really understand our own ideas if we suppose them to be self-generating, that is, not owing their existence to extramental realities.

The more we focus on our ideas in a way that systematically ignores their objective origins, the more unreliable those ideas become. The healthy bonds that bind together the subjective and objective orders are put under great strain, and if we push the process too far, the bonds may break. Then we have effectively divorced ourselves from the objective world. Instead of seeing the world as it is, we see a projected world, one that is not presented *to* our minds but which is the product *of* our minds.

When we speak of "establishing a fact," we do not refer to establishing the existence of an idea in the mind. The idea in the mind, as we have seen, is a subjective fact, but the kind of fact we are concerned with establishing is an objective fact. To do so, we must look beyond our ideas to their sources in the objective world. I establish a fact if I successfully ascertain that there is, for a particular idea I have in mind, a corresponding reality external to my mind. For instance, I have a particular idea in my mind, which I label

"cat." Corresponding to that idea are actually existing things in the extramental world called "cats." But I could have another idea in my mind, which I label "centaur" but for which no corresponding fact can be found in the extramental world. For all that, the idea of "centaur" is a subjective fact, since it really exists as an idea in my mind.

5. Match Ideas to Facts

There are three basic components to human knowledge: first, an objective fact (e.g., a cat); second, the idea of a cat; third, the word we apply to the idea, allowing us to communicate it to others (e.g., in English, "cat"). It all starts with the cat. If there were no real cats, there would be no idea about them, and there would be no word for the idea. I have been stressing the general point that ideas (subjective realities) are clear or sound to the extent that they reflect objective realities. And we have said that all ideas have their ultimate source in the objective world. Now we must look more closely at how ideas relate to the objective world, for the relation is not always simple. Next, we must address the question: How are bad ideas possible?

Sometimes there is a direct correlation between an idea and an objective fact. Example: the idea of cat. We will call this a "simple" idea. Corresponding to my idea of cat is a single, particular sort of entity in the extramental world—that furry, purring creature which in English we name a cat. In dealing with simple ideas it is relatively easy to test their reliability, because we need only refer to one thing. My idea of cat is clear and sound if it refers to an actual cat.

We will call "complex" ideas those for which there is no simple one-to-one correspondence between idea and thing. Here the correspondence is one to many. There is more than a single originating source for this kind of idea in the objective world. Let's take the idea of democracy. Is it a clear or a sound one? It is, at least potentially. It is a clear or sound idea to the extent that we are able to relate it to the objective world. But there are many things in the objective world that go together to compose the rich meaning of the idea of democracy: persons, events, constitutions, legislative acts, past institutions, present institutions. If my idea of democracy is going to be communicable to others, it must refer to what is common to me and to others, those many things in the objective world that are its originating source. To prevent my idea from being a product of pure subjectivism, in which case it could not be communicated to others, I must continuously touch base with those many facts in the objective world from which the idea was born.

How are we to explain bad (that is, unclear or unsound) ideas? An idea is unclear or unsound to the degree that it is distanced from and unmindful of its originating source in the objective world. No idea, even the most bizarre, can completely sever its ties with the objective world, but ideas can become so remote from that world that their relation to it is difficult, if not impossible, to see. Bad ideas can be informative, not about the objective world—for they have ceased faithfully to reflect that world—but about the subjective state of the persons who nourish those ideas. Bad ideas do not just happen. We are responsible for them. They result from carelessness on our part, when we cease to pay

sufficient attention to the relational quality of ideas, or worse, are a product of the willful rejection of objective facts.

6. Match Words to Ideas

As we have seen, first comes the thing, then the idea, then the word. If our ideas are sound to the extent that they faithfully represent the thing, they will be clearly communicable only if we clothe them in words that accurately signify them. Ideas as such are not communicable from one mind to another. They have to be carefully fitted to words, so that the words might communicate them faithfully. Putting the right word to an idea is not an automatic process, and sometimes it can be quite challenging. We have all had the experience of knowing what we want to say but not being able to come up with the words for it.

How do we ensure that our words are adequate to the ideas they seek to convey? The process is essentially the same as the one we follow when confirming the clarity and soundness of our ideas: We must go back to the sources of the ideas. Often we cannot come up with the right word for an idea because we don't have a firm grasp on the idea itself. Usually, when we clarify the idea by checking it against its source in the objective world, the right word will come to us.

Sometimes there is a perfect match between word and idea, which would mean a perfect match between word and thing, for if the idea is clear it faithfully represents the thing, and if the word accurately expresses the idea, it would at the same time faithfully identify the thing. This

commonly happens with simple ideas. If I say, "The monument is granite," and the monument to which I refer is in fact granite, then in "granite" I have the perfect match for the idea and the thing it represents. It gets more complicated when we are dealing with complex ideas, but the general principle remains the same: In order to guarantee accuracy in your use of words, go back to the objective facts that are the foundational explanations for words.

In the effort to come up with words that accurately convey ideas, our ultimate purpose should always be this: to shape our language that it communicates to others the way things actually are—objective reality. It is not enough that language be satisfied with ideas as such, but with clear and sound ideas. Let us say I fervently hold to the real existence of Lilliput, and have all sorts of ideas about it. I may be able to come up with scads of words that accurately convey those ideas to you, but all those words do is reveal the state of my mind. They do not reveal the state of the world. They deal with subjective reality, not objective reality.

7. Effective Communication

Language and logic are inextricably bound up with each other. How that is so becomes clear when we recall the relationship between the idea and the word. Although it is a disputed point among the experts, it seems possible that we can hold an idea in our mind without having a precise word for it. In any event, if we are going to attempt to communicate an idea to others, it is imperative that we express it by a word. And, as we have seen, the better the fit between word

and idea, the clearer and more effective the communication of the idea.

Matching words to ideas is the first and most basic step in communication. The next step is putting ideas together to form coherent statements. If I said to you "dog" or "cat," your response would be expectant, waiting to hear more. You would wonder, What about dogs or cats? Through the words I'm speaking, you know the ideas I'm dealing with, but you don't know what I intend to do with those ideas. I'm simply "saying" the ideas; I'm not saying anything *about* them. We say something about ideas when we put them together to form statements that can be responded to affirmatively or negatively. Notice that if someone simply says "dog," there would not be much sense in responding with "That's true" or "That's false." But if someone says something about a dog—"The dog is in the garage"—then such a response would be appropriate. "Statement" has a special meaning in logic. It is a linguistic expression to which the response of either "true" or "false" is appropriate.

Words have been called the building blocks of language, but it is the *statement* that logic starts with, for it is only at the level of the statement that the question of truth or falsity is introduced, and logic is all about establishing what is true and distinguishing it from what is false. It can sometimes be tough enough determining whether a statement is true or false when that statement is clearly understood. But if we have difficulty understanding what a statement is attempting to say, then our difficulties are compounded, because we have to figure out the meaning of the statement before we can get on to the main business of determining whether it is

true or false. Thus the importance of clear, effective communication.

It is impossible to have clear communication without clear thinking. How can I give you a clear idea of something if it is not first clear in my own mind? However, clear ideas do not guarantee clear communication. I may have a perfectly good idea of what I'm *trying* to say, but can't succeed in getting my ideas across clearly and effectively.

Here are some basic guidelines for effective communication:

Don't assume your audience understands your meaning if you don't make it explicit.

The more complicated the subject matter dealt with, the more important this point is. We sometimes take it for granted that an audience is aware of background information that is necessary for a correct understanding of the subject we're speaking on, but in fact the audience may be quite innocent of this information. When in doubt, spell out the background information. It is always better to err on the side of saying too much than on the side of saying too little.

Speak in complete sentences.

The sentence with which logic is most concerned is the declarative sentence. A declarative sentence is the same thing as a statement (also called a "proposition" in logic). If I say "Dog turtle," "Falling stock prices in July," "The building's Indiana limestone facade," you could presume I am intending in each case to link certain ideas together, but

you do not know how. That is because I am not forming genuine statements. I need to speak in complete sentences: "The dog bit the turtle," "Falling stock prices in July depressed Julian," "The building's Indiana limestone facade was severely defaced by the vandals."

Don't treat evaluative statements as if they were statements of objective fact.

"The Pearce Building is on the corner of Main and Adams" is a statement of objective fact, and as such it is either true or false. "The Pearce Building is ugly" is an evaluative statement, and as such it combines both subjective and objective elements. Evaluative statements do not lend themselves to a simple true-or-false response. We must not invite unwarranted responses to statements, which is just what we do when we attempt to pass off an evaluative statement as if it were a statement of objective fact. True statements of objective fact are not open to argument; evaluative statements are. If I want an evaluative statement to be accepted, I must argue for it.

Avoid double negatives.

In Spanish, double negatives have the effect of intensifying the negative import of a sentence. In English, double negatives cancel each other out, making the sentence affirmative. This can sometimes cause confusion, since the sentence sounds negative but is in fact affirmative. To avoid that confusion, and for greater clarity of expression, avoid double negatives. Instead of saying, "It is not unlikely that she would be welcome," say "She would be welcome."

Gear your language to your audience.

If you are a physicist discussing the principle of indeterminacy with other physicists at a professional conference, you can freely use the technical jargon of your profession. But if you are asked to explain that principle to a group of nonphysicists, you should adjust your vocabulary and present your material in ordinary language. Don't use technical or "insider" language merely to impress people. The point is to communicate. The two extremes to be avoided are talking down to people and talking over their heads.

An important point to note here is that we obviously cannot attune our language to our audience if we do not know our audience. The first order of business, then, is to have a reasonably good sense of the composition and background of the group you will be addressing.

8. Avoid Vague and Ambiguous Language

Vagueness and ambiguity are specific instances of the kind of language that can inhibit clear and effective communication. The word "vague" comes from the Latin adjective *vagus*, which means "wandering," while the word "ambiguous" traces its origin to the Latin verb *ambigere*, which means "to wander about." Vague and ambiguous words and expressions wander about among various ideas instead of settling definitely upon one or another particular idea. They all share the defect of not having a fixed, unmistakable meaning.

A word is vague if its referent is blurred. We do not know precisely what the word is pointing to. Consider the

two statements "People don't like music like that" and "They say he will not run for a second term." A natural response to the first statement would be: "What people, and what kind of music?" A response to the second statement might be: "Who are 'they'?" In both instances we are uncertain of what is being talked about for lack of precise information. For those statements substitute these: "People who have been trained at the San Francisco Conservatory of Music don't like West Cork folk music." "The Candidate Selection Committee for the People's Party says he will not run again." Now we have something more definite to respond to.

As a rule, the more general the word, the vaguer it is. A sure preventative against vagueness, then, is to make your words as precise and sharply focused as possible. Your reader or listener should not be forced to guess at exactly what your words are pointing to. If you mean to communicate information specifically about rocking chairs, or antique chairs, or dentist's chairs, or electric chairs, then use those specific terms rather than the more general "chairs." Usually the context in which a general term appears will allow your audience to figure out its referent, but if you have any doubts about that, use a specific term.

Terms like "love," "democracy," "fairness," "equality," "good," and "evil" can be vague, not because they have no meaning but because they are especially rich in meaning. Thus, two people can use the same term—"love," for example—and understand it in quite different, perhaps even contradictory, ways. That is why it is imperative, in using terms of this sort, that you make explicit your understand-

ing of them. Before you attempt to persuade an audience that a certain situation is unfair, tell them what you mean by unfairness.

An ambiguous term (“equivocal,” in the language of logic) is one which has more than a single meaning and whose context does not clearly indicate which meaning is intended. A sign posted at a fork in a trail which reads BEAR TO THE RIGHT can be understood in two ways. The more probable meaning is that it is instructing hikers to take the right trail, not the left. But let us say that the ranger who painted the sign meant to say just the opposite. He was trying to warn hikers against taking the right trail because there is a grizzly bear in the area through which it passes. The ranger’s language was therefore careless, and open to misinterpretation that could have serious consequences. The only way to avoid ambiguity is to spell things out as explicitly as possible: “Keep left. Do not use trail to the right. Grizzly bears in the area.”

9. Avoid Evasive Language

You should always be so straightforward in your language that it would be impossible for any reasonably attentive audience to miss your meaning. This is not to suggest that you have to use words like sledgehammers. One can be perfectly clear without being either crude or cruel.

There is a place for euphemism in language. But we have to be careful that euphemistic usage doesn’t become a way of evading what really is at issue. Consider a term like “final solution,” which was used to disguise a heinous pro-

gram for exterminating an entire people. The problem with evasive language, language that does not state directly what a speaker or writer has in mind, is twofold. First, and obviously, it can deceive an audience. Second, and more subtly, it can have a deleterious effect on the people who use it, distorting their sense of reality. The user shapes language, but language shapes the user as well. If we consistently use language that serves to distort reality, we can eventually come to believe our own twisted rhetoric. Such is the power of language. At first hearing, terms like “cultural revolution” and “reeducation” might sound quite harmless. Then one learns that they masked totalitarian brutality at its worst.

It is juvenile to use language simply to shock. But shocking language is preferable to evasive language, if it can disabuse people of hazy ideas and acquaint them with the truth.

10. Truth

The whole purpose of reasoning, of logic, is to arrive at the truth of things. This is often an arduous task, as truth can sometimes be painfully elusive. But not to pursue truth would be absurd, since it is the only thing that gives meaning to all our endeavors. It would be equally absurd to suppose that truth is something forever to be pursued but never to be attained, for that renders our activity purposeless, which is to say, irrational, and turns truth into a chimera.

Truth has two basic forms. There is “ontological” truth and “logical” truth. Of these two, ontological truth is the more basic. By ontological truth we refer to the truth of

being or existence. Something is said to be ontologically true, then, if it actually exists; it has real being. The lamp sitting on my desk is ontologically true because it is really there. It is not an illusion. The opposite of ontological truth is nonexistence.

Logical truth, as you might suspect, is the form of truth we are most directly concerned with as logicians. Logical truth is simply the truth of statements. More broadly, we could say that it is truth as it manifests itself in our thinking and language. Let us examine the notion of logical truth carefully, for it is going to prove very important in all that follows.

Recall the definition of a statement, given earlier: a linguistic expression to which the responses "true" or "false" would be appropriate. To affirm a statement is to declare it to be true; to deny it is to brand it as false.

A statement is true if what it says reflects what is the case. Consider the statement "The boat is tied to the pier." The statement is true if there really is a boat, there really is a pier, and the boat is really tied to the pier. What a true statement does is declare, through the medium of language, a correspondence between ideas in the mind (subjective facts) and real states of affairs in the world (objective facts). "The boat is tied to the pier" would be false if there were a discrepancy between what it says and what actually is the case.

Establishing the truth in any particular situation is a matter of determining whether what one believes to be true, or suspects might be true, has a basis in fact. It is a matter of bringing together into harmonious juxtaposition the

subjective and the objective. But the focus of attention here must be on the objective order of things. If I am uncertain about the truth of the statement "The dog is in the garage," it will not help me to resolve the issue if all I do is reflect upon my own ideas on dogs and garages and the various ways they can be related to one another. I have to go out and check the garage. It should be clear now why we said that of the two forms of truth, ontological and logical, the former is more basic. What determines the truth or falsity of a statement is what actually exists in the real world. Logical truth, in other words, is founded upon ontological truth.

A word in passing about lies. Lying is more a psychological problem than a logical one. When I lie, I have no doubts about an actually existing situation in the real world, but in my statement about that situation I consciously and deliberately contradict my own knowledge. I know the situation to be properly expressible in the form "A is B," but my statement says "A is not B."

Logical truth, as we have seen, is a matter of a correspondence between the content of a statement (which reflects the ideas held by the person making the statement) and objective facts. This understanding of the nature of truth, not surprisingly, has been called the "correspondence theory of truth." Another theory, the "coherence theory of truth," is subordinate to the correspondence theory.

The coherence theory of truth maintains that any given statement is true if it harmoniously fits into (is coherent with) an already established theory or system of thought. Take, for example, Einstein's Special Theory of Relativity. It is concluded that a particular statement about the nature

of the physical world is true because what it says is consonant with the Special Theory of Relativity. What would make such a conclusion a logically responsible one is the fact that the Special Theory of Relativity itself, as a theory, reflects the way the physical world actually *is*. There is a correspondence between the theory and objective reality. We can see, then, that the coherence theory of truth, if responsibly applied, depends upon the correspondence theory of truth, which remains foundational.

We should be aware, though, that the coherence theory of truth can be seriously abused, which would be the case if a statement is judged to be true merely by virtue of the fact that it fits into an established theory or system of thought that itself does not correspond with reality, or does so only questionably. For example, if Marxist economic theory can be shown to be dubious, then the claim that a certain statement about economic matters is true because it is consonant with that theory is likewise dubious.

PART TWO

*The Basic Principles
of Logic*

Whether logic is regarded as a science, an art, or a skill—and it can properly be regarded as all three—there must be principles, seminal regulating ideas, that shape the enterprise and guide its activities. In this part we will treat the most basic of the principles of logic. Our focus will be less on the theoretical backdrop of the principles and more on their practical application. The ideal is to assimilate these principles to the point where they become like second nature to you, smoothly guiding your thought without your having to refer consciously to them.

1. First Principles

A science is any organized body of knowledge that is possessed of first principles. The first principles of any science are those fundamental truths upon which the science is founded and by which all its activities are informed. Logic, as a science, has its first principles, but logic stands in a unique relationship to all other sciences because the first principles of logic apply not just to logic but to all the sciences. Indeed, their coverage is more comprehensive still, because they apply to human reason as such, however it might be exercised. This being so, the terms “the first principles of logic” and “the first principles of human reason” can be said to refer to the same thing.

There are four first principles of logic (or of human reason); the one we are most concerned with here is the principle of contradiction. To put it in its proper context, however, let us first review the three other first principles of logic.

THE PRINCIPLE OF IDENTITY

Stated: A thing is what it is.

Explanation: The whole of existing reality is not a homogenous mass. It is a composition of individuals, and the individuals are distinguishable from one another. If a thing is what it is, obviously it is not something other than what it is. An apple is an apple. It is not an orange, a banana, or a pear.

THE PRINCIPLE OF THE EXCLUDED MIDDLE

Stated: Between being and nonbeing there is no middle state.

Explanation: Something either exists or it does not exist; there is no halfway point between the two. The lamp sitting on my desk is either really there or it is not. There is no other possibility. We might ask: How about becoming? Isn't the state of becoming between those of being and nonbeing? The answer is no. There is no such thing as just becoming; there are only *things that become*. The state of becoming is already within the realm of existence. A lamp in the process of being made is not yet a lamp; however, the parts that will go to compose it actually exist, and the lamp's "becoming" depends entirely on their existence. There is, then, no becoming in the absolute sense, no passage from nonbeing to being. Elaine, who is becoming every day a

more accomplished musician because of assiduous practice, could not be becoming a musician if she were not already Elaine. There is no becoming with respect to the very existence of a human person. Elaine is "becoming" relatively, not absolutely: She is not becoming Elaine; she is becoming Elaine the more accomplished musician. Again, the basic idea behind the principle of excluded middle is that there are no gaps in being. What we call "becoming" is not a passage from nonbeing to being, but an alteration in a thing or in things already in existence.

THE PRINCIPLE OF SUFFICIENT REASON

Stated: There is a sufficient reason for everything.

Explanation: The principle could also be called "the principle of causality." It states that everything that actually exists in the physical universe has an explanation for its existence. What is implied in the principle is that nothing in the physical universe is self-explanatory or the cause of itself. (For a thing to be a cause of itself, it would somehow have to precede itself, which is absurd.) One thing is said to be the cause of another thing because (a) it explains the very existence of that thing, or (b) it explains why the thing exists in this or that particular way, the "mode" of its existence. Larry's mother and father are the cause of his very existence; if it were not for them, he would not be. Larry's tennis coach in high school is a cause of his being a good tennis player. The coach is the cause of Larry's being in a particular way—in this case, a good tennis player. The coach did not, as did Larry's parents, bring him into being, but he caused a modification in his being. (Of course, there could have been other

causes contributing to Larry's being a good tennis player, so the coach may be only one among several causes.)

THE PRINCIPLE OF CONTRADICTION

Stated: It is impossible for something both to be and not be at the same time and in the same respect.

Explanation: This principle could be regarded as a fuller expression of the principle of identity, for if X is X (principle of identity) it cannot at one and the same time be non-X (principle of contradiction). The phrase "in the same respect" in the statement refers to the mode of existence in question. There would be no contradiction if something both was and was not at the same time but in different respects. For example, you can be physically in New York right now and mentally three thousand miles away in San Francisco. But you cannot right now be physically (i.e., in the same respect) both in New York and in San Francisco. Two statements are in contradiction if what one says completely negates what the other says. For example:

a) Alexander Hamilton was a member of George Washington's cabinet.

b) Alexander Hamilton was not a member of George Washington's cabinet.

Both of these statements cannot be true. If one is true, the other must be false, and vice versa. As it happens, (a) is true; (b), therefore, is false.

The word "contradiction" comes from two Latin roots, *contra* ("against") and *dicere* ("to speak"). A contradictory statement in effect speaks against itself, for it is saying something that does not correspond to the objective facts.

The avoidance of contradiction, therefore, is simply the avoidance of falsehood. If the primary purpose of logic is to attain the truth, then it is evident that nothing could be more important than avoiding the opposite of truth.

Sometimes we entertain contradictions without realizing that they are such, because we are ignorant of the relevant objective facts. This is excusable so long as we are not responsible for our ignorance. If we are going to make deliberate statements about important matters in a serious context, we are under obligation to make sure our statements square with what is actually the case. This goes back to the importance of paying attention.

There are times when we hold contradictory views and we know it, at least at one of the deeper levels of consciousness. Most of us could not comfortably live with ourselves if we made a habit of holding flatly contradictory statements at the forefront of our consciousness. For example, I could not explicitly say to myself "I tell many deliberate lies to Stephanie" and "I never lie to Stephanie." What I do, assuming the first statement reflects objective facts, is suppress the second statement. Another way I can allow myself to hold on to statements that contradict the facts is deliberately to refrain from examining the facts to which the statements refer. This attitude is expressed by the quip "Don't bother me with the facts; I've already made up my mind." Mental operations of these kinds are not so much instances of reasoning as evasion of reasoning. Obviously, this can have nothing to do with logic. Those forms of unhealthy reasoning can be known as "rationalization." Rationalization is reasoning in the service of falsehood.

Having now reviewed the first principles of reasoning, I am assuming that nothing you just read struck you as radically new. That is because these principles express truths we all become aware of very early in our careers as conscious, rational agents. There are a couple of other things about first principles—all first principles—that need to be noted. They are self-evident. For instance, the first time you read the principle of contradiction, you may have to puzzle over it a moment. But as soon as you see what it is saying, your natural response is, “Of course!”

Another trait of first principles—it follows from their being self-evident—is that they cannot be proven. This means that they are not conclusions that follow from premises; they are not truths dependent upon antecedent truths. This is because first principles represent truths that are absolutely fundamental. They are “first” in the strongest sense of the word.

Consider the principle of sufficient reason. I cannot prove that everything that exists must have a cause, nor do I need to, since it is a truth self-evident to me simply by my observing the way the world works. I either see it or I don’t. If the first principles of a science are not seen as self-evident and accepted at face value, the science could not proceed. It would stall right there.

2. Real Gray Areas, Manufactured Gray Areas

A gray area is a situation in which the truth cannot be clearly established. Life is full of them, and they have to be cheer-

fully contended with. But don’t make too much of them. Some people become so fixated upon life’s gray areas that they eventually succeed in convincing themselves that there is nothing *but* gray areas. A little realism is in order here. We must recognize that many things are, in fact, clearly and sharply defined, and not to see that is simply not to see clearly.

Gray can exist as gray only because there are the distinct alternatives of black and white. That you might find yourself at times in a situation in which you see no clear alternatives does not mean, objectively considered, that there *are* no clear alternatives. It simply means that you do not see them. Don’t project your subjective state of uncertainty upon the world at large and claim objective status for it.

To be in a state of uncertainty concerning the truth is neither a pleasant nor a desirable state to be in, and we should always be striving to get out of such states as soon as possible. But, as a stay against discouragement while mired in a state of uncertainty, consider this: You may, right now, be uncertain about a particular matter, but that experience is only possible because you have known the opposite experience, the experience of being certain about something. (The principle is this: A negative can only be recognized as a negative—“uncertainty”—because its positive opposite is already known.) Therefore you know that certainty is a real possibility. If certainty is possible at all, then it is possible, eventually, with regard to the matter about which you are now uncertain. There is nothing to preclude, theoretically, your one day overcoming the uncertainty about a particular matter you are now experiencing.

3. There's an Explanation for Everything, Eventually

The principle of sufficient reason tells us that things don't just happen. They are caused to happen. We do not know the causes of everything, but we know that everything has a cause. A good part of our energies as rational creatures is devoted to the search for causes. We want to know why things happen. The knowledge of causes, simply from a theoretical point of view, can be very satisfying, since to know the causes of things is to have a truly profound understanding of them. But the knowledge of causes also has wide-ranging practical implications, for in many instances to know causes is to be able to control them, and to control causes is to control effects. If we know a certain bacterium is the cause of a particular disease, we may be in a position to eliminate the disease (effect) by negating the causal activity of the bacterium.

In the search for causes we obviously begin with effects. We are confronted with a phenomenon of one kind or another—an object, a state of affairs, an event—and we are seeking an explanation for it. There is no doubt in our minds that we are dealing with objective facts; our doubts concern only how those facts came to be. Our search is given systematic direction by the principle that there is a certain rudimentary similarity between every cause and effect. What this means, in terms of the cause, is that it must be capable of bringing about just the kinds of effects we are witnessing. And, in doing so, it leaves its peculiar mark on the effect. That being the case, every effect, to some degree or another, reflects the nature of its cause.

What are the practical implications of this? I cannot know directly what a cause is capable of effecting when it is precisely that cause I am looking for, but I can get an indirect knowledge of its causal capability through the effect that is right before me. It is by carefully sizing up the nature of the effect that I can get some understanding of the nature of the cause, and that knowledge will guide me in my search.

Let us say I am working in my study. I hear an odd noise coming from the kitchen. I go to investigate. On the floor lie the contents of a half-gallon bottle of milk that I had carelessly left on the counter. This is an objective matter of fact: the effect. What is the cause? On the counter, I see three ants near the bottle. The ants? No, they would not have been able to bring about an effect of this magnitude. I note that my canary is out of its cage and perched on top of the refrigerator. The canary? Once again, no. The effect is beyond the capacities of the canary. Then, through the open window, I see, out in the backyard, my neighbor's cat. Aha! Though I cannot be positive that the cat was the cause of the spilled milk, I know that a cat would at least be capable of bringing about such an effect. More investigation needs to be done, but at the moment I can at least consider the cat to be a possible cause of the spilled milk. He is under serious suspicion.

4. Don't Stop Short in the Search for Causes

Causes often arrange themselves in a series. For example, let us suppose that we have a situation in which A is the

cause of B. Next, we note that B is in turn the cause of C. We end up with a sequence that can be diagrammed as follows:

$$A \rightarrow B \rightarrow C$$

Let us next suppose that C represents a problematical state of affairs that calls for a quick remedy. Knowing that C has been caused by B, we decide to concentrate our attention on B, guided by the principle that the correct way to deal with problems is to get at their causes.

The logic being followed here is commendable as far as it goes, but it does not go far enough. While it is true that B is the immediate cause of C, it is not its ultimate cause. The causal sequence begins with A, and therefore that is the source of the problem C.

B is clearly the immediate cause of C, so if C is problematical, that means there is something problematical about B. But because B is itself an effect, whatever is problematical about it is to be traced to its cause A. The problem with C will not be effectively addressed, then, until the ultimate source of the problem with A is taken care of.

Let's see if we can put that in plain English. Sam notices a foul odor in the kitchen. Investigating, he discovers that a bucket placed in the cabinet under the sink is filled to the brim with reeking water. Once he empties the bucket, the stench is gone. But it gradually returns as the bucket fills up again. Now, Sam could continue to empty the bucket on a regular basis to meet the problem of the bad smell, but we would be disinclined to give him high marks for intelligence were he to remain satisfied with this solution. The only way

to solve the problem once and for all is to get at the root of it and fix the leaky pipes that are the explanation for the bucket continuously filling up.

Sometimes our failure to find the root causes of things is attributable to simple laziness. We don't push the investigation far enough. Other times it is impatience which works against us. We are so pressed by the need to do something that we settle for quick fixes, stop-gap measures, while the basic problem remains essentially undisturbed.

5. Distinguish Among Causes

Thus far, we have been dealing primarily with what is called the "efficient cause." The efficient cause, to rephrase what was said earlier, is an agent whose activity brings something into existence or that modifies its existence in one way or another. Besides the efficient cause there are the "final cause," the "material cause," and the "formal cause." Not every type of cause can be applied to everything we are attempting to analyze in terms of causality, but the more types of causes we can identify with something, the more comprehensive is our understanding of it.

The final cause, as applied to activity, is the purpose of the activity; as applied to an object, it is the use to which the object can be put. The material cause is the material out of which an object is composed. The formal cause is the identifying nature of a thing, that which makes it precisely what it is.

Let us analyze a birdhouse in terms of the four causes. Its efficient cause is Fred, who made it. Its material cause is

pinewood, the metal of nails, screws, and staples, and paint. Its formal cause is the peculiar configuration of its material, which accounts for its being a birdhouse and not a file box or a window planter. Its final cause is to provide shelter and a nesting site for birds.

As already mentioned, not everything can be analyzed in terms of all four causes. A mathematical idea (or any idea) would not have a material cause, because ideas are immaterial. A mathematician comes up with a particular idea; he would be its efficient cause. Its formal cause would be the specific nature of the idea (e.g., it is about concentric circles), and its final cause, let us say, is to contribute to the solution of a long-standing mathematical problem concerning concentricity and circularity.

In efficient causality a distinction can be made between the "principal cause" and the "instrumental cause." We say that a sculptor is the principal cause of a marble statue, because he is the ultimate explanation for its existence. But he is not the only explanation, for he needed tools to make the statue. In an important sense those tools caused the statue, albeit in a subordinate way—as instruments in the hands of the sculptor. The instruments are the means through which a principal efficient cause brings about a certain effect.

Though instrumental causes are subordinate to principal causes, in many cases they are no less necessary. A great cellist absolutely needs his instrument if he is to bring beautiful cello music into being. It is obvious that the dependence of the instrumental cause on the principal cause is absolute. The instrumental cause is passive and cannot initiate the action of which it is capable. A cello cannot play it-

self. The quality of both principal and instrumental causes have a bearing on the quality of the effect. The best cello ever made will not produce the best music ever heard in the hands of a cellist of limited talent. And the best cellist in the world will be prevented from making the exquisite music he wants to make, and which he is capable of making, if he has to play an inferior instrument.

Though both the principal and instrumental causes are necessary, the principal cause is the more important of the two, something we tend to forget when we put too much stress on the importance of the instrumental cause. It is doubtless necessary to provide the best instruments possible, but not to the neglect of providing the best instrumentalists possible as well. To repeat, the best instruments in incompetent hands don't bring about the best effects. There is also this to consider: A proficient principal cause can do things with even inferior instruments that an incompetent principal cause couldn't do with even the best of instruments.

6. Define Your Terms

The most effective way to avoid vagueness or ambiguity in logical discourse is to define one's terms. We speak of defining terms, but actually what we are defining is the objects to which terms (words) refer. The process of definition, the mechanics of it, is the way we relate a particular object (the object to be defined) to other objects and thereby give it a precise "location." In defining a term or word, we relate it as rigorously as possible to the object to which it refers. There

are two immediate practical benefits of carefully defining terms. Our own ideas are clarified, and, as a result, we can more effectively communicate them to others. Terms such as “justice,” “beauty,” and “wisdom,” which tend toward vagueness, are in special need of definition.

The logical definition of terms is a two-step process. Step one: Place the term to be defined in its “proximate genus.” Step two: Identify the term’s “specific difference.”

The proximate genus is that large class of objects in which the object we want to define belongs because it shares a nature with all the other members of that class. Aristotle’s classic definition of man is “the rational animal.” In that definition, “animal” is the proximate genus: the most immediate class in which “man” belongs. Why? Because man shares an animal nature with the other members of the class. Aristotle did not choose a class such as “living organism,” or “physical substance,” or “thing,” because these would be too broad. The “man” he wanted to define would have been grouped with all sorts of objects with which it did not share a nature.

Consider an assortment of toys in a large toy box placed in a room in a house located in Lansing, Iowa. We could say the toys are in the toy box, or in the room, or in the house, or in Lansing, Iowa. All statements would be true. But the toy box would be comparable to the proximate genus. There are different kinds of toys, but because they are all toys, they belong in the toy box. That is their proper “class.”

The specific difference is the characteristic (or characteristics) that sets apart the object we want to define from

other objects in its genus. In Aristotle’s definition of man, a single characteristic, rationality, is cited as differentiating man from all the other animals. The specific difference literally *specifies*; that is, it identifies a particular species and sets it apart from other species in its genus. When we define something, what we are attempting to do is simply identify it more precisely—first by grouping it with other things that are *generally* similar to it, then by noting what is unique to it (the specific difference) in comparison with the other things in the group.

Let us try it with a couple of challenging terms.

a) Term to be defined: justice.

Step 1: “Justice is a social virtue . . .”

Step 2: “. . . by which each individual renders to all others what is due to them.”

COMMENT: “Social virtue” is the right category (proximate genus) in which to put our term because it provides an accurate general description of it. Categories like “mineral” or “institution” or “event” would obviously be wrong for the term. Categories such as “something” or “concept” or “phenomenon” would be too large; they would lack the quality of proximity (as in “proximate genus”). But while justice is a social virtue, it is not the only one. What, then, distinguishes it from other social virtues, such as courtesy, generosity, or tolerance? The specific difference we have given in the definition pinpoints its uniqueness, as a social virtue, rather nicely.

b) Term to be defined: fear.

Step 1: "Fear is an emotion . . ."

Step 2: ". . . that causes us to withdraw from perceived danger."

COMMENT: "Sense appetite" is another term that could be used to identify the proximate genus. The specific difference succeeds in telling us precisely what kind of emotion we are dealing with.

Aristotle's pithy two-word definition of man—the rational animal—has gained classical status. "Animal" is the proximate genus; "rational" is the specific difference. But seldom can we match that kind of economy, especially when it comes to specific difference. If we were to define "automobile," for example, taking the first step would be easy enough: "vehicle." But then we would have to come up with several specific differences in order to distinguish it precisely from all the other kinds of vehicles there are in the world.

The special value of logical definition is that it reveals the exact nature of the object defined. Such definition is not always possible, however, as when we are not yet familiar enough with an object to be able to determine its exact nature. In such a case we can define the object in a loose way, by description. A good description gives as complete and detailed an account of the observable characteristics of an object as possible. The hope is that this account will provide some revealing hints as to the nature of the object in question.

7. The Categorical Statement

The purpose of the reasoning process, logic's principal concern, is demonstration. I am not reasoning with you if I simply *say* that such-and-such is true and expect you to accept it as true only on my say-so. I must *show* you that such-and-such is true, and I do that by making an argument. An argument will only be as good as the statements of which it is composed, and those statements, in turn, will only be as good as the terms of which they are composed. Everything I have said thus far has been said with argument in mind. Argument is *the* activity of logic, and any particular argument is a concrete manifestation of the reasoning process. The next step in the process will be to look more closely at the statement, more specifically, at the "categorical statement." The most effective argument is one whose conclusion is a categorical statement. A categorical statement tells us that something definitely is the case. For example, "The radio is in the backseat of the car." We are certain as to what is the actual situation here. But if someone says, "Perhaps the radio is in the backseat of the car," or "The radio may be in the backseat of the car," all certitude is gone. Those are not categorical statements, and we are left in doubt as to what actually is the case. A categorical argument (one made up of categorical statements) is the most effective of arguments, then, because it provides us with certain knowledge. But it is the actual situation which determines whether or not we are allowed to speak in categorical statements. For example, if I have genuine doubts as to the whereabouts of the radio, it would be irresponsible of me to state categorically that it

is in the back of the car. But whenever the situation warrants it, that is, whenever we have real certitude, we should express that certitude by speaking categorically.

A word of caution. A statement may be categorical in form but may not express what is *objectively* the case. A person may say, "The Chicago Cubs are the best team in baseball." That is a categorical statement, but what it tells us is that the person making it has no doubts about this particular matter. It reveals what is subjectively the case, because it declares what is, in fact, the speaker's opinion. But it does not refer to any objective state of affairs.

8. *Generalizing*

A general statement is one whose subject is very large in scope. Such a statement is not necessarily inaccurate. "Horses are vertebrates" and "Houses are domestic dwellings" are general statements, and there is no reason to dispute the claims they are making. What makes a general statement sound is the fact that what is being attributed to the class represented by the subject is (a) true and (b) in fact applies to the entire class.

In a statement like "Horses are vertebrates," the assumption is that each and every member of the class specified by the subject ("horses") is being referred to. But the language of the statement does not make that explicit. In order to eliminate any doubt about the matter, we add the qualifier "all" to the statement: "All horses are vertebrates." And, if we do not intend to refer to each and every member

of the subject class, then we must be explicit in our language: "Some houses are bungalows."

Explicit language in general statements is important because it guards against any possible confusion on the part of an audience. Some people deliberately leave out linguistic qualifiers ("all," "some") because they want what they are saying to be understood as applying to an entire class without being explicit about it. In more cases than not, a statement such as "Carthaginians are cruel and stupid" is meant to refer to *all* Carthaginians. If one who makes such a claim is called to task, he can use as an out the fact that he didn't say *all* Carthaginians are cruel and stupid. True, he didn't say it, but he implied it.

There are two types of general statements, the universal and the particular. A "universal affirmative statement" is an "every" or "all" statement ("All whales are mammals"). It affirms something about an entire class. A "universal negative statement" is a "no" statement ("No fish have feet"). It denies something of an entire class. A "particular statement," affirmative or negative, does not refer to each and every member of the class specified by its subject. It is usually marked by the qualifier "some" ("Some mammals are arboreal"; "Some potatoes are not new"). But the statements "Most adult Americans drive cars" and "The majority of the junior class voted for Peterson" are also particular statements. So long as the *entire* class is not being referred to, the statement is particular. Be it large or small, a portion is a portion.

When we refer to a statement's being universal or par-

ticular, we are concerned with what in logical language is called the “quantity” of the statement. The “singular statement” stands in contrast to the “general statement”; it is characterized by the fact that its subject is an individual. “Mary is from Maryland” is a singular statement; so is “Wrigley Field is in Chicago.”

“Universal statements,” affirmative or negative, are very precise. They are affirming or denying something of an entire class, with no exceptions. Particular statements, on the other hand, are usually rather vague. “Some” covers a lot of territory; it could mean 99 percent or 2 percent. But it is possible for particular statements to be quite precise: “Sixteen percent of the runners finished the race in under two hours.” Always be as precise in your statements about things as your knowledge of them allows you to be.

PART THREE

*Argument:
The Language
of Logic*

