

Irving M. Copi

INTRODUCTION TO
LOGIC

SEVENTH EDITION

Irving M. Copi

UNIVERSITY OF HAWAII

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LOGIC

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*This book is dedicated to the memory of
my mother and father*

HOW THE ART OF REASONING IS NECESSARY

When one of his audience said, "Convince me that logic is useful," he said,

"Would you have me demonstrate it?"

"Yes."

"Well, then, must I not use a demonstrative argument?"

And, when the other agreed, he said, "How then shall you know if I impose upon you?" And when the man had no answer, he said, "You see how you yourself admit that logic is necessary, if without it you are not even able to learn this much—whether it is necessary or not."

—DISCOURSES OF EPICETUS

Preface

In a republican nation, whose citizens are to be led by reason and persuasion and not by force, the art of reasoning becomes of first importance.

—THOMAS JEFFERSON

Civilized life depends upon the success of reason in social intercourse, the prevalence of logic over violence in interpersonal conflict.

—JULIANA GERAN PILON

There are obvious benefits to be gained from the study of logic: heightened ability to express ideas clearly and concisely, increased skill in defining one's terms, and enlarged capacity to formulate arguments rigorously and to analyze them critically. But the greatest benefit, in my judgment, is the recognition that reason can be applied in every aspect of human affairs.

Democratic institutions require that citizens think for themselves, discuss problems freely with one another, and decide issues on the basis of deliberation and the weighing of evidence. Through the study of logic we can acquire not only practice in reasoning, but also respect for reason, and thus reinforce and secure the values we prize.

To help achieve these goals, a textbook of logic should contain an ample selection of illustrations and exercises that are of political, scientific, and philosophical interest. These should have been presented by serious writers in honest efforts to solve real problems. Ideally, they should include fallacies as well as paradigms of demonstration. This new edition contains a fair number of new examples of this sort.

An introductory logic course is often the only philosophy course taken by many college and university students. It is therefore desirable to include some philosophical issues and arguments in the logic course, if not

to interest students in additional philosophy courses, at least to interest them in further thinking and reading in philosophy.

The rate of expansion of human knowledge, especially scientific information, has been accelerating so rapidly in recent years that there is increasing danger that by the time many students graduate, much of the substantive material taught them in their classes may already be out of date. It is only partly in jest that some research laboratories post a sign on their walls reading, "If it works, it's obsolete." There is also an increasing tendency for people to change careers at least once during their lifetimes. So the most valuable thing a student can learn in college is how to think, how to study, how to learn, how to acquire and process new information. Ideally, every course taken should contribute to this end. In fact, many do not. But it is squarely within the province of logic to focus on this supremely important task. I have tried to make each succeeding edition of this textbook a more effective instrument for such learning and teaching.

There are several ways in which this edition differs from earlier ones. Two sections have been deleted from Chapter One, because the important but difficult distinction between Deduction and Induction does not find much application in the first part of the book. The distinction, I felt, was more usefully presented in the later parts of the text where its application is required. In their place, a new section has been included on Problem Solving, whose ideas and materials can be immediately applied in working out the answers to the logical puzzles at the end of the first chapter.

An entire new chapter on the Logic of Relations has been added to the Symbolic Logic portion of the text. In it the use of symbolism in logical analysis is presented as simply and straightforwardly as I could manage. It includes a discussion of two of the important contributions made to logic by Gottlob Frege and Bertrand Russell: Frege's dealing with the notion of identity, and Russell's with the definite description.

The discussion of Analogy and Probable Inference, now in Chapter Twelve, has been enlarged to include new materials on the topic of refutation by logical analogy.

Since the appearance of the previous edition, many readers, both teachers and students, have written to suggest changes in the book. In many cases I have gratefully accepted their recommendations. Among those whose correspondence was particularly helpful are Mr. Raymond C. Allen of Pittsburgh, Pennsylvania; Professor Sydney Allen of San Bernardino Valley College, California; Professor Robert W. Beard of Florida State University; Professor Richard W. Behling of The University of Wisconsin-Eau Claire; Mr. John C. Bennett of Fort Worth, Texas; Mr. Bill Billings of Tracy, Iowa; Professor Richard Brockhaus of Bucknell University, Lewisburg, Pennsylvania; Professor Claro R. Ceniza of De La Salle University Manila, Philippines; Professor Scott Crom of Beloit College, Wisconsin; Professor Howard DeLong of Trinity College, Hartford, Connecticut; Professor Richard Double of Old Dominion University, Norfolk, Virginia;

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I. M. C.

INTRODUCTION TO
LOGIC

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PART ONE

LANGUAGE

CHAPTER 1

Introduction

. . . this we do affirm—that if truth is to be sought in every division of Philosophy, we must, before all else, possess trustworthy principles and methods for the discernment of truth. Now the Logical branch is that which includes the theory of criteria and of proofs; so it is with this that we ought to make our beginnings.

—SEXTUS EMPIRICUS

. . . bad reasoning as well as good reasoning is possible; and this fact is the foundation of the practical side of logic.

—CHARLES SANDERS PEIRCE

1.1 What Is Logic?

Logic is the study of the methods and principles used to distinguish good (correct) from bad (incorrect) reasoning. This definition must not be taken to imply that only the student of logic can reason well or correctly. To say so would be as mistaken as to say that to run well requires studying the physics and physiology involved in that activity. Some excellent athletes are quite ignorant of the complex processes that go on inside their bodies when they perform. And, needless to say, the somewhat elderly professors who know most about such things would perform very poorly were they to risk their dignity on the athletic field. Even given the same basic muscular and nervous apparatus, the person who knows might not surpass the “natural athlete.”

But given the same native intelligence, a person who has studied logic

is more likely to reason correctly than is one who has never thought about the general principles involved in that activity. There are several reasons for this. First, the proper study of logic will approach it as an art as well as a science, and the student will do exercises in all parts of the theory being learned. Here, as anywhere else, practice will help to make perfect. Second, a traditional part of the study of logic has been the examination and analysis of fallacies, which are common and often quite “natural” mistakes in reasoning. Not only does this part of the subject give increased insight into the principles of reasoning in general, but an acquaintance with these pitfalls helps to keep us from stumbling into them. Finally, the study of logic will give students techniques and methods for testing the correctness of many different kinds of reasoning, including their own; and when errors are easily detected, they are less likely to be allowed to stand.

We are often moved by appeals to emotion. But an appeal to reason can be tested and appraised by criteria that define correct argument. If these criteria are not known, then they cannot be employed. It is the purpose of logic to discover and make available those criteria that can be used to test arguments for correctness.

Logic has frequently been defined as the science of the laws of thought. But this definition, although it gives a clue to the nature of logic, is not accurate. In the first place, thinking is studied by psychologists. Logic cannot be “the” science of the laws of thought, because psychology is also a science that deals with laws of thought (among other things). And logic is not a branch of psychology; it is a separate and distinct field of study.

In the second place, if “thought” refers to *any* process that occurs in people’s minds, not all thought is an object of study for the logician. All reasoning is thinking, but not all thinking is reasoning. Thus one may “think” of a number between one and ten, as in a parlor game, without doing any “reasoning” about it. There are many mental processes or kinds of thought that are different from reasoning. One may remember something, or imagine it, or regret it, without doing any reasoning about it. Or one may let one’s thoughts “drift along” in a daydream or reverie, building castles in the air or following what psychologists call free association, in which one image is replaced by another in an order that is anything but logical. There is often great significance to the sequence of thoughts in such free association, and some psychiatric techniques make use of it. One need not be a psychiatrist, of course, to gain insight into people’s characters by observing the flow of their streams of consciousness. It is the basis of a very effective literary technique pioneered by James Joyce in his novel *Ulysses*. Conversely, if a person’s character is sufficiently well known beforehand, the flow of that person’s stream of consciousness can be traced or even anticipated. We all remember how Sherlock Holmes used to break in on his friend Watson’s silences, to answer the very question to which Dr. Watson had been “led” in his musings. There seem to be certain laws governing reverie, but they are studied by psychologists rather than by logicians. The laws that describe the movements of the mind in reverie