Logic and Philosophy:
A Modern Introduction

Sixth Edition

Kahane

Logic and Philosophy
A Modern Introduction
Sixth Edition

Howard Kahane

University of Maryland Baltimore County

Preface to
to the Sixth Edition

The purpose of this sixth edition is the same as the first five: to provide students with a clear, concise, *comprehensible* introduction to a complete system for sentential and first order predicate logic, the fundamentals of the traditional syllogistic logic, an empiricist account of the logic of scientific inference, and related material on logic and philosophy. This great variety of material (more than in any other introductory text) enables instructors to choose topics of interest to them and best suited to the needs of their students.

This sixth edition contains many minor and several major revisions, including the following:

1. A significant increase in the number of exercises, in particular in Parts One and Two of the text dealing with sentential and predicate logic (coupled with the replacement of a great many old exercise items and examples with fresh items).

2. A greatly improved chapter on the truth tree method (moved from further back in the book into Part Two as new Chapter Eleven).

3. A complete revision of the chapter on fallacies in Part Three, coupled with a tremendous increase in the number of fallacy exercise items.

4. A greatly improved discussion of Mill's Methods in Chapter Sixteen.

5. An improved discussion of the rules for dropping and adding quantifiers. A simplified introduction is provided in Chapter Six, a precise and more rigorous account in Chapter Seven, and an explanation (unique to *Logic and Philosophy*) of the reasons why any valid and complete set of quantifier rules for predicate logic must be rather complicated.

6. An improved discussion of predicate logic symbolizations of everyday statements.

7. An improved and expanded discussion of the various conceptions of cause and effect in Chapter Sixteen.

8. Addition of a discussion of the alleged paradoxes of material implication in Chapter Nine.

9. An improvement in the discussions of the basic natures of deduction and induction.

10. Improved Key Terms sections at the end of each chapter.

The key to understanding logic is still the same. Students who fail to grasp the material (assuming at least modest effort) almost always do so because they don't quite understand the difference between variables and constants and thus between sentences and sentence forms, and as a consequence don't understand the concept of a substitution instance of a sentence form. (Failure to grasp the idea of truth functionality is the next most important reason for failure to grasp the material in general.)

I learned my logic from the late Hans Reichenbach, and my debt to him is obvious. I am also indebted to several other teachers, in particular Nelson Goodman, although our differences of opinion on several subjects tend to cloud this fact. I must also mention my debt to Carl Hempel, since the viewpoint on philosophy of science expressed in this text more nearly resembles his than that of any other eminent philosopher.

I would also like to thank the many students in my logic classes at Whitman College, the University of Kansas, Baruch College, and U.M.B.C. for their invaluable aid; my colleagues at these schools—especially Richard Cole, Warner Morse, Douglas Lackey, and in particular Arthur Skidmore and Parviz Morewedge—for their expert advice and assistance; Nelson Pole, Cleveland State University; and my friend Alan Hausman, Ohio State University. I'm also indebted to the publisher's readers: David Cole, University of Minnesota, Duluth; Thomas R. Foster, Ball State University; Charles W. Johnson, Utah State University; William R. Neblett, Occidental College; Sid Gendin, Eastern Michigan University; Thomas McKay, Syracuse University; Robert Schwartz, University of Wisconsin-Milwaukee; R. V. Dusek, University of New Hampshire; Patrick Maher, University of Illinois at Urbana-Champaign; Thomas O'Kelley, St. Petersburg Junior College; Rex Hollowell, Spokane Falls Community College; Frank Leavitt, Wright State University; James Roper, Michigan State University; Joseph Gilbert, SUNY Brockport; Robert Barrett, Washington University; Thomas Blakeley, Boston College; Nino Cocchiarella, Indiana University; Arthur Lord, Centralia College; Kenneth H. Small, University of Washington; William Bonis, California State University, Long Beach; Christopher Boorse, University of Delaware; George Gale, University of Missouri, Kansas City; Emily Groscholz, Pennsylvania State University; Harrison Hall, University of Delaware; Wesley Morriston, University of Colorado at Boulder; Paul Roth, University of Missouri at St. Louis; and especially Walter O'Briant, University of Georgia and Robert Burch, Texas A&M University; to the three Wadsworth philosophy editors who have helped develop this text, Robert Gormley, Michael Helm, and Ken King (who in the words of another Wadsworth author exercised his "remarkable ability to stroke and poke at just the right times"); and to several others at Wadsworth, in particular Mary Arbogast.

Many instructors who have used previous editions of this text have sent me suggestions that have been incorporated into this text. I would like to thank all of them, in particular, J. Michael Dunn, Indiana University; D. D. Todd, Simon Fraser University; Kenneth E. Haas, Hamline University; Mark A. Brown and John D'Onofrio, Syracuse University; Norman A. Krebs, Whit-

Howard Kahane
Mill Valley, California

Contents

To Art, Betsy, Charles, Don, Edward,
Frank, George, Harry, and . . . Nancy.

---

1 *Reasoning and Arguments*

Consider the following simple example of reasoning:

> Identical twins often have different IQ test scores. Yet such twins inherit the same genes. So environment must play some part in determining IQ.

Logicians call this kind of reasoning an **argument.** (But they don't have in mind shouting or fighting. Rather, their concern is *arguing for* or presenting reasons for a conclusion.) In this case, the argument consists of three statements:

1. Identical twins often have different IQ test scores.
2. Identical twins inherit the same genes.
3. So environment must play some part in determining IQ.

The first two statements in this argument give *reasons* for accepting the third. In logic talk, they are said to be **premises** of the argument, and the third statement is called the argument's **conclusion.**

In everyday life, few of us bother to label premises or conclusions. We usually don't even bother to distinguish one argument from another. But we do sometimes give clues. Such words as *because, since,* and *for* usually indicate that what follows is a premise. And words like *therefore, hence, consequently,* and *so,* usually signal a conclusion. Similarly, expressions like "It has been observed that . . .", "In support of this . . ." and "The relevant data . . ." generally introduce premises, while expressions such as "It follows that . . .", "The result is . . .", "The point of all this is . . .", and "The implication is . . ." usually signal conclusions. Here is a simple example:

> *Since* it's wrong to kill a human being, *it follows that* abortion is wrong, *because* abortion takes the life of (kills) a human being.

In this example, the words *since* and *because* signal premises offered in support of the conclusion signalled by the phrase *it follows that*. Put into textbook form, the argument reads:

1.   It's wrong to kill a human being.
2.   Abortion takes the life of (kills) a human being.
/∴ 3.   Abortion is wrong.*

(Of course, an argument may have any number of premises and may be surrounded by or embedded in other arguments.)

But not all groups of statements form arguments. Only those do that provide *reasons* for believing something. Thus, anecdotes are generally not arguments, nor are most other forms of *exposition* or *explanation*. It's important to understand the difference between rhetoric that is primarily expository or explanatory and rhetoric that is basically argumentative. A passage that contains only exposition gives us no reason to accept the "facts" in it other than the authority of the writer or speaker, whereas passages that contain arguments give reasons for some of their claims (conclusions) and call for a different sort of evaluation than merely an evaluation of the authority of the writer.

Examples:

Here are three examples of group's of statements that do not constitute arguments:

1.   Wow! Indian food sure is hot. Pass the water pitcher.
2.   Every time something goes wrong around here, people blame me. Wonder what it's like in other offices.
3.   Well, our vacation was just great. We flew to Paris. Then we went over to Vienna, Budapest, Bucharest, and then Athens, before flying back to the States. All in ten days. What a wonderful trip.

Exercise 1-1

Here are twelve passages (the first six are from student papers and exams, modestly edited). Determine which contain arguments and which do not.

---

*The symbol "/∴" is used to indicate that a conclusion follows.

Label the premises and conclusions of those that do, and *explain* your answers. Paraphrase if that makes things clearer. (Even-numbered items in most exercise sets are answered in a section at the back of the book.)

1. (I don't like big-time college football)(I don't like pro football on TV either)(In fact, I don't like sports, period) con.

2. My summer vacation was spent working in Las Vegas. I worked as a waitress at the Desert Inn and made tons of money. But I guess I got addicted to the slots and didn't save too much. Next summer my friend Hal and I are going to work in Reno, if we can find jobs there.

3. (Well, I have a special reason for believing in big-time college football)(After all, I wouldn't have come here if Ohio State hadn't gone to the Rose Bowl)(because that's how I heard about this place in the first place)

4. (At the present rate of consumption, the oil will be used up in 20–25 years) (And we're sure not going to reduce consumption in the near future)(So we'd better start developing solar power, windmills, and other "alternative energy sources" pretty soon) Conclusion

5. The abortion issue is blown all out of proportion. How come we don't hear nearly as much about the evils of the pill? After all, a lot more potential people are "killed" by the pill than by abortion.

6. I've often wondered how they make lead pencils. Of course, they don't use lead, they use graphite. But I mean how do they get the graphite into the wood? That's my problem. The only thing I can think of is maybe they cut the lead into long round strips and then cut holes in the wood and slip the lead in.

7. (Punishment, when speedy and specific, may suppress undesirable behavior,)(but it cannot teach or encourage desirable alternatives) (Therefore, it is crucial to use positive techniques to model and reinforce appropriate behavior that the person can use in place of the unacceptable response that has to be suppressed) Conclusion
—Walter and Harriet Mischel, *Essentials of Psychology*

8. There was no European language that Ruth could not speak at least a little bit. She passed the time in the concentration camp, waiting for death, by getting other prisoners to teach her languages she did not know. Thus did she become fluent in Romany, the tongue of the gypsies.

—Kurt Vonnegut, *Jailbird*

9. How do education and training affect lifetime income? Are they worth their cost? The evidence answers, decidedly yes (Men who never finish eight grades of school earn scarcely $3,800 annually) (college graduates do three times as well)(Unemployment among school dropouts exceeds that of graduates by a growing margin) conclusion
—Paul Samuelson, *Economics* (7th ed.)

conclusion

10. [There are two main reasons why someone might buy a six-month bank certificate instead of going for the higher yields of a money-market fund.] [The first is that these certificates are insured by an agency of the federal government.] [The second is that a certificate enables you to lock up your 9 percent, or whatever rate you are getting for the next six months.]

—Richard Blodgett, *McCall's* magazine

11. Disclosing new details of a planned military cutback, Soviet leader Mikhail Gorbachev said yesterday that the Soviet defense budget is to be reduced by more than 14 percent, and that nearly half of a previously announced 500,000-man troop cut will come from units in the European part of the country. . . . "Our 'perestroika' will come to pass," he promised, using the Russian term to describe his reform program. "But we expect perestroika from your side as well."

—*San Francisco Chronicle*, 19 January 1989

12. [You can choose to fight them in the morning—they'll kill you or enslave you.] [You can choose to hide from them—they'll find you.] [Or you can take their victory from them. They will remember you.]

—ABC dramatization *Masada*

implied conclusion

2 Deduction and Induction

Deduction and induction are commonly thought to be the cornerstones of good reasoning. Roughly speaking, the fundamental property of a **deductively valid argument** is this: *If all of its premises are true, then its conclusion must be true also. It is impossible for all of its premises to be true and yet its conclusion be false.** (In some contexts, deductively valid arguments are referred to simply as **valid arguments.**)

The question naturally arises as to why it is impossible for the conclusion of a deductively valid argument to be false if all of its premises are true. Why do its premises, if true, "guarantee" the truth of its conclusion? Unfortunately, there are no simple or generally accepted answers to questions of this kind.† However, it is revealing to notice that in a typical case

---

*We say "roughly speaking" for three reasons: First, we have not yet specified the sense in which the terms "must" and "impossible" are being used; second, there are two special cases of deductive validity that need to be discussed; third, there is a good deal of disagreement among philosophers concerning the precise way in which deductive validity should be characterized. These complications are discussed further in Chapter Nine, Section 6, after sufficient logical machinery has been introduced to enable beginning students to grasp what is at issue.

†In philosophy, fundamental questions of this kind tend to be the most difficult to answer and the most controversial. See Chapter Nine, Section 6, for more on this question.