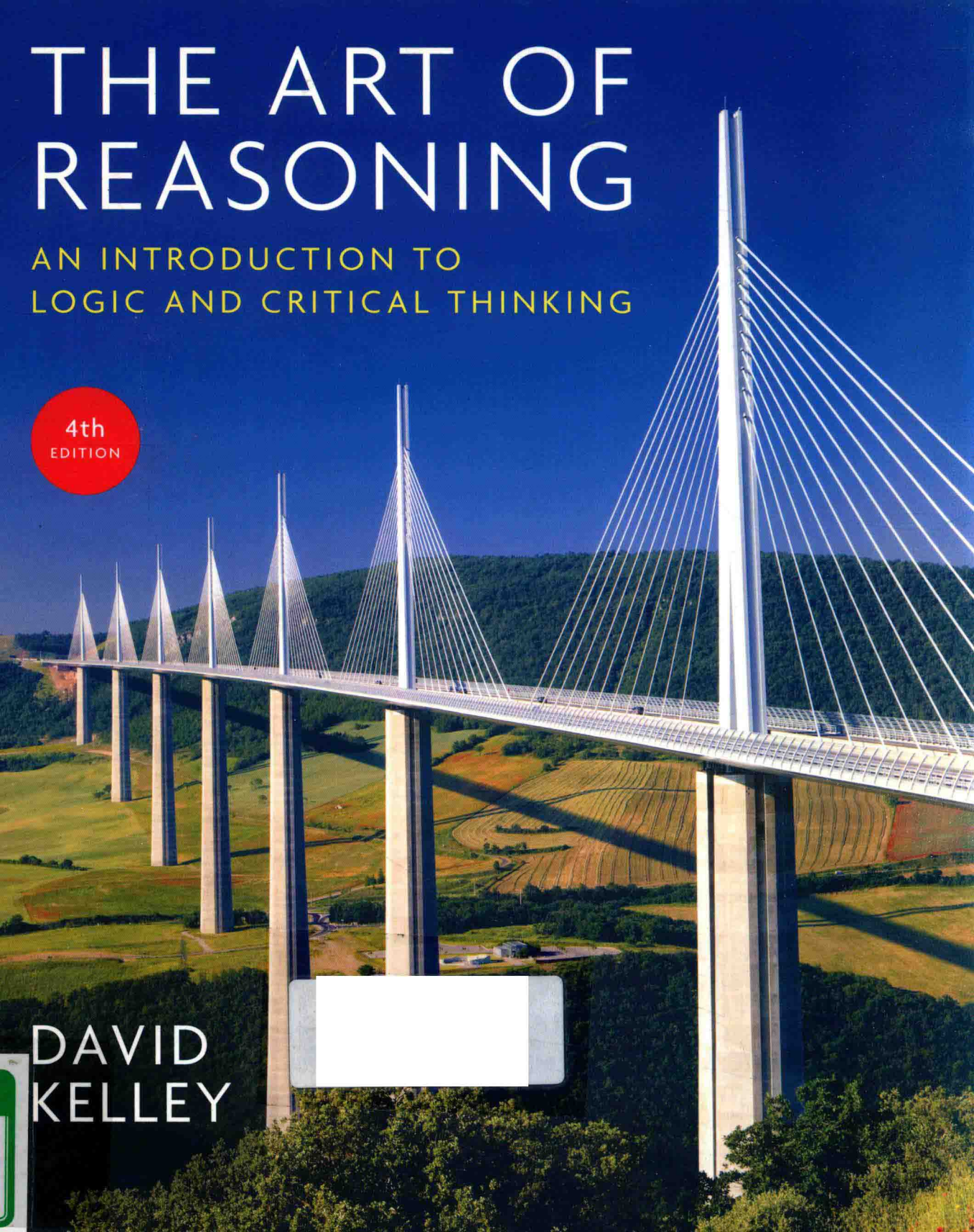
THE ART OF REASONING

AN INTRODUCTION TO LOGIC AND CRITICAL THINKING

4th EDITION



DAVID KELLEY

FOURTH EDITION

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An Introduction to Logic and Critical Thinking

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NEW YORK · LONDON

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Common Fallacies

accident: applying a generalization to a special case in disregard of qualities or circumstances that make it an exception to the generalization.

ad hominem: using a negative trait of a speaker as evidence that the speaker's statement is false or the argument is weak.

appeal to authority: using testimonial evidence for a proposition when the conditions for credibility aren't satisfied or when the use of such evidence is inappropriate.

appeal to emotion: trying to get someone to accept a proposition on the basis of an emotion one induces.

appeal to force: trying to get someone to accept a proposition on the basis of a threat.

appeal to ignorance: using the absence of proof for a proposition as evidence of the truth of the opposing proposition.

appeal to majority: using the fact that large numbers of people believe a proposition to be true as evidence of its truth.

begging the question: trying to support a proposition with an argument in which that proposition is a premise.

composition: inferring that a whole has a property merely because its parts have that property.

diversion: trying to support one proposition by arguing for another proposition.

division: inferring that a part has a property merely because the whole has that property.

equivocation: using a word with two different meanings in the premises and/or the conclusion of an argument.

false alternative: excluding relevant possibilities without justification.

hasty generalization: inferring a general proposition from an inadequate sample of positive instances.

post hoc: using the fact that one event preceded another as sufficient evidence for the conclusion that the first caused the second.

slippery slope: arguing against a proposed action or policy by claiming, with insufficient evidence, that it will lead to a series of increasingly bad consequences.

subjectivism: using the fact that one believes or wants a proposition to be true as evidence of its truth.

Categorical Propositions

The Four Standard Forms

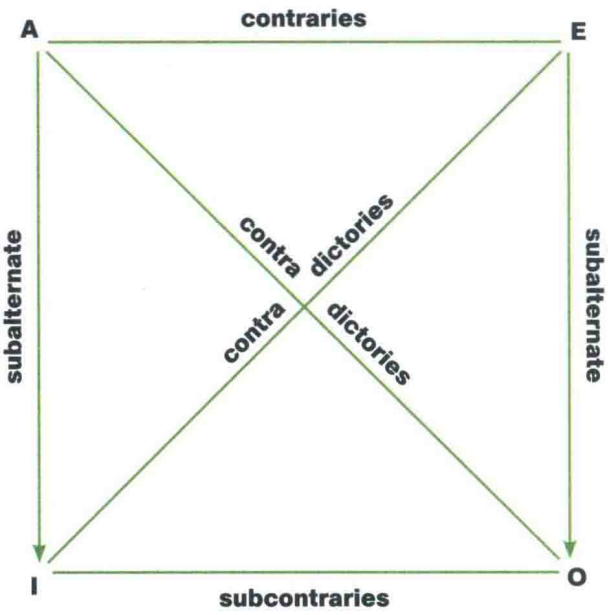
A: All *S* are *P*

E: No *S* is *P*

I: Some *S* are *P*

O: Some *S* are not *P*

The Traditional Square of Opposition



Immediate Inferences

Each statement in the left column is logically equivalent to the statement directly across from it in the right column.

CONVERSION

E: No *S* is *P*	No *P* is *S*
I: Some *S* are *P*	Some *P* are *S*

OBVERSION

A: All *S* are *P*	No *S* is non-*P*
E: No *S* is *P*	All *S* are non-*P*
I: Some *S* are *P*	Some *S* are not non-*P*
O: Some *S* are not *P*	Some *S* are non-*P*

CONTRAPOSITION

A: All *S* are *P*	All non-*P* are non-*S*
O: Some *S* are not *P*	Some non-*P* are not non-*S*

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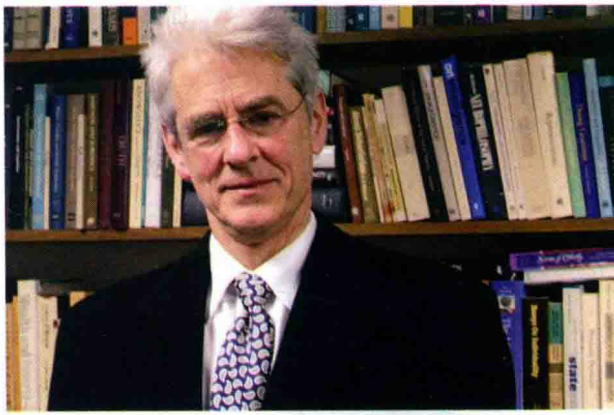
About the Author



David Kelley is Founder of The Atlas Society in Washington, DC. He has a Ph.D. in philosophy from Princeton University and has taught at Vassar College and Brandeis University.

Preface

The Art of Reasoning is a textbook designed for courses in introductory logic or critical thinking. In addition to the elements of formal deductive logic, it includes classification and definition, basic argument analysis, fallacies, and inductive reasoning.

My goal in the book is to make it a valuable resource for the classroom instructor. Based on my own experience as a teacher, I believe the most important means to that end is to write in a way that will hold the interest of students. Otherwise, they are not likely to do the reading assignments; they will not come to class prepared; and instructors will have to spend valuable class time reviewing the basics. I have therefore tried to explain the standards of good thinking in a clear, engaging, conversational style. On each topic, I have tried to follow an arc of learning: beginning with a clear, straightforward example; then extracting the relevant concept or principle; and then moving on to further implications, qualifications, and more complex or borderline examples. And I have kept theoretical discussion to a minimum, including only those points necessary to make the standards and techniques intelligible.

Organization

Part 1, Language and Reasoning, covers the basic linguistic tools required for thinking clearly and the basic elements of argument analysis and evaluation. The material on classification (Chapter 1) is rarely covered in other texts, but I find that a clear understanding of genus–species hierarchies makes it much easier for students to master other topics, especially definitions (Chapter 2), categorical syllogisms (Chapters 6–8), inductive generalization (Chapter 12), and statistical reasoning (Chapter 14). In addition, Chapter 3, which discusses propositions as assertions, gives students the preparatory work they need to identify the premises and conclusions of arguments.

Chapter 4 (Argument Analysis) begins the treatment of arguments and introduces key logical concepts: premise and conclusion; deduction and induction; and validity, soundness, strength, and cogency. This material has been substantially expanded for the fourth edition, including a new section on deductive and inductive arguments. The chapter presents a simple diagramming technique that can be used with arguments of any type and any degree of complexity, and it gives students guidelines on identifying assumed premises. Chapter 5 (Fallacies) focuses on the fallacies most often encountered in everyday thought and speech and indicates the contexts in which each fallacy is most likely to be committed. (This edition contains new sections on the fallacies of accident and slippery slope.)

Part 2 covers both traditional and modern deductive logic. Chapters 6 and 7 deal with categorical propositions and syllogisms. The treatment of Venn diagrams has been expanded to give students more help in diagramming propositions, immediate inferences, and syllogisms. Chapter 8 begins with the traditional versions of disjunctive and hypothetical syllogisms. It goes on to show how to identify and analyze deductive arguments as they typically occur in ordinary language, including complex arguments that involve combinations of categorical, hypothetical, and disjunctive syllogisms. The chapter will be useful for instructors who do not plan to cover the modern propositional and predicate logic.

For instructors who *do* cover modern symbolic logic, the next three chapters deal with propositional (Chapters 9 and 10) and predicate (Chapter 11) logic. For the fourth edition, these chapters have been significantly expanded in response to comments by reviewers. I have added more explanations to help students understand the connectives, truth tables, and proofs. The text breaks processes down into small sections with explanations at each step. The exercises have many real-language applications of the logic—everything from arguments in science, religion, and law to Robert Frost's poetry—and are balanced to test the items students need to master, with roughly equal representation of each method, inference rule, etc.

Chapter 9 includes a new section on tautology, contradiction, and consistency. Chapter 11 now introduces proofs in predicate logic early on. It treats rules, restrictions, and strategies contextually, moving from basic proofs, to those involving conditional and *reductio* proofs, to relational predicates and multiple quantification. For the three chapters on modern logic, moreover, I have doubled the number of exercises.

Part 3, finally, covers inductive reasoning. In addition to material on rules for inductive generalization and Mill's methods for causal inference (Chapter 12) and argument by analogy (Chapter 13), I have devoted a chapter to statistical reasoning (Chapter 14), offering students the basic concepts and standards for evaluating the kinds of statistical arguments they will frequently encounter in the media. Chapter 15 deals with the analysis and evaluation of explanations. Among other things, it shows how the same diagramming technique used for arguments can easily be extended to explanatory structures. And Chapter 16, new to this edition, covers the basics of probability.

Pedagogical Features

Throughout the book, elements of design help students assimilate the material:

- *Summary* sidebars pull together important definitions, principles, and rules.
- *Strategy* sidebars highlight procedures to follow, including heuristics and tips.
- *Summaries* at the end of each chapter condense the essential material in each chapter.
- *Key terms* following each end-of-chapter Summary give definitions of concepts introduced in the chapter and are compiled in the Glossary at the back of the book.

Each chapter also contains abundant exercises of different types and levels of difficulty. Following most sections of each chapter are exercises to let students test their understanding of the material before proceeding to the next section. Answers to every third item of these exercises and to every third item of the Additional Exercises are included at the back of the book. At the end of each chapter, Additional Exercises integrate the material in the chapter by asking students to use their skills in many different combinations on different sorts of task. There are creative exercises asking students to come up with their own definitions, arguments, and explanations, as well as critical exercises in which they evaluate those of others. Examples are drawn from works in many different disciplines—politics, science, literature, and history—so that all students will encounter at least some material from fields with which they are familiar. I have tried to use examples and exercises that have the flavor of reality to help students see how the standards of thinking apply to the sorts of issues they actually encounter in their everyday experience, in political debate, and in the other courses they take across the curriculum.

For this fourth edition of *The Art of Reasoning*, I have substantially revised the examples used in the text and exercises and have added more than 600 new exercises. In the end, however, I think variety is more important than sheer abundance. There are diminishing returns from performing the same task over and over on material of the same kind. I have tried to give students an imaginative variety of tasks that, like finger exercises for pianists, will exercise their mental muscles in different combinations, sounding different chords of understanding.

Custom Options

The Art of Reasoning has a basically modular design, allowing individual chapters to be used in various combinations, but there are a number of integrating links (such as diagrams for classification and for argument structure), and most chapters provide some exercises that ask students to use skills they have learned in earlier chapters. There is more material in the book than can be covered in a one-semester course, even at the brisk pace of a chapter a week, and many different selections are possible.

- A course in *informal logic and critical reasoning*, emphasizing basic skills in analyzing language and reasoning, might cover the five chapters in Part 1 (Language and Reasoning), Chapters 6–8 (traditional categorical logic), and Chapters 12–14 (inductive logic).
- A course in *introductory logic*, including traditional syllogistic and modern logic, might begin with Chapter 1 (Classification), Chapter 3 (Propositions), Chapter 4 (Argument Analysis), and Chapter 5 (Fallacies); and then move on to Chapters 6 and 7 (traditional syllogism), Chapters 9 and 10 (propositional logic), and Chapter 12 (Inductive Generalizations).
- A course in *modern formal logic* might include Chapter 4 (Argument Analysis) and then move on to Part 2 (Deductive Logic), including Chapter 6 (Categorical Propositions) and Chapters 9–11 (propositional and predicate logic).

These three selections are available as standard custom editions from W. W. Norton. Many other combinations are possible on request.

Supplements

In addition to the text, *The Art of Reasoning* comes with supplemental materials designed to make the instructor's job easier and to improve learning outcomes:

- *Study Space*: The companion student Web site (wwnorton.com/studyspace) includes flashcards of key terms, chapter summaries, and feature boxes, including a complete list of the rules of inference.
- *Online Homework*: A comprehensive online homework system that students can access through StudySpace gives students feedback and guidance as they work through problems. Access to this system is free with every new copy purchased of *The Art of Reasoning*. Instructors should go to wwnorton.com/logic to learn more or to set up a course.
- *Test Bank*: Extensively revised by Andrew Hill (Xavier University) and Richard Shedenhelm (University of Georgia), the test bank now includes more than 2,600 questions, all keyed and categorized according to question type and difficulty level.
- *Solutions Manual*: In this resource for instructors, I have provided solutions to all 2,400 problems found in the book, and the problems are rated by difficulty.
- *Lecture PowerPoint Slides*: These lecture slides, written by Dr. Ray Peace (Valdosta State University), are completely new to the fourth edition. With more than 30 slides per chapter (more than 500 total), these PowerPoint slides offer clear, detailed outlines to help professors prepare for lectures. Where applicable, we have included figures and diagrams from the textbook.

Instructors should contact their local W. W. Norton representative or go to wwnorton.com/logic for more information or to request access to these supplemental materials.

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Contents in Brief

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