

THIRD EDITION

LOGIC

Stan
Baronett

The cover features two large, intricate geometric patterns on a blue background. These patterns are composed of various colored squares and triangles in shades of red, yellow, teal, and dark blue, arranged in complex, symmetrical, star-like or snowflake-like shapes. One pattern is on the left side, and another is on the right side, both partially overlapping the bottom edge.

OXFORD
UNIVERSITY PRESS

Logic

Third Edition

Stan Baronett

New York Oxford
Oxford University Press

Oxford University Press is a department of the University of Oxford.
It furthers the University's objective of excellence in research,
scholarship, and education by publishing worldwide.

Oxford New York
Auckland Cape Town Dar es Salaam Hong Kong Karachi
Kuala Lumpur Madrid Melbourne Mexico City Nairobi
New Delhi Shanghai Taipei Toronto

With offices in
Argentina Austria Brazil Chile Czech Republic France Greece
Guatemala Hungary Italy Japan Poland Portugal Singapore
South Korea Switzerland Thailand Turkey Ukraine Vietnam

Copyright © 2016, 2013 by Oxford University Press. Copyright © 2008
by Pearson Education, Inc.

For titles covered by Section 112 of the US Higher Education Opportunity
Act, please visit www.oup.com/us/oe for the latest information about
pricing and alternate formats.

Published by Oxford University Press.
198 Madison Avenue, New York, New York 10016
<http://www.oup.com>

Oxford is a registered trademark of Oxford University Press.

All rights reserved. No part of this publication may be reproduced,
stored in a retrieval system, or transmitted, in any form or by any means,
electronic, mechanical, photocopying, recording, or otherwise,
without the prior permission of Oxford University Press.

Library of Congress Cataloging-in-Publication Data

Baronett, Stan.

Logic / Stan Baronett. — Third edition.
pages cm.

ISBN 978-0-19-938340-5

1. Logic. I. Title.

BC108.B26 2016

160—dc23

2015004575

Printing number: 9 8 7 6 5 4 3 2 1

Printed in the United States of America
on acid-free paper

Brief Contents

<i>Preface</i>	xii
----------------------	-----



PART I Setting the Stage

Chapter 1 What Logic Studies	2
---	---



PART II Informal Logic

Chapter 2 Language Matters	60
Chapter 3 Diagramming Arguments	105
Chapter 4 Informal Fallacies	119



PART III Formal Logic

Chapter 5 Categorical Propositions	184
Chapter 6 Categorical Syllogisms	235
Chapter 7 Propositional Logic	307
Chapter 8 Natural Deduction	382
Chapter 9 Predicate Logic	461



PART IV Inductive Logic

Chapter 10 Analogical Arguments	520
Chapter 11 Legal Arguments	540
Chapter 12 Moral Arguments	573
Chapter 13 Statistical Arguments and Probability	597
Chapter 14 Causality and Scientific Arguments	633

<i>Glossary</i>	671
<i>Answers to Selected Exercises</i>	678
<i>Index</i>	717

ONLINE CHAPTER 15 Analyzing a Long Essay

Instructors interested in providing students with an opportunity for further analysis can refer them to Chapter 15: Analyzing a Long Essay, located on the Companion Website at www.oup.com/us/baronett.

Contents

Preface xii

Part I Setting the Stage

CHAPTER 1 What Logic Studies	2
A. Statements and Arguments	4
B. Recognizing Arguments	5
<i>Exercises 1B</i>	10
C. Arguments and Explanations	18
<i>Exercises 1C</i>	20
D. Truth and Logic	22
E. Deductive and Inductive Arguments	22
<i>Exercises 1E</i>	25
F. Deductive Arguments:	
Validity and Soundness	29
Argument Form	30
Counterexamples	32
Summary of Deductive Arguments	39
<i>Exercises 1F</i>	39
G. Inductive Arguments:	
Strength and Cogency	42
Techniques of Analysis	43
The Role of New Information	44
Summary of Inductive Arguments	45
<i>Exercises 1G</i>	46
H. Reconstructing Arguments	47
<i>Exercises 1H</i>	52
SUMMARY	55
KEY TERMS	57
LOGIC CHALLENGE:	
<i>The Problem of the Hats</i>	57

Part II Informal Logic

CHAPTER 2 Language Matters	60
A. Intension and Extension	62
Terms, Use, and Mention	62
Two Kinds of Meaning	63
Proper Names	64
<i>Exercises 2A</i>	65
B. Using Intensional Definitions	67
Synonymous Definitions	68
Word Origin Definitions	68
Operational Definitions	69
Definition by Genus and Difference	70
C. Using Extensional Definitions	72
Ostensive Definitions	72
Enumerative Definitions	73
Definition by Subclass	73
<i>Exercises 2C</i>	74
D. Applying Definitions	76
Stipulative Definitions	77
Lexical Definitions	78
Functional Definitions	79
Precising Definitions	79
Theoretical Definitions	81
Persuasive Definitions	82
<i>Exercises 2D</i>	84
E. Guidelines for Informative Definitions	88
<i>Exercises 2E</i>	93
F. Cognitive and Emotive Meaning	94
<i>Exercises 2F</i>	96
G. Factual and Verbal Disputes	98
<i>Exercises 2G</i>	99
SUMMARY	102
KEY TERMS	104
LOGIC CHALLENGE: <i>The Path</i>	104





CHAPTER 3 Diagramming Arguments	105	11. Division	139
A. The Basics of Diagramming Arguments	105	12. Biased Sample	140
B. Diagramming Extended Arguments	108	False Cause Fallacies	140
Exercises 3B	109	13. <i>Post Hoc</i>	141
SUMMARY	118	14. Slippery Slope	144
KEY TERMS	118	Summary of Weak Inductive	
LOGIC CHALLENGE: <i>The Train to Vegas</i>	118	Argument Fallacies	145
		Exercises 4C	145
CHAPTER 4 Informal Fallacies	119	D. Fallacies of Unwarranted Assumption or	
A. Why Study Fallacies?	121	Diversions	150
B. Fallacies Based on Personal Attacks or		Unwarranted Assumption	150
Emotional Appeals	121	15. Begging the Question	150
Fallacies Based on Personal Attacks	122	16. Complex Question	153
1. <i>Ad Hominem</i> Abusive	122	17. Appeal to Ignorance	154
2. <i>Ad Hominem</i> Circumstantial	122	18. Appeal to an Unqualified Authority	156
3. Poisoning the Well	123	19. False Dichotomy	156
4. <i>Tu Quoque</i>	124	Fallacies of Diversion	158
Fallacies Based on Emotional Appeals	125	20. Equivocation	158
5. Appeal to the People	125	21. Straw Man	160
6. Appeal to Pity	127	22. Red Herring	161
7. Appeal to Fear or Force	128	23. Misleading Precision	162
Summary of Fallacies Based on		24. Missing the Point	163
Personal Attacks	129	Summary of Fallacies of Unwarranted	
Summary of Fallacies Based on Emotional		Assumption and Diversion	164
Appeals	129	Exercises 4D	165
Exercises 4B	130	E. Recognizing Fallacies in	
C. Weak Inductive Argument Fallacies	135	Ordinary Language	170
Generalization Fallacies	135	Exercises 4E	172
8. Rigid Application of a Generalization	135	SUMMARY	179
9. Hasty Generalization	136	KEY TERMS	181
10. Composition	137	LOGIC CHALLENGE: <i>A Clever Problem</i>	181



Part III Formal Logic

CHAPTER 5	Categorical Propositions	184
A.	Categorical Propositions	185
	<i>Exercises 5A</i>	187
B.	Quantity, Quality, and Distribution	188
	<i>Exercises 5B</i>	191
C.	Existential Import	192
D.	The Modern Square of Opposition and Venn Diagrams	193
	Venn Diagrams	195
	<i>Exercises 5D</i>	199
E.	Conversion, Obversion, and Contraposition in the Modern Square	201
	Conversion	201
	Obversion	201
	Contraposition	202
	Diagrams	202
	Summary of Conversion, Obversion, and Contraposition	204
	<i>Exercises 5E</i>	205
F.	The Traditional Square of Opposition and Venn Diagrams	206
	<i>Exercises 5F.1</i>	209
	Venn Diagrams and the Traditional Square	212
	<i>Exercises 5F.2</i>	214
G.	Conversion, Obversion, and Contraposition in the Traditional Square	216
	Summary of Conversion, Obversion, and Contraposition	216
	Conversion	216
	Obversion	217
	Contraposition	217
	<i>Exercises 5G</i>	218
H.	Translating Ordinary Language into Categorical Propositions	218
	Missing Plural Nouns	218
	Nonstandard Verbs	219
	Singular Propositions	220
	Adverbs and Pronouns	221
	"It Is False That . . ."	222
	Implied Quantifiers	223
	Nonstandard Quantifiers	224
	Conditional Statements	225
	Exclusive Propositions	227
	"The Only"	227
	Propositions Requiring Two Translations	228
	<i>Exercises 5H</i>	229
	SUMMARY	232
	KEY TERMS	233
	LOGIC CHALLENGE: Group Relationship	234
CHAPTER 6	Categorical Syllogisms	235
A.	Standard-Form Categorical Syllogisms	235
B.	Mood and Figure	237
	<i>Exercises 6B</i>	239
C.	Diagramming in the Modern Interpretation	241
	Diagramming A-Propositions	243
	Diagramming E-Propositions	244
	Diagramming I-Propositions	244
	Diagramming O-Propositions	246
	Wrapping Up the X	248
	Is the Syllogism Valid?	249
	<i>Exercises 6C</i>	253
D.	Rules and Fallacies Under the Modern Interpretation	258
	Rule 1: The middle term must be distributed in at least one premise	258
	Rule 2: If a term is distributed in the conclusion, then it must be distributed in a premise	259
	Rule 3: A categorical syllogism cannot have two negative premises	261
	Rule 4: A negative premise must have a negative conclusion	261
	Rule 5: A negative conclusion must have a negative premise	262

Rule 6: Two universal premises cannot have a particular conclusion	263		
Exercises 6D	264		
E. Diagramming in the Traditional Interpretation	266		
A-Propositions	266		
E-Propositions	267		
Exercises 6E	270		
F. Rules and Fallacies Under the Traditional Interpretation	275		
Exercises 6F	275		
G. Ordinary Language Arguments	276		
Reducing the Number of Terms in an Argument	276		
Exercises 6G.1	281		
Paraphrasing Ordinary Language Arguments	284		
Categorical Propositions and Multiple Arguments	285		
Exercises 6G.2	287		
H. Enthymemes	289		
Exercises 6H	294		
I. Sorites	297		
Exercises 6I	300		
SUMMARY	305		
KEY TERMS	306		
LOGIC CHALLENGE: <i>The Four Circles</i>	306		
CHAPTER 7 Propositional Logic	307		
A. Logical Operators and Translations	308		
Simple and Compound Statements	308		
Negation	310		
Conjunction	310		
Disjunction	310		
Conditional	312		
Distinguishing "If" from "Only If"	312		
Sufficient and Necessary Conditions	313		
Biconditional	314		
Exercises 7A	315		
B. Compound Statements	318		
Well-Formed Formulas	319		
		Exercises 7B.1	321
		Main Operator	321
		Exercises 7B.2	323
		Translations and the Main Operator	324
		Exercises 7B.3	325
C. Truth Functions	328		
Defining the Five Logical Operators	328		
Negation	329		
Conjunction	330		
Disjunction	331		
Conditional	331		
Biconditional	332		
Exercises 7C.1	333		
Operator Truth Tables and Ordinary Language Propositions with Assigned Truth Values	338		
Exercises 7C.2	339		
D. Truth Tables for Propositions	341		
Arranging the Truth Values	341		
The Order of Operations	342		
Exercises 7D	345		
E. Contingent and Noncontingent Statements	347		
Tautology	347		
Self-Contradiction	348		
Exercises 7E	348		
F. Logical Equivalence and Contradictory, Consistent, and Inconsistent Statements	349		
Logical Equivalence	349		
Exercises 7F.1	351		
Contradictory, Consistent, and Inconsistent Statements	352		
Exercises 7F.2	354		
G. Truth Tables for Arguments	355		
Validity	356		
Analyzing Sufficient and Necessary Conditions in Arguments	357		
Technical Validity	359		
Exercises 7G.1	360		
Argument Forms	364		

Exercises 7G.2	367	F. Replacement Rules II	428
H. Indirect Truth Tables	368	Transposition (Trans)	428
Thinking Through an Argument	368	Material Implication (Impl)	428
A Shorter Truth Table	369	Material Equivalence (Equiv)	429
Exercises 7H.1	373	Exportation (Exp)	430
Using Indirect Truth Tables to Examine		Tautology (Taut)	431
Statements for Consistency	376	Applying the Second Five Replacement	
Exercises 7H.2	378	Rules	432
SUMMARY	379	Exercises 8F	434
KEY TERMS	381	G. Conditional Proof	442
LOGIC CHALLENGE: A Card Problem	381	Exercises 8G	447
CHAPTER 8 Natural Deduction	382	H. Indirect Proof	450
A. Natural Deduction	383	Exercises 8H	452
B. Implication Rules I	385	I. Proving Logical Truths	455
Modus Ponens (MP)	385	Exercises 8I	458
Modus Tollens (MT)	387	SUMMARY	458
Hypothetical Syllogism (HS)	388	KEY TERMS	460
Disjunctive Syllogism (DS)	388	LOGIC CHALLENGE:	
Justification: Applying the Rules		The Truth	460
of Inference	389	CHAPTER 9 Predicate Logic	461
Exercises 8B	390	A. Translating Ordinary Language	463
C. Tactics and Strategy	396	Singular Statements	463
Applying the First Four Implication		Universal Statements	464
Rules	397	Particular Statements	465
Exercises 8C	398	Paying Attention to Meaning	466
D. Implication Rules II	401	Exercises 9A	468
Simplification (Simp)	402	B. Four New Rules of Inference	470
Conjunction (Conj)	402	Universal Instantiation (UI)	470
Addition (Add)	403	Universal Generalization (UG)	472
Constructive Dilemma (CD)	404	Existential Generalization (EG)	473
Applying the Second Four Implication		Existential Instantiation (EI)	474
Rules	406	Summary of the Four Rules	475
Exercises 8D	407	Tactics and Strategy	476
E. Replacement Rules I	413	Exercises 9B	477
De Morgan (DM)	414	C. Change of Quantifier (CQ)	480
Double Negation (DN)	415	Exercises 9C	482
Commutation (Com)	416	D. Conditional and Indirect Proof	484
Association (Assoc)	418	Conditional Proof (CP)	484
Distribution (Dist)	419	Indirect Proof (IP)	486
Applying the First Five Replacement		Exercises 9D	487
Rules	420	E. Demonstrating Invalidity	489
Exercises 8E	422		



Part IV Inductive Logic

Counterexample Method	489
Finite Universe Method	490
Indirect Truth Tables	491
<i>Exercises 9E</i>	493
F. Relational Predicates	495
Translations	496
<i>Exercises 9F.1</i>	499
Proofs	500
A New Restriction	501
Change of Quantifier	502
Conditional Proof and Indirect Proof	502
<i>Exercises 9F.2</i>	503
G. Identity	504
Simple Identity Statements	504
"Only"	505
"The Only"	506
"No . . . Except"	506
"All Except"	506
Superlatives	507
"At Most"	507
"At Least"	508
"Exactly"	509
Definite Descriptions	509
<i>Exercises 9G.1</i>	512
Proofs	513
<i>Exercises 9G.2</i>	514
SUMMARY	516
KEY TERMS	517
LOGIC CHALLENGE:	
<i>Your Name and Age, Please</i>	518

CHAPTER 10 Analogical Arguments	520
A. The Framework of Analogical Arguments	520
<i>Exercises 10A</i>	524
B. Analyzing Analogical Arguments	528
Criteria for Analyzing Analogical Arguments	530
<i>Exercises 10B</i>	530
C. Strategies of Evaluation	532
Disanalogies	532
Counteranalogy	534
Unintended Consequences	534
Combining Strategies	535
<i>Exercises 10C</i>	537
SUMMARY	538
KEY TERMS	539
LOGIC CHALLENGE: Beat the Cheat	539
CHAPTER 11 Legal Arguments	540
A. Deductive and Inductive Reasoning	540
B. Conditional Statements	541
C. Sufficient and Necessary Conditions	542
D. Disjunction and Conjunction	544
E. Analyzing a Complex Rule	545
<i>Exercises 11E</i>	547
F. Analogies	551
G. The Role of Precedent	554
<i>Exercises 11G</i>	557
SUMMARY	571
KEY TERMS	572
LOGIC CHALLENGE: A Guilty Problem	572
CHAPTER 12 Moral Arguments	573
A. Value Judgments	574
Justifying "Should"	574
Types of Value Judgments	575
Taste and Value	576
<i>Exercises 12A</i>	577

B.	Moral Theories	578	H.	True Odds in Games of Chance	627
	Emotivism	578	I.	Bayesian Theory	628
	Consequentialism	579		<i>Exercises 13I</i>	629
	Egoism	579		SUMMARY	631
	Utilitarianism	580		KEY TERMS	632
	Deontology	582		LOGIC CHALLENGE: <i>The Second Child</i>	632
	Relativism	583			
	Contrasting Moral Theories	584			
	<i>Exercises 12B</i>	584	CHAPTER 14 Causality and Scientific		
C.	The Naturalistic Fallacy	585	Arguments	633	
D.	The Structure of Moral Arguments	586	A.	Sufficient and Necessary Conditions	634
E.	Analogies and Moral Arguments	589		<i>Exercises 14A</i>	636
	<i>Exercises 12E</i>	590	B.	Causality	637
	SUMMARY	594	C.	Mill's Methods	639
	KEY TERMS	595		Method of Agreement	639
	LOGIC CHALLENGE: <i>Dangerous Cargo</i>	595		Method of Difference	640
				Joint Method of Agreement and	
				Difference	641
				Method of Residues	642
				Method of Concomitant Variations	643
				<i>Exercises 14C</i>	645
CHAPTER 13 Statistical Arguments			D.	Limitations of Mill's Methods	648
and Probability	597		E.	Theoretical and Experimental Science	650
A.	Samples and Populations	598	F.	Inference to the Best Explanation	652
	<i>Exercises 13A</i>	599	G.	Hypothesis Testing, Experiments, and	
B.	Statistical Averages	602		Predictions	655
	<i>Exercises 13B</i>	605		Controlled Experiments	655
C.	Standard Deviation	606		Determining Causality	656
	Dividing the Curve	606	H.	Science and Superstition	657
	The Size of the Standard Deviation	608		The Need for a Fair Test	657
	How to Calculate the Standard			Verifiable Predictions	658
	Deviation	609		Nontrivial Predictions	659
	<i>Exercises 13C</i>	610		Connecting the Hypothesis and	
D.	What If the Results Are Skewed?	611		Prediction	661
E.	The Misuse of Statistics	613		Science and Superstition	661
	<i>Exercises 13E</i>	615		The Allure of Superstition	663
F.	Probability Theories	617		<i>Exercises 14H</i>	664
	<i>A Priori</i> Theory	617		SUMMARY	668
	Relative Frequency Theory	619		KEY TERMS	670
	Subjectivist Theory	620		LOGIC CHALLENGE:	
G.	Probability Calculus	621		<i>The Scale and the Coins</i>	670
	Conjunction Methods	621			
	Disjunction Methods	623			
	Negation Method	624			
	<i>Exercises 13G</i>	625			

<i>Glossary</i>	671
<i>Answers to Selected Exercises</i>	678
<i>Index</i>	717

ONLINE CHAPTER 15 Analyzing a Long Essay

Instructors interested in providing students with an opportunity for further analysis can refer them to Chapter 15: Analyzing a Long Essay, located on the Companion Website at www.oup.com/us/baronett.

- A. Childbed Fever
- B. Vienna
Exercises 15B

- C. Miasm and Contagion
Exercises 15C
- D. Semmelweis's Account of the Discovery
Exercises 15D
- E. Initial Questions
Exercises 15E
- F. A New Interpretation
Exercises 15F

SUMMARY

BIBLIOGRAPHY

Answers to Selected Exercises for Chapter 15

Preface

Today's logic students want to see the relevance of logic to their lives. They need motivation to read a logic textbook and do the exercises. Logic and critical thinking instructors want their students to read the textbook and to practice the skills being taught. They want their students to come away with the ability to recognize and evaluate arguments, an understanding of formal and informal logic, and a lasting sense of why they matter. These concerns meet head-on in the classroom. This textbook is designed to help alleviate these concerns.

THE CONTINUING STORY

The driving force behind writing this edition has been the continuing effort to make logic **relevant, interesting, and accessible to today's students**, without sacrificing the coverage that instructors demand and expect. An introduction to logic is often a student's only exposure to rigorous thinking and symbolism. It should prepare them for reasoning in their lives and careers. It must balance careful coverage of abstract reasoning with **clear, accessible explanations and vivid everyday examples**.

This book was written to meet all those challenges. **Relevant examples provide a bridge between formal reasoning and practical applications of logic, thereby connecting logic to student lives and future careers.** Each chapter opens with a discussion of an everyday example, often taken directly from contemporary events, to pose the problem and set the narrative tone. This provides an immediate connection between logic and real-world issues, motivating the need for logic as a tool to help with the deluge of information available today.

The challenge of any introduction to logic textbook is to connect logic to students' lives. Yet existing texts can and should do more to reinforce and improve the basic skills of reasoning we all rely on in daily life. Relevant, real-life examples are essential to making logic accessible to students, especially if they can mesh seamlessly with the technical material. To accomplish this, quotes and passages from modern and classic sources illustrate the relevance of logic through some of the perennial problems that impact everyone's lives. Examples from the workplace, careers, sports, politics, movies, music, TV, novels, new inventions, gadgets, cell phones, transportation, newspapers, magazines, computers, speeches, science, religion, superstition, gambling, drugs, war, abortion, euthanasia, capital punishment, the role of government, taxes, military spending, and unemployment are used to **show how arguments, and thus the role of logic, can be found in nearly every aspect of life.** The examples were chosen to be interesting, thought-provoking, and relevant to students. The voice of the book strives to engage students by connecting logic to their lives.

AN INCLUSIVE TEXT

The fourteen chapters are designed to provide a comprehensive logic textbook, but also one that can be tailored to individual courses and their needs. The result is a full five chapters on deductive logic, but also a uniquely applied five-chapter part on inductive logic. Here separate chapters on analogical arguments, legal arguments, moral arguments, statistical arguments, and scientific arguments get students to apply the logical skills learned in the earlier parts of the book. As with previous editions, explanations and examples have been created to facilitate student comprehension, and to show students that the logical skills they are learning do in fact have practical, real-world application. The material also provides more experience to help students when they do the exercise sets.

Since each chapter has been developed to provide maximum flexibility to instructors, some sections can be skipped in lecture without loss of continuity. In addition, those wishing a briefer text can choose a text tailored to their course. They may choose to emphasize or omit certain chapters on formal logic or critical reasoning, and they may choose a selection of the five applied chapters to reflect their and their students' interest.

ALTERNATE AND CUSTOM EDITIONS

Because every course and professor is unique, Alternate and Custom Editions are available for this book. Each Alternate Edition comes with answers to problems, a full glossary, and an index. The books are in stock and available for ordering. Please see the ISBN information below:

Logic: Concise Edition

Chapters 1, 3, 4, 5, 6, 7, 8

Order using ISBN: 978-0-19-026620-2

Logic: An Emphasis on Critical Thinking and Informal Logic

Chapters 1, 2, 3, 4, 10, 11, 12, 13 A–E, 14

Order using ISBN: 978-0-19-026622-6

Logic: An Emphasis on Formal Logic

Chapters 1, 4, 5, 6, 7, 8, 9

Order using ISBN: 978-0-19-026621-9

Logic: With Diagramming in Chapter 4 Informal Fallacies

Full text

Order using ISBN: 978-0-19-026623-3

It is also possible to create a customized textbook by choosing the specific chapters necessary for a course. Please contact your Oxford University Press Sales Representative or call 800-280-0280 for details.

For more information on Alternate and Custom Editions, please see the insert in the Instructor's Edition of this book.

NEW TO THIS EDITION

Careful attention has been given to retain the style of presentation and the voice of the previous editions, since considerable evidence exists that students have responded well to the manner of presentation. Every change was designed to preserve the delicate balance of rigor with the text's overriding goal of relevance, accessibility, and student interest.

General changes: The *Key Terms* lists at the end of each chapter are now listed alphabetically with reference to the page on which they first appear. The *Check Your Understanding* problem sets are now called *Exercises*. This is in line with how most instructors refer to the problem sets, and is a closer fit to what students are exposed to in their other textbooks. This edition contains over 200 new exercises, bringing the total to nearly 2,800 exercises.

Chapter 1: New exercises were added to section *1E, Deductive and Inductive Arguments*, allowing students to benefit from more exposure to real-life sources. In section *1F, Deductive Arguments: Validity and Soundness*, additional applications of counterexample techniques are presented, and a new exercise set was created. In section *1G, Inductive Arguments: Strength and Cogency*, a new topic, "The Role of New Information," was added to expand the techniques of analysis of inductive arguments, and a new set of exercises was created. Finally, a new section, *1H. Reconstructing Arguments*, offers additional information regarding argument recognition, and more practice in applying the techniques introduced in this introductory chapter.

Chapter 3: The chapter now concentrates on diagramming arguments. Given this new focus, two topics, *incomplete arguments* and *rhetorical language*, were removed, rewritten, and adapted for use in Chapter 1. Also, the *necessary and sufficient conditions* section was removed and placed in Chapter 14 in order to supplement coverage of causality. These changes were based on many instructors' and reviewers' suggestions that Chapter 3 should be devoted solely to one topic. In addition, many instructors wanted to use the material in the aforementioned sections but they did not want to cover diagramming. Thirty additional exercises were added to the exercise set in Chapter 3, so students can get more practice with diagramming extended arguments.

Chapter 4: This chapter has undergone a major revision based on feedback from instructors and reviewers. In the second edition, 27 fallacies were divided into three general groups. The third edition has 24 fallacies divided into six groups with each group having no more than five fallacies. Each fallacy group focuses on specific characteristics that define the group. The presentation of the fallacies has been expanded to include more explanation of why and how the fallacies occur, as well as additional examples of each type of fallacy. The chapter now includes explanations and examples of arguments in which the fallacies do *not* occur. The exercise sets have been expanded

to include passages where no fallacy exists, so students are given more opportunity to apply their understanding. The alternative version of Chapter 4 (with diagramming) is still available in either an alternate edition or custom edition.

Chapters 5 and 6: The major changes to both chapters have been the separation of the *modern* and the *traditional* squares of opposition and their interpretations. This was a cause for concern for many instructors and reviewers who did not want to introduce both interpretations in their courses. The changes make it easier to navigate through the two chapters. An instructor who wants to do just the modern interpretation can skip the sections that introduce the traditional material. The same holds for an instructor who wants to do just the traditional interpretation. Those instructors who do both interpretations can just go straight through the chapter without skipping any sections. Several of the exercise sets have been rewritten so instructors can concentrate on one interpretation, if they wish.

Chapter 7: New examples were added to clarify the use and meaning of the logical operators that are presented. The discussion of disjunction has been expanded to include more examples from ordinary language, especially regarding the distinction between inclusive and exclusive disjunction. The *sufficient and necessary conditions* subsection has been moved to earlier in the chapter so it follows the discussion of conditional statements. The discussion of truth-functional propositions has been expanded. The material and exercises regarding *propositions with assigned truth values* have been moved earlier to section 7C, *Truth Functions*, where it seems to fit better. Since sections F and G cover related material, they were combined to form 7F, *Logical Equivalence, Contradictory, Consistent, and Inconsistent Statements*. The material and exercises regarding *argument form* have been moved up to section 7G, *Truth Tables for Arguments*, so it can be introduced with the use of full truth tables. Finally, one hundred new questions have been added to the chapter.

Chapter 8: The strategy and tactics guides have been completely redone, based on suggestions from instructors and reviewers. The revised guides now provide more direct application of the proof tactics. Several of the inference rules have new examples and fuller explanations. A few minor adjustments were made to the order in which some inference rules are presented. In each case, the more intuitive rules are presented first, in order to ease students into the material. Two inference rules have been modified: First, Disjunctive Syllogism (DS) is now validly applied when there is a negation of *either* the right or left disjunct of a disjunction that occurs as the main operator in a premise or a derived line. (Previously, you could apply DS only when the left disjunct was negated.) Second, a similar change has been made to Simplification (Simp); either the right or left conjunct can now be validly derived from a conjunction that occurs as the main operator of a premise or a derived line. (Previously, you could apply Simp only to the left conjunct.) These two modifications reduce the frustration of waiting until Commutation (Com) is introduced, and they make the two rules more intuitive. Finally, a new section, 8I, *Proving Logical Truths*, has been added to the end of the chapter.

Chapter 9: A few of the *restrictions* to rules were modified in order to help clarify the ideas. In several instances, exercises that did not work have been replaced.

Chapter 14: A new section, *14A, Sufficient and Necessary Conditions*, was added to the beginning of the chapter. This section was originally in Chapter 3 of the second edition, but it seems more natural to include it directly in the chapter on causality instead of expecting students to refer back to it in an earlier chapter.

Chapter 15: Although this chapter has proven to be useful for informal logic and critical thinking courses, we have decided to eliminate it from the main text for this edition. However, the entire chapter and the accompanying exercise sets are available on the Companion Website, the Ancillary Resource Center, and the Dashboard site (please see “Student and Instructor Resources” below for more details). The chapter can also be included in a custom edition of the book, if an instructor wishes.

SPECIAL FEATURES

The features that instructors found most useful in the second edition have been retained:

Each chapter opens with a **preview**, beginning with real-life examples and outlining the questions to be addressed. It thus serves both as motivation and overview, and wherever possible it explicitly bridges both formal and informal logic to real life. For example, Chapter 1 starts with the deluge of information facing students today, to show the very need for a course in logic or critical thinking.

Marginal definitions of key terms are provided for quick reference. Key terms appear in boldface when they are first introduced.

The use of reference boxes has been expanded, since they have proven useful to both students and instructors. They capture material that is spread out over a number of pages in one place for easy reference.

Profiles in Logic are short sketches of logicians, philosophers, mathematicians, and others associated with logic. The men and women in these sketches range in time from Aristotle and the Stoics to Christine Ladd-Franklin, the early ENIAC programmers, and others in the past century.

Bulleted summaries are provided at the end of each chapter, as well as a list of key terms.

The *Exercises* include a solution to the first problem in each set. Explanations are also provided where additional clarity is needed. This provides a model for students to follow, so they can see what is expected of their answers. In addition, approximately 25% of the exercises have answers provided at the back of the book.

End-of-chapter *Logic Challenge* problems are included for each chapter. These are the kind of puzzles—like the problem of the hats, the truth teller and the liar, and the scale and the coins—that have long kept people thinking. They end chapters on a fun note, not to mention with a reminder that the challenges of logic are always lurking in plain English.

A full glossary and index are located at the end of the book.

STUDENT AND INSTRUCTOR RESOURCES

A rich set of supplemental resources is available to support teaching and learning in this course. These supplements include Instructor Resources on the Oxford University Press **Ancillary Resource Center (ARC)** at www.oup-arc.com/baronett; intuitive, auto-graded assessments and other student resources on **Dashboard** by Oxford University Press at www.oup.com/us/dashboard; a free **Companion Website** for students available online at www.oup.com/us/baronett; and downloadable **Learning Management System Cartridges**.

The **ARC** site at www.oup-arc.com/baronett houses a wealth of **Instructor Resources**:

- A customizable, auto-graded **Computerized Test Bank** of roughly 1,500 multiple-choice and true/false questions
- An **Instructor's Manual**, which includes the following:
 - A traditional “Pencil-and-Paper” version of the Test Bank, containing the same 1,500 questions as the Computerized Test Bank, but converted for use in hard-copy exams and homework assignments, including some open-ended questions that allow students to develop extended analysis, such as drawing Venn diagrams, completing truth tables, and doing proofs
 - A list of the 1,500 questions from the Computerized Test Bank (in their closed-ended, multiple-choice and true/false format)
 - Complete answers to every set of exercises in the book—almost 2,800 exercises in total—including extended explanations for many of the questions that often require additional discussion and clarification
 - Complete answers and extended explanations for every end-of-chapter “Logic Challenge”
 - Bulleted Chapter Summaries, which allow the instructor to scan the important aspects of each chapter quickly and to anticipate section discussions
 - A list of the boldfaced Key Terms from each chapter of the book
 - **PowerPoint-based Lecture Outlines** for each chapter, to assist the instructor in leading classroom discussion
 - **Online Chapter 15**, “Analyzing a Long Essay”

The Instructor's Manual and Test Bank are also available in printed format.

Dashboard at www.oup.com/us/dashboard contains a wealth of **Student Resources** for *Logic* and connects students and instructors in an intuitive, integrated, mobile device–friendly format:

- Chapter Learning Objectives adapted from the book's chapter headings
- Level-One and Level-Two Quizzes with a total of around 2,500 questions, auto-graded and linked to the Learning Objectives for easy instructor analysis of each student's topic-specific strengths and weaknesses. Each question set is preceded by a short recap of the material pertaining to the questions.

- **BRAND NEW!** A Proof-Checking Module for solving symbolic proofs that allows students to enter proof solutions, check their validity, and receive feedback, both by line and as a whole, as well as Venn Diagram and Truth Table Creation Modules, all feeding automatically into a gradebook that offers instructors the chance to view students' individual attempts
- Quiz Creation Capability for instructors who wish to create original quizzes in multiple-choice, true/false, multiple-select, long-answer, short-answer, ordering, or matching question formats, including customizable answer feedback and hints
- A built-in, color-coded Gradebook that allows instructors to quickly and easily monitor student progress from virtually any device
- Video Tutorials that work through example questions, bringing key concepts to life and guiding students on how to approach various problem types
- Interactive Flashcards of Key Terms and their definitions from the book
- A Glossary of Key Terms and their definitions from the book
- Chapter Guides for reading that help students to think broadly and comparatively about the new ideas they encounter
- Tipsheets that help students to understand the particularly complicated ideas presented in each chapter
- Online Chapter 15, "Analyzing a Long Essay"
- Tools for student communication, reference, and planning, such as messaging and spaces for course outlines and syllabi

Access to Dashboard can be packaged with *Logic* at a discount, stocked separately by your college bookstore, or purchased directly at www.oup.com/us/dashboard.

The free **Companion Website** at www.oup.com/us/baronett contains supplemental **Student Resources**:

- Level-One and Level-Two Student Self-Quizzes, containing roughly 1,500 multiple-choice and true/false questions. The Level-One Quizzes feature mostly questions taken from and answered in the book itself, while the Level-Two Quizzes are unique to the Student Resources and give students a chance to review what they encountered in each chapter. Each question set is preceded by a short recap of the material pertaining to the questions.
- Interactive Flashcards of Key Terms and their definitions from the book
- Video Tutorials that work through example questions, bringing key concepts to life and guiding students on how to approach various problem types
- Chapter Guides for reading that help students to think broadly and comparatively about the new ideas they encounter
- Tipsheets that help students to understand the particularly complicated ideas presented in each chapter
- Online Chapter 15, "Analyzing a Long Essay"

The Instructor Resources from the ARC and the Student Resources from the Companion Website are also available in **Course Cartridges** for virtually any Learning Management System used in colleges and universities.

To find out more information or to order a printed Instructor's Manual, Dashboard access, or a Course Cartridge for your Learning Management System, please contact your Oxford University Press representative at 1-800-280-0280.

ACKNOWLEDGMENTS

For their very helpful suggestions throughout the writing process, I would like to thank the following reviewers:

- Guy Axtell, Radford University
- Joshua Beattie, California State University—East Bay
- Luisa Benton, Richland College
- Michael Boring, Estrella Mountain Community College
- Bernardo Cantens, Moravian College
- John Casey, Northeastern Illinois University
- Darron Chapman, University of Louisville
- Eric Chelstrom, Minnesota State University, Moorhead
- Lynnette Chen, Humboldt State University
- Kevin DeLapp, Converse College
- Toby DeMarco, Bergen Community College
- William Devlin, Bridgewater State University
- Ian Duckles, Mesa College
- David Lyle Dyas, Los Angeles Mission College
- David Elliot, University of Regina
- Thompson M. Faller, University of Portland
- Craig Fox, California State University, Pennsylvania
- Matthew Frise, University of Rochester
- Dimitria Electra Gatzia, University of Akron
- Cara Gillis, Pierce College
- Nathaniel Goldberg, Washington and Lee University
- Michael Goodman, Humboldt State University
- Matthew W. Hallgarth, Tarleton State University
- Anthony Hanson, De Anza College
- Merle Harton, Jr., Everglades University
- John Helsel, University of Colorado, Boulder
- Will Heusser, Cypress College
- Charles Hogg, Grand Valley State University
- Jeremy D. Hovda, Katholieke Universiteit Leuven
- Debby D. Hutchins, Gonzaga University
- Daniel Jacobson, University of Michigan—Ann Arbor
- William S. Jamison, University of Alaska Anchorage
- Benjamin C. Jantzen, Virginia Polytechnic Institute & State University
- Gary James Jason, California State University, Fullerton

- William M. Kallfelz, Mississippi State University
- Lory Lemke, University of Minnesota–Morris
- David Liebesman, Boston University
- Ian D. MacKinnon, University of Akron
- Erik Meade, Southern Illinois University Edwardsville
- Alexander Miller, Piedmont Technical College
- James Moore, Georgia Perimeter College
- Allyson Mount, Keene State College
- Nathaniel Nicol, Washington State University
- Joseph B. Onyango Okello, Asbury Theological Seminary
- Lawrence Pasternack, Oklahoma State University
- Christian Perring, Dowling College
- Adam C. Podlaskowski, Fairmont State University
- Greg Rich, Fayetteville State University
- Miles Rind, Boston College
- Linda Rollin, Colorado State University
- Frank X. Ryan, Kent State University
- Eric Saidel, George Washington University
- Kelly Salsbery, Stephen F. Austin State University
- David Sanson, Illinois State University
- Stephanie Semler, Virginia Polytechnic Institute & State University
- Robert Shanab, University of Nevada–Las Vegas
- David Shier, Washington State University
- Aeon J. Skoble, Bridgewater State University
- Nancy Slonneger-Hancock, Northern Kentucky University
- Basil Smith, Saddleback College
- Joshua Smith, Central Michigan University
- Paula Smithka, University of Southern Mississippi
- Deborah Hansen Soles, Wichita State University
- Tim Sundell, University of Kentucky
- Eric Swanson, University of Michigan, Ann Arbor
- Matthew Talbert, West Virginia University
- James S. Taylor, The College of New Jersey
- Joia Lewis Turner, St. Paul College
- Patricia Turrisi, University of North Carolina–Wilmington
- Mark C. Vopat, Youngstown State University
- Reginald Williams, Bakersfield College
- Mia Wood, Pierce College
- Kiriake Xerohehema, Florida International University
- Jeffrey Zents, South Texas College

Many thanks also to the staff at Oxford University Press—Robert Miller, executive editor; Maegan Sherlock, development editor; Kaitlin Coats, assistant editor; Barbara Mathieu, senior production editor; and Michele Laseau, art director—for their work on the book. Joia Lewis Turner was instrumental in supervising the revision of the ancillary material for Dashboard and the Companion Website. The *Profiles in Logic* portraits were drawn by Andrew McAfee.

Part I

SETTING THE STAGE



Chapter 1

What Logic Studies

- A. *Statements and Arguments*
 - B. *Recognizing Arguments*
 - C. *Arguments and Explanations*
 - D. *Truth and Logic*
 - E. *Deductive and Inductive Arguments*
 - F. *Deductive Arguments: Validity and Soundness*
 - G. *Inductive Arguments: Strength and Cogency*
 - H. *Reconstructing Arguments*
-

We live in the Information Age. The Internet provides access to millions of books and articles from around the world. Websites, blogs, and online forums contain instant commentary about events, and cell phones allow mobile access to breaking stories and worldwide communication. Cable television provides local and world news 24 hours a day. Some of the information is simply entertaining. However, we also find stories that are important to our lives. In fact, they may do more than just supply facts. They may make us want to nod in agreement or express disbelief. For example, suppose you read the following:

The Senate recently held hearings on for-profit colleges, investigating charges that the schools rake in federal loan money, while failing to adequately educate students. Critics point to deceptive sales tactics, fraudulent loan applications, high drop-out rates, and even higher tuitions. In response, the Department of Education has proposed a “gainful employment” rule, which would cut financing to for-profit colleges that graduate (or fail) students with thousands of dollars of debt and no prospect of salaries high enough to pay them off.

Jeremy Dehn, “Degrees of Debt”

If the information in this passage is accurate, then government decisions might affect thousands of people. On reading this, you would probably search for related material, to determine whether the information is correct. However, you would be concerned for more than just accuracy. You would also be asking what it means for you. Are the critics correct? Are the new rules justified, and do they address the criticism? Further research on the topic might help answer your questions.

Other types of information contain different claims. For example, in 2005, California passed a law prohibiting the sale of violent video games to minors. The law applied to games (a) in which the range of options available to a player includes

killing, maiming, dismembering, or sexually assaulting an image of a human being, (b) that are offensive to prevailing standards in the community, and (c) that lack serious literary, artistic, political, or scientific value for minors. Representatives for the video game industry argued that the law was unconstitutional. The case went to the Supreme Court, where the decision was 7–2 in favor of overturning the law. Here is an excerpt of the Court’s decision:

Like protected books, plays, and movies, video games communicate ideas through familiar literary devices and features distinctive to the medium. And the basic principles of freedom of speech do not vary with a new and different communication medium. The most basic principle—that government lacks the power to restrict expression because of its message, ideas, subject matter, or content—is subject to a few limited exceptions for historically unprotected speech, such as obscenity, incitement, and fighting words. But a legislature cannot create new categories of unprotected speech simply by weighing the value of a particular category against its social costs and then punishing it if it fails the test. Therefore, video games qualify for First Amendment protection.

Adapted from California v. Entertainment Merchants Association

The information in this passage contains an argument. An **argument** is a group of **statements** (sentences that are either true or false) in which the conclusion is claimed to follow from the premise(s). A **premise** is the information intended to provide support for the **conclusion** (the main point of an argument). An argument can have one or more premises, but only one conclusion. In the foregoing example, the conclusion is “video games qualify for First Amendment protection.” The premises are the first four sentences of the passage.

It is quite common for people to concentrate on the individual statements in an argument and investigate whether they are true or false. Since people want to know things, the actual truth or falsity of statements is important; but it is not the only important question. Equally important is the question “Assuming the premises are true, do they support the conclusion?” This question offers a glimpse of the role of **logic**, which is the study of reasoning, and the evaluation of arguments.

Arguments can be simple, but they can also be quite complex. In the argument regarding video games and the First Amendment, the premises and conclusion are not difficult to recognize. However, this is not always the case. Here is an example of a complex piece of reasoning taken from the novel *Catch-22*, by Joseph Heller:

There was only one catch and that was Catch-22, which specified that a concern for one’s own safety in the face of dangers that were real and immediate was the process of a rational mind. Orr was crazy and could be grounded. All he had to do was ask; and as soon as he did, he would no longer be crazy and would have to fly more missions. Orr would be crazy to fly more missions and sane if he didn’t, but if he was sane he had to fly them. If he flew them he was crazy and didn’t have to; but if he didn’t want to he was sane and had to. Yossarian was moved very deeply by the absolute simplicity of this clause of Catch-22 and let out a respectful whistle.

Argument A group of statements in which the conclusion is claimed to follow from the premise(s).

Statement A sentence that is either true or false.

Premise The information intended to provide support for a conclusion.

Conclusion The statement that is claimed to follow from the premises of an argument; the main point of an argument.

Logic The study of reasoning, and the evaluation of arguments.

This passage cleverly illustrates complex reasoning. Once you know how to tease apart its premises and conclusions, you may find yourself as impressed as Yossarian.

Logic investigates the level of correctness of the reasoning found in arguments. There are many times when we need to evaluate information. Although everyone reasons, few stop to think about reasoning. Logic provides the skills needed to identify other people's arguments, putting you in a position to offer coherent and precise analysis of those arguments. Learning logical skills enables you to subject your own arguments to that same analysis, thereby anticipating challenges and criticism. Logic can help, and this book will show you how. It introduces the tools of logical analysis and presents practical applications of logic.

A. STATEMENTS AND ARGUMENTS

The terms “sentence,” “statement,” and “proposition” are related, but distinct. Logicians use the term “statement” to refer to a specific kind of sentence in a particular language—a *declarative sentence*. As the name indicates, we declare, assert, claim, or affirm that something is the case. In this sense every statement is either true or false, and these two possibilities are called **truth values**. For example, the statement “Water freezes at 32° F” is in English, and it is true. Translated into other languages we get the following statements:

Truth value Every statement is either true or false; these two possibilities are called *truth values*.

El agua se congela a 32° F.

(Spanish)

Wasser gefriert bei 32° F.

(German)

Pāñi 32 đigrī ēpha mēm freezees.

(Hindi)

L'eau gèle à 32° F. (French)

Nước đông băng ở 32° F.

(Vietnamese)

Tubig freezes sa 32° F. (Filipino)

Air membeku pada 32° F. (Malay)

Maji hunganda yapitapo nyuzi joto
32° F. (Swahili)

The foregoing list contains eight *sentences* in eight different languages that certainly look different and, if spoken, definitely sound different. Since the eight sentences are all declarative sentences, they are all *statements*. However, the eight statements all *make the same claim*, and it is in that sense that logicians use the term “proposition.” In other words, a **proposition** is the information content imparted by a statement, or, simply put, its meaning. Since each of the eight statements makes the same claim, they all have the same truth value.

Proposition The information content imparted by a statement, or, simply put, its meaning.

It is not necessary for us to know the truth value of a proposition to recognize that it must be either true or false. For example, the statement “There is a diamond ring buried fifty feet under my house” is either true or false regardless of whether or not anyone ever looks there. The same holds for the statement “Abraham Lincoln sneezed four times on his 21st birthday.” We can accept that this statement must be true or false, although it is unlikely that we will ever know its truth value.

Many sentences do not have truth values. Here are some examples:

What time is it? (Question)

Clean your room now. (Command)

Please clean your room. (Request)
 Let's do lunch tomorrow. (Proposal)

None of these sentences make an assertion or claim, so they are neither true nor false. Quite often we must rely on context to decide whether a sentence is being used as a statement. For example, the opening sentence of a poem by Robert Burns is "My love is like a red, red rose." Given its poetic use, we should not interpret Burns as making a claim that is either true or false.

The term **inference** is used by logicians to refer to the *reasoning process* that is expressed by an argument. The act or process of reasoning from premises to a conclusion is sometimes referred to as *drawing an inference*. Arguments are created in order to establish support for a claim, and the premises are supposed to provide good reasons for accepting the conclusion.

Arguments can be found in almost every part of human activity. Of course, when we use the term in a logical setting, we do not mean the kinds of verbal disputes that can get highly emotional and even violent. Logical analysis of arguments relies on rational use of language and reasoning skills. It is organized, is well thought out, and appeals to relevant reasons and justification.

Arguments arise where we expect people to know what they are talking about. Car mechanics, plumbers, carpenters, electricians, engineers, computer programmers, accountants, nurses, office workers, and managers all use arguments regularly. Arguments are used to convince others to buy, repair, or upgrade a product. Arguments can be found in political debates, and in ethical and moral disputes. Although it is common to witness the emotional type of arguments when fans discuss sports, for example, nevertheless there can be logical arguments even in that setting. For example, if fans use statistics and historical data to support their position, they can create rational and logical arguments.

Inference A term used by logicians to refer to the reasoning process that is expressed by an argument.

B. RECOGNIZING ARGUMENTS

Studying logic enables us to master many important skills. It helps us to recognize and identify arguments correctly, in either written or oral form. In real life, arguments are rarely found in nice neat packages. We often have to dig them out, like prospectors searching for gold. We might find the premises and conclusions occurring in any order in an argument. In addition, we often encounter incomplete arguments, so we must be able to recognize arguments even if they are not completely spelled out.

An argument offers reasons in support of a conclusion. However, not all groups of sentences are arguments. A series of sentences that express *beliefs* or *opinions*, by themselves, do not constitute an argument. For example, suppose someone says the following:

I wish the government would do something about the unemployment situation. It makes me angry to see some CEOs of large corporations getting huge bonuses while at the same time the corporation is laying off workers.

The sentences certainly let us know how the person feels. However, none of the sentences seem to offer any support for a conclusion. In addition, none of the sentences seem to be a conclusion. Of course it sometimes happens that opinions are meant to act as premises of an argument. For example, suppose someone says the following:

I don't like movies that rely on computer-generated graphics to take the place of intelligent dialogue, interesting characters, and an intricate plot. After watching the ads on TV, I have the feeling that the new movie *Bad Blood and Good Vibes* is not very good. Therefore, I predict that it will not win any Academy Awards.

Although the first two sentences express opinions and feelings, they are offered as reasons in support of the last sentence, which is the conclusion.

Many newspaper articles are good sources of information. They are often written specifically to answer the five key points of reporting: *who, what, where, when, and why*. A well-written article can provide details and key points, but it need not conclude anything. Reporters sometimes simply provide information, with no intention of giving reasons in support of a conclusion. On the other hand, the editorial page of newspapers can be a good source of arguments. Editorials generally provide extensive information as *premises*, meant to support a position strongly held by the editor. The editorial page usually contains letters to the editor. Although these pieces are often highly emotional responses to social problems, some of them do contain arguments.

When people write or speak, it is not always clear that they are trying to conclude something. Written material can be quite difficult to analyze because we are generally not in a position to question the author for clarification. We cannot always be certain that what we think are the conclusion and premises are, in fact, what the author had intended. Yet we can, and should, attempt to provide justification for our interpretation. If we are speaking with someone, at least we can stop the conversation and seek clarification. When we share a common language and have similar sets of background knowledge and experiences, then we can recognize arguments when they occur by calling on those shared properties.

Since every argument must have a conclusion, it sometimes helps if we try to identify that first. Our shared language provides **conclusion indicators**—useful words that nearly all of us call on when we wish to conclude something. For example, we often use the word “therefore” to indicate our main point. Here are other words or phrases to help recognize a conclusion:

CONCLUSION INDICATORS

Therefore	Consequently	It proves that
Thus	In conclusion	Suggests that
So	It follows that	Implies that
Hence	We can infer that	We can conclude that

We can see them at work in the following examples:

- Salaries are up. Unemployment is down. People are happy. *Therefore*, re-elect me.

Conclusion indicator

Words and phrases that indicate the presence of a conclusion (the statement claimed to follow from premises).

- Salaries are down. Unemployment is up. People are not happy. *Consequently, we should throw the governor out of office.*
- The book was boring. The movie based on the book was boring. The author of both the book and the screenplay is Horst Patoot. *It follows that he is a lousy writer.*

Although conclusion indicators can help us to identify arguments, they are not always available to us, as in this example:

We should boycott that company. They have been found guilty of producing widgets that they knew were faulty, and that caused numerous injuries.

If you are not sure which sentence is the conclusion, you can simply place the word “therefore” in front of each of them to see which works best. In this case, the first sentence seems to be the point of the argument, and the second sentence seems to offer reasons in support of the conclusion. In other words, *because* the company has been found guilty of producing widgets that they knew were faulty, and that caused numerous injuries, *therefore* we should boycott the company.

In addition to identifying the conclusion, our analysis also helped reveal the premise. As here with “because” in this example, a **premise indicator** distinguishes the premise from the conclusion. Here are other words or phrases that can help in recognizing an argument:

PREMISE INDICATORS		
Because	Assuming that	As indicated by
Since	As shown by	The fact that
Given that	For the reason(s) that	It follows from

Premise indicator

Words and phrases that help us recognize arguments by indicating the presence of premises (statements being offered in support of a conclusion).

When premise and conclusion indicators are not present, you can still apply some simple strategies to identify the parts of an argument. First, to help locate the conclusion, try placing the word “therefore” in front of the statements. Second, to help locate the premise or premises, try placing the word “because” in front of the statements.

In some cases you will have to read a passage a few times in order to determine whether an argument is presented. You should keep a few basic ideas in mind as you read. For one thing, at least one of the statements in the passage has to provide a reason or evidence for some other statement; in other words, it must be a premise. Second, there must be a claim that the premise supports or implies a conclusion. If a passage *expresses a reasoning process*—that the conclusion follows from the premises—then we say that it makes an **inferential claim**. The inferential claim is an objective feature of an argument, and it can be *explicit* or *implicit*. Explicit inferential claims can often be identified by the premise and conclusion indicator words and phrases discussed earlier (e.g., “because” and “therefore”). On the other hand, while implicit inferential claims do not have explicit indicator words, they still contain an inferential relationship between the premises and the conclusion. In these cases we follow the advice given earlier by supplying the words “therefore” or “because” to the statements in the passage in order to help reveal the inferential claim that is implicit.

Inferential claim

If a passage expresses a reasoning process—that the conclusion follows from the premises—then we say that it makes an inferential claim.

Of course, determining whether a given passage in ordinary language contains an argument takes practice. Like all tools, our strategies and indicator words take practice in order to use them correctly. Even the presence of an indicator word may not by itself mean that the passage contains an argument:

He climbed the fence, threaded his stealthy way through the plants, till he stood under that window; he looked up at it long, and with emotion; then he laid him down on the ground under it, disposing himself upon his back, with his hands clasped upon his breast and holding his poor wilted flower. And *thus* he would die—out in the cold world, with no shelter over his loving face, no friendly hand to wipe the death-damps from his brow, no loving face to bend pityingly over him when the great agony came. Mark Twain, *Tom Sawyer*

In this passage the word “thus” (my italics) is not being used as a conclusion indicator. It simply indicates the manner in which the character would die. Here is another example:

The modern cell phone was invented during the 1970s by an engineer working for the Motorola Corporation. However, the communications technologies that made cell phones possible had been under development *since* the late 1940s. Eventually, the ability to make and receive calls with a mobile telephone handset revolutionized the world of personal communications, with the technology still evolving in the early 21st century.

Tom Streissguth, “How Were Cell Phones Invented?”

Although the passage contains the word “since” (my italics), it is not being used as a premise indicator. Instead, it is used to indicate the period during which communications technology was developing.

We pointed out that *beliefs* or *opinions* by themselves do not constitute an argument. For example, the following passage simply *reports* information, without expressing a reasoning process:

Approximately 2,000 red-winged blackbirds fell dead from the sky in a central Arkansas town. The birds had fallen over a 1-mile area, and an aerial survey indicated that no other dead birds were found outside of that area. Wildlife officials will examine the birds to try to figure out what caused the mysterious event. “Why Did 2,000 Dead Birds Fall From Sky?” Associated Press

The statements in the passage provide information about an ongoing situation, but no conclusion is put forward, and none of the statements are offered as premises.

A noninferential passage can occur when someone provides *advice* or words of wisdom. Someone may recommend that you act in a certain way, or someone may give you advice to help you make a decision. Yet if no evidence is presented to support the advice, then no inferential claim is made. Here are a few simple examples:

In three words I can sum up everything I’ve learned about life: it goes on.

Robert Frost, as quoted in *The Harper Book of Quotations* by Robert I. Fitzhenry

People spend a lifetime searching for happiness; looking for peace. They chase idle dreams, addictions, religions, even other people, hoping to fill the emptiness that plagues them. The irony is the only place they ever needed to search was within. Ramona L. Anderson, as quoted in *Wisdom for the Soul* by Larry Chang

The passages may influence our thinking or get us to reevaluate our beliefs, but they are noninferential. The same applies to *warnings*, a special kind of advice that cautions us to avoid certain situations:

- Dangerous currents. No lifeguard on duty.
- All items left unattended will be removed.
- Unauthorized cars will be towed at owner's expense.

The truth value of these statements can be open to investigation, but there is no argument. No evidence is provided to support the statements, so the warnings, however important they may be, are not inferential.

Sometimes a passage contains *unsupported* or *loosely associated statements* that elaborate on a topic but do not make an inferential claim:

Coaching takes time, it takes involvement, it takes understanding and patience. Byron and Catherine Pulsifer, "Challenges in Adopting a Coaching Style"

Our ability to respect others is the true mark of our humanity. Respect for other people is the essence of human rights. Daisaku Ikeda, "Words of Wisdom"

The passages lack an inferential claim. The statements in the passages may elaborate a point, but they do not support a conclusion.

Some passages contain information that illustrates how something is done, or what something means, or even how to do a calculation. An *illustration* may be informative without making an inferential claim:

To lose one pound of fat, you must burn approximately 3500 calories over and above what you already burn doing daily activities. That sounds like a lot of calories and you certainly wouldn't want to try to burn 3500 calories in one day. However, by taking it step-by-step, you can determine just what you need to do each day to burn or cut out those extra calories.

Paige Waeher, "How to Lose Weight: The Basics of Weight Loss"

The passage provides information about calories, fat, and weight loss. It illustrates what is required in order to lose one pound of fat, but it does not make an inferential claim. For another example, the definition of a technical term:

In order to measure the performance of one investment relative to another you can calculate the "Return on Investment (ROI)." Quite simply, *ROI* is based on returns over a certain time period (e.g., one year) and it is expressed as a percentage. Here's an example that illustrates how to perform the calculation: A 25% annual ROI would mean that a \$100 investment returns \$25 in one year. Thus, in one year the total investment becomes \$125.

"How to Calculate a Return on an Investment," eHow, Inc.