

# Steps for Critical Thinking

## Recognize the Argument

- ▲ Count the claims
- ▲ Look for reasons
- ▲ Identify the purpose



## Analyze the Argument

- ▲ Pay attention to inference indicators
- ▲ Identify conclusion and premises
- ▲ Determine the issue
- ▲ Analyze any subarguments
- ▲ Detect fallacies
- ▲ Diagram the argument



## Evaluate the Argument

- ▲ Determine reasoning style
- ▲ Identify argument kind
- ▲ Use appropriate terminology and tools

### Deductive Reasoning

#### Categorical Arguments

- ▲ Translate into standard form
- ▲ Check validity using Venn diagram
- ▲ Check validity using Rules

#### Truth-Functional Arguments

- ▲ Translate into symbolic form
- ▲ Check validity using Forms
- ▲ Check validity using Truth Table
- ▲ Check validity using Shortcut

### Inductive Reasoning

#### Analogical Arguments

- ▲ Present in general form
- ▲ Assess the evidence for the analogy
- ▲ Check the relevance of the analogy

#### Inductive Generalizations

- ▲ Present in general form
- ▲ Assess the sample randomness
- ▲ Assess the sample size

#### Causal Arguments

- ▲ Present in general form
- ▲ Determine the method
- ▲ Assess causal evidence

## CRITICAL THINKING

# CRITICAL THINKING

## A USER'S MANUAL

DEBRA JACKSON & PAUL NEWBERRY

California State University, Bakersfield



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**Critical Thinking: A User's Manual****Debra Jackson and Paul Newberry**

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Art Director: Jennifer Wahli

Print Buyer: Karen Hunt

Rights Acquisition Specialist, image:  
Mandy Groszko

Rights Acquisition Specialist, text: Katie Huha

Production Service: S4Carlisle Publishing Services

Text Designer: Norman Baugher

Cover Designer: Norman Baugher

Cover Image: Getty Images

Compositor: S4Carlisle Publishing Services

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Library of Congress Control Number: 2010929837

ISBN-13: 978-0-495-81407-8

ISBN-10: 0-495-81407-5

**Wadsworth**

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# Preface

As college instructors, we know that critical thinking changes lives. Learning to recognize, analyze, and evaluate arguments can provide students with the foundation to successfully complete college, pursue their future careers, and become more engaged citizens. But, to provide the best opportunities for our students to acquire these vital skills, we needed a genuinely different kind of text, one that is

- ▶ accessible yet challenging to both beginning and advanced students;
- ▶ focused on building foundational skills in a step-by-step fashion;
- ▶ committed to integrated, active learning strategies;
- ▶ packed with clear examples and exercises that epitomize the skills learned; and
- ▶ structured to ensure that students transfer critical thinking skills beyond the classroom.

*Critical Thinking: A User's Manual* is that text, and it works. We know because we've been using it in our classes for two years now.

Why do we call this text *A User's Manual*? User's manuals are written for the beginner and the do-it-yourselfer. We have taken the same approach here. We focus on three essential skills—argument recognition, analysis, and evaluation—and break each down into its basic components. In this way, students learn to think critically in a step-by-step fashion, as they would learn to master any skill, be it speaking Japanese, playing basketball, or painting a portrait. In addition, like any good user's manual, this text is easy to follow. We provide clear examples and explanations, and we integrate workbook-style writing and thinking exercises that promote active learning.

## Step-by-Step Approach

We treat the acquisition of critical thinking skills as a process, starting simply and working toward more complex skills. For example, in Chapter 3 (Analyzing Arguments), we begin by analyzing very simple arguments containing inference indicators. Next, we

introduce, one-by-one, arguments without inference indicators, arguments with extra claims, arguments with missing conclusions, and arguments with implied claims. Only then do students encounter arguments with multiple conclusions and chain arguments. This process is repeated in Chapter 4 (Diagramming Arguments) as students learn to draw argument diagrams, again in a step-by-step manner. By the end of Chapter 4, students are able to analyze and diagram complex chain arguments containing extra and implied claims.

### **“Your Turn!”**

By reading actively, with a pencil in hand, students are more likely to analyze, apply, and synthesize what they learn in the context of their own experiences. It can be difficult to get students to read this way, so we provide frequent, workbook-style “Your Turn!” exercises so that students can focus their reading, check their understanding of new content immediately, and integrate earlier skills with later ones. This feature can be incorporated into lectures, utilized in group activities, or included with homework assignments.

### **Stylized Examples**

When teaching a language, instructors do not begin with metaphors, sarcasm, puns, and double entendres. These are for advanced students, not for ones learning the basics. Similarly, when teaching critical thinking, relying on arguments gleaned from the popular press is more likely to confuse than enlighten beginning students. If you have ever asked your class to discover fallacies on the editorial page, you will most likely understand what we mean. For this reason, we utilize highly stylized examples that clearly demonstrate the particular argument patterns. This feature is most pronounced in Chapter 5 (Detecting Fallacies), Chapter 9 (Evaluating Analogical Arguments), and Chapter 11 (Evaluating Causal Arguments) because their real-life versions are often overly complicated, poorly constructed, or otherwise unhelpful.

### **Abundant, Integrated Exercises**

This text includes over 1,100 exercises, designed to provide students with immediate practice of individual skills as they are learned. Answers to selected exercises are provided in the back of the book as a self-check for students. These exercises are progressive, so that students have time to absorb the basics before encountering tougher problems. Cumulative exercises are also provided for additional reinforcement. For example, in Chapter 5 (Detecting Fallacies), we introduce six common fallacies. Students practice identifying each fallacy immediately after it is introduced, and also practice distinguishing those fallacies that commit similar mistakes in reasoning. Finally, the chapter concludes with cumulative exercises covering all six fallacies as well as material from preceding chapters.

## **"Putting It All Together"**

As a means to improve critical thinking by writing, we provide comprehensive writing exercises at the end of Chapters 3 through 11. In these highly structured assignments, students integrate all previously learned skills with those presented in the current chapter. For example, at the end of Chapter 6 (Preparing to Evaluate Arguments), students write paragraphs in which they combine their ability to distinguish five kinds of arguments with their earlier acquired skills in recognizing (Chapter 2), analyzing (Chapter 3), and diagramming (Chapter 4) arguments, and in detecting fallacies (Chapter 5). Each "Putting It All Together" section includes clear instructions and examples of the proper way for students to demonstrate the new skills.

## **Flexibility**

Although we expect and allow for some instructor choice about which topics are covered and which order to cover them, the material is most effective when Chapters 1 through 6 are taught in order. By doing so, you can best take advantage of the step-by-step progression built into the text. The remaining chapters may be chosen according to instructor preference, depending upon course time and needs.

## **Argument Construction**

In Chapter 12 (Constructing Arguments), students learn to write an effective argumentative essay following our step-by-step process. Beginning with prewriting and brainstorming activities, students learn to construct each of the main elements of an argumentative essay: the introduction, support for premises, response to objections, and the conclusion. We provide them with examples of better and worse ways to do this, referencing the challenges they faced in earlier chapters when analyzing arguments and detecting fallacies. We also emphasize the importance of properly utilizing and citing sources. Because this process relies heavily on skills acquired in the first half of the book, we recommend it be taught only after Chapters 1 through 6 are completed.

## **Supplements**

*Critical Thinking: A User's Manual* is available with Aplia™, an online interactive homework solution that improves comprehension and outcomes by increasing student effort and engagement. Founded by a professor to enhance his own courses, Aplia™ provides automatically graded assignments with detailed, immediate explanations on every question, as well as innovative teaching materials. This easy-to-use system has benefited more than 1,000,000 students at over 1,800 institutions.

Instructor Materials are available on the PowerLecture CD, ISBN 0495814075. PowerLecture is a digital presentation tool that contains prepared lecture slides. Also included is the complete *Instructor's Manual*, and the ExamView digital test bank. The *Instructor's Manual* is also available at [www.cengagebrain.com/shop/ISBN/0538452838](http://www.cengagebrain.com/shop/ISBN/0538452838). There we provide teaching suggestions for each chapter and answers to all exercises.

## Acknowledgments

We are grateful for all the assistance, advice, and inspiration from our Wadsworth team, including Norman Baugher, Cathy Brooks, Josh Brown, Emily Bush, Chris Feldman, Mandy Groszko, Michaela Henry, and Megan Lassard. We are especially grateful to Joann Kozyrev, our managing editor, and Ian Lague, our development editor, for their invaluable advocacy on behalf of the book. Joann's unwavering commitment and support, and Ian's meticulous edits and suggestions for every chapter have significantly improved this text.

The book was also improved by the comments of the following reviewers:

Robert Abele, Diablo Valley College; Ralph Acampora, Hofstra University; Minerva Ahumada, Northeastern Illinois University; Patricia Allen, MassBay Community College; James Anderson, San Diego State University; Robin Arneson, Normandale Community College; Julie M. Aultman, Northeastern Ohio Universities Colleges of Medicine and Pharmacy and Youngstown State University; Claudia Basha, Victor Valley College; Michael Bishop, Florida State University; Diana C. Blauvelt, Passaic County Community College; Daniel R. Boisvert, University of North Carolina at Charlotte; Michael Boring, Estrella Mountain Community College; Craig Bradley, Grossmont College; William Brunson, University of Nevada, Las Vegas; Leslie Burkholder, University of British Columbia; Christopher Caldwell, Virginia State University; Delilah Caldwell, Virginia State University; Charles E. Cardwell, Pellissippi State Community College; Barbara Carlson, Clark University; Jennifer Caseldine-Bracht, IPFW; Denise Chambers, Normandale Community College; Dobin Choi, SUNY-Buffalo; Doug Clouatre, Mid-Plains Community College; Alan Clune, Sam Houston State University; Marlys Cordoba, College of the Siskiyous; Judy Covington, Trident Technical College; Sharon Crasnow, Riverside Community College; Marcel Daguerre, CSU-Chico; Michelle Darnell, Fayetteville State University; William Davenport, Lakeland Community College; Theresa Dolan, Los Angeles Trade Technical College; Tom Duran, Labette Community College; Joe Emeka, Quincy University; Frank Fair, Sam Houston State University; Stephen Findley, Webster University; Galen Foresman, North Carolina A & T State University; David Foster, The University of Findlay; LaVerne S. Fox, CSU-Long Beach; Matthew Freytag, University of Maine at Farmington; Amy Garcia, Fullerton College; Kristen Gerdes, Cerritos Community College; William Gifford, Truckee Meadows Community College; Nuria Giralt, CSU-Long Beach; Cynthia Gobatie, Riverside City College; Nathan Griffith, Belmont University; Shahrokh Haghighi, CSU-Long Beach; Courtney Hammons, Cuyamaca College; Mara Harrell, Carnegie Mellon University; William J. Hawk, James Madison University; Kenneth Hochstetter, College of Southern Nevada; Sharon M. Hope, Maria College; Steven A. Jauss, University of Arkansas-Little Rock; Joseph Jedwab, Kutztown University; Doris Jones, The American University in Cairo; Veronica C. Jones, Southeast Community College-Lincoln; Andrew Jones, Cathcart, College of the Canyons; Allyn Kahn, Champlain College; David Kite, Champlain College; Rory Kraft, York College of Pennsylvania; Michael LaBossiere, Florida A&M University; Carole Mackewich, Clark College; Terrance MacMullan, Eastern Washington University; Ivan Nikolaeff, Everest College; Susan Nylander, Victor Valley College; John Orr, Fullerton College; Slobodan Perovic, Carleton University; Jamie Phillips, Clarion University of Pennsylvania; Michael Principe, Middle Tennessee State University; Susan

Priest, Western Nevada College; N. Mark Rauls, College of Southern Nevada; Andrea Reynolds, Ventura College; Dennis Ryan, Edgewood College; Paula Sabin, CSU–Long Beach; Leah Savion, Indiana University; Suzette Schlapkohl, Scottsdale Community; Michael Schroeder, Savannah State University; Janet Simpson, Suffolk County Community College; Robert Skipper, St. Mary’s University–San Antonio; Dennis Slivinski, CSU–Channel Islands; Richard Smith, University of Findlay; Cindy Stern, CSU–Northridge; Lou Suarez, Lorain County Community College; Patricia Jo Teel, Victor Valley College; Susan Vineberg, Wayne State University; Susan Weaver, University of the Cumberlands; James Wilson, Victor Valley College; and James Woolever, Foothill College.

## Special Thanks

We have benefited from a collegial and supportive department, several of whom deserve special recognition: Gary Kessler, for encouragement and introductions to Wadsworth/Cengage; Steven Gamboa, especially for help with Chapters 7 and 9; Senem Saner, for using drafts of the text in her classes; Jacquelyn Kegley, for using an early draft of Chapter 4 in her class; and Liora Gubkin Malicdem, for her help in creating a useful *Instructor’s Manual*.

Paul wishes to thank Joanne Newberry for her continual support, helpful suggestions, and careful edits; Madeline Newberry for testing several chapters, creating exercise examples, and checking all answers for the exercises; and Brent Currie for testing chapters and reading the text as students would.

Debra wants to thank Mike Tann for his loving encouragement and incredible patience throughout the development of this book.

Finally, we are grateful to the numerous students who took our Logical Reasoning courses while we tested drafts of the text. This book is for you.

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# Getting Started

## CHAPTER

# 1

Imagine that you check your Facebook account and see that your friend, Sara, has posted a new status update encouraging everyone to join a campaign to make your campus smoke-free. You also see that a number of people have commented on her post, some supporting the campaign and others opposing it.



**Sara says** Hey people! Check out this link! We should definitely start this campaign on our campus...



**Smoke-Free Campus** The Smoke-Free Campus Initiative aims to promote a clean, safe, and healthy campus environment by eliminating smoking from college campuses...



**James says** I don't smoke, but I don't think it's a good idea to ban smoking on campus. Since when does completely banning something work? Alcohol and drugs are illegal on campus, so no one uses them, right? Wrong!



**Davion says** If you want to subject yourself to the health risks of smoking, that's fine. But smoking in public places should be banned. Why? It's simple. Smoking poses a health risk to others, and anything that does that should be outlawed. Period.



**Veronica says** Are we living in a fascist state now??? The only people who would support this are uptight nonsmokers who want to take away my freedom to express myself and enjoy life. I know smoking is bad for me, but it's my choice!

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## EXERCISE 1.1



**Your Turn!** Which of these arguments do you find most persuasive? Which is the least persuasive? Explain why.

You have probably encountered exchanges similar to this one on social networking sites like Facebook, in blogs, or in the comments section following Internet news and video posts. If you have seen even a handful of these, you likely know that responses like Veronica's are very common (and usually much more brutal). Personal attacks and rhetoric quickly get out of hand, and the conversation veers away from the original topic. Should you respond to attacks of this sort by engaging in some name-calling of your own, replying with more reasonable arguments, or just ignoring it? Like James, people also often encourage others to approach the problem in front of them by appealing to similar cases. But, what exactly are we to accept from such comparisons? Davion's comment offers compelling reasons for banning smoking, but only if he's right about the extent of the dangers from secondhand smoke. How do we go about evaluating the credibility of those claims?

## EXERCISE 1.2



**Your Turn!** How would you respond to the discussion about the campaign for a smoke-free campus?

Each of the posts is trying to persuade you, but not all should succeed. This book will provide you with the necessary critical thinking tools for constructively engaging in conversations like these by teaching you argument recognition, analysis, and evaluation. This means determining exactly what an arguer says and whether the argument is a good one. For example, you will learn to recognize that:

- Sara doesn't offer an argument at all. She merely states her opinion.
- James's and Davion's responses employ different styles of reasoning. In order to determine whether their arguments should convince us, we need to utilize different criteria.
- Veronica's reply commits a common mistake in reasoning called a fallacy. She attacks the people who support the smoking ban rather than their reasons for doing so.

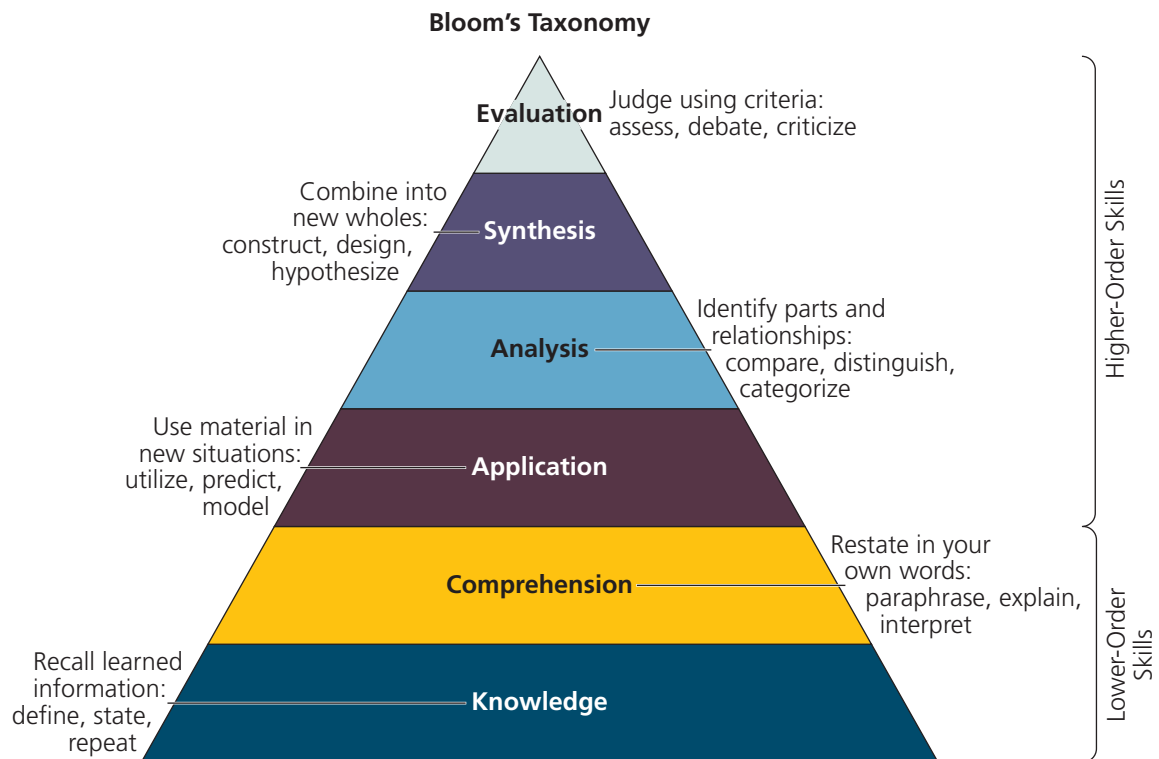
Notice, then, that when we talk about critical thinking, the term doesn't describe thinking that is severe, negative, or harsh; instead, *critical thinking* refers to thinking that is careful, consistent, and exact. The purpose of critical thinking is not to belittle or berate, but to get clear and concise so as to be a better thinker.

Before moving forward in the building of these skills, we'd like to point out that their usefulness extends beyond the fun of participating in online conversations about controversial issues. In fact, the skills you will learn in this text will help you do well in your college classes, be more successful in your career, avoid being manipulated by people who want your money or your support, and live a deeper, more meaningful life. That's quite a lot for any book to claim, so let us provide some evidence to back it up.

## Using Critical Thinking in the Classroom

Over the years, our fellow educators in various disciplines—business management, criminal justice, nursing, psychology, biology, and others—have repeatedly said how important it is for students in their classes to have strong critical thinking skills. Our colleagues are apparently in good company, according to a report by the Foundation for Critical Thinking ([www.criticalthinking.org](http://www.criticalthinking.org)). In a survey of faculty at 38 public and 28 private California universities, nearly 90% of respondents claimed that critical thinking constituted a primary objective of their teaching. Yet, only a small minority (9%) clearly taught critical thinking skills on any given day. The first statistic shows just how important critical thinking is in the eyes of instructors, but the second indicates that you must acquire those vital skills *before* you get to the discipline-based courses.

Why do professors consider these skills—the most essential of which are taught in this text—so important to students in their discipline? One reason is that in college you are expected not only to learn more advanced material than you learned in high school, but also to do things with that material that are more cognitively sophisticated and demanding than has been expected of you up to this point. From elementary school through high school, your learning most likely has focused on basic information such as the main characters and events in American history, the structure of a grammatically correct sentence, the proper procedures for a chemistry experiment, the rudiments of speaking another language, and so on. All of this is important knowledge. In college, however, you must go far beyond these basics both in content and in what you are asked to do with the information you learn. This is shown in a well-known pyramid of cognitive activities known as Bloom's Taxonomy.



Of course, in college you still must demonstrate knowledge and comprehension of subjects. However, you are also expected to employ Bloom's higher cognitive skills of application, analysis, synthesis, and evaluation. So, instead of merely memorizing pertinent information to repeat back on exams or in written work, you must dismantle the parts, apply them in new ways and to new problems, and determine what works well and what doesn't. That is, you must use higher level cognitive skills. For example, if your Economics instructor asked you, "Is Adam Smith's argument for the 'invisible hand' that guides economic interaction convincing or not?" he or she would be asking you to utilize a higher order cognitive skill, namely *evaluation*. For such an assignment, you cannot simply recite the information provided to you, but instead must assess its worth. The major critical thinking skills taught in this book—recognizing, analyzing, and evaluating arguments—are all higher level cognitive skills.

### EXERCISE 1.3



**Your Turn!** If you were asked to *paraphrase* Adam Smith's argument, which cognitive skill would be required?

Critical thinking skills are useful in college courses for yet another reason. As you learn more about a subject, you move beyond the material everyone in the discipline accepts to ideas, theses, and formulations that experts in the field disagree about. For example, because you have been exposed to American history throughout your education, it might appear that all the "facts" about American history are already discovered and agreed upon. But historians argue, sometimes vehemently, over the credibility of eye-witness testimony, the usefulness of recently acquired documents or artifacts, and the value of innovative research methods. In your college history courses, you will be expected to analyze and evaluate these kinds of arguments.

For courses in all disciplines, whether it is history, sociology, biology, business, or anything else, arguments play a large role in the college classroom. Having information, especially in the Internet era, is not sufficient in your advanced courses. You must understand that information as never before by applying it in novel situations and critically appraising the results of others doing the same. That is, you must be able to recognize, analyze, evaluate, and create arguments in a variety of disciplines.

Before we consider reasons that critical thinking skills are important outside of college as well, let's look at some sample class assignments to see just how such higher cognitive skills might appear in your class assignments. We'll give an example first, and then you can try some exercises.

Suppose you have a writing assignment such as the following in an Art History class.

*Compare the painting styles of the Impressionists with the Pointillists.*

What cognitive skills will you use in this assignment? To figure that out, look at the description of the primary activity. It says you are to *compare*. When you *compare* two or more things, you are identifying similarities and differences. Notice that the Bloom's Taxonomy pyramid lists *compare* as an example of the activities associated with analysis.

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Thus, comparisons involve identifying parts and relationships. Of course, to be able to do any higher order activity, from the third level on up, you must first have the lower level ones of knowledge and comprehension. However, the highest level skill required for this assignment is analysis.

#### EXERCISE 1.4

**Your Turn!** Go back to Exercise 1.3 and identify the lower level skill that would also be required for the paraphrase assignment.



#### EXERCISE 1.5

Using Bloom's Taxonomy table, choose the highest level skill required to address each of these sample course assignments.

1. How long was the Hundred Years' War?
  - a. Knowledge
  - b. Application
  - c. Synthesis
2. In a short paragraph, explain how a gang may serve as a substitute family.
  - a. Comprehension
  - b. Analysis
  - c. Evaluation
3. Jones argues that the lessons learned by the English occupation of Calais and Bordeaux during the Hundred Years' War prevented a permanent peace. Determine whether she gives a persuasive argument, and justify your answer.
  - a. Knowledge
  - b. Analysis
  - c. Evaluation
4. Write an essay in which you show how Joan of Arc's role as a military leader during the Hundred Years' War could give our military leaders a better understanding of religious mysticism among violent extremists in our own time.
  - a. Comprehension
  - b. Application
  - c. Synthesis

5. What is the AMA's definition of *mercy killing*?
    - a. Knowledge
    - b. Comprehension
    - c. Analysis
  6. In a five-paragraph essay, debate the pros and cons of the AMA's definition of *mercy killing*.
    - a. Application
    - b. Synthesis
    - c. Evaluation
  7. Design a classroom activity to teach students about ratios.
    - a. Comprehension
    - b. Synthesis
    - c. Evaluation
  8. Using your own words, describe the purpose of an annual physical exam.
    - a. Comprehension
    - b. Analysis
    - c. Evaluation
  9. Compare the financial impacts of Hurricane Katrina and Hurricane Ivan on low income residents of coastal communities in the United States.
    - a. Knowledge
    - b. Analysis
    - c. Application
  10. What did Socrates mean when he claimed that "The unexamined life is not worth living"?
    - a. Comprehension
    - b. Application
    - c. Evaluation
- 

## Using Critical Thinking in the Workplace

Imagine this scene. The academic term is about to begin and faculty from all disciplines have gathered to hear about changes and prepare for the new term. The director of the campus's Career Development Center comes to the podium to speak. "Which major," she asks, "best prepares students for what employers want in a graduate?" The guesses seem sensible enough: accounting, business, criminal justice. Nope, she replies, not these. She informs the crowd about the then-most-recent annual survey conducted by the National Association of Colleges and Employers (NACE), which polls employers to construct a list of abilities they want from college graduates. Which major is number one? After a pause, the director reveals the answer: "Philosophy!" The results surprise the philosophy professors as much as anyone. Although they staunchly defend the value of their major, they had not thought of it as particularly attractive to employers. And, yet, every year, the critical thinking skills taught in philosophy courses are among the very top qualities and skills employers desire. As we write this, the current year's results have recently been published, and again critical thinking, described as "analytical reasoning," is in the top five.

**EXERCISE 1.6**

**Your Turn!** Why do you think that employers would want their employees to have good critical thinking skills?



You don't have to be a philosophy major to acquire these vital critical thinking skills: you will learn the foundations of critical thinking in this text. Yet accounting majors might ask, "Aren't serious mathematical and business skills more important for a career as an accountant?" Likewise, nursing majors might suggest that a serious knowledge of medicine is more important for them. Although these skills are obviously necessary for accountants and nurses, they must also have a full complement of higher order thinking skills. People in these kinds of careers must be prepared to solve difficult problems by applying their knowledge to new situations. In addition, they must be able to decide which new ideas they should accept or reject, and be able to justify their decisions. On any given day, people in these careers, and most of the careers you may be considering after college, must be able to effectively use critical thinking skills.

Can you think of ways that people in the career you are thinking about pursuing might need to use critical thinking skills? Let's consider an example and see if you can imagine critical thinking situations.

*Suppose you are working as a manager in a restaurant.*

Here are a couple of managerial tasks that require critical thinking skills:

- Recommend a system to avoid lines during lunch service, so people will patronize the restaurant on their lunch breaks.
- Design a working schedule that evenly distributes lunch shifts and dinner shifts among employees.

These involve critical thinking skills, specifically the skills of *evaluation* (a recommendation is the result of judging) and *synthesis* (to design, one must put something new together from parts).

**EXERCISE 1.7**

**Your Turn!** Think of two additional ways that a restaurant manager might need to use critical thinking at work.

**EXERCISE 1.8**

The following are some of the most in-demand occupations, according to the U.S. Department of Labor. Give an example of a situation in which critical thinking skills would be important for each job.

1. Elementary school teacher
2. Registered nurse

3. Business accountant
4. Computer software engineer
5. Lawyer
6. Pharmacist
7. Police officer
8. Electrician
9. Civil engineer
10. Airline pilot

## Using Critical Thinking in the Marketplace

Have you ever received that famous e-mail from an ex-general or ousted leader of Nigeria who pleads for your help in recovering millions of dollars owed to him? If you are just willing to help a little, he is more than willing to give you millions of dollars in return. It seems as if everyone is familiar with this example, but still it keeps showing up. Why? The answer is amazingly simple. Because it works! As crazy as it may sound, many people have been cheated out of thousands of dollars by this scam or others like it.

Do you know how much a TV advertisement costs for the 2009 Super Bowl football game? According to the Reuters news agency, the cost for one 30-second ad was \$3 million! Why in the world would successful corporations spend such a staggering sum to present a 30-second pitch? For the very same reason the Nigerian scam doesn't go away—it works! Advertisers create commercials—funny ones, ironic ones, clever ones, stupid ones—present them on TV, the Internet, and virtually every blank space that can be read by more than three people and, lo and behold, people buy more of the product. None of us think this trickery works on us, but *somebody* is buying additional products in large enough quantities to pay for those fantastically expensive Super Bowl commercials.

Infomercials like this one offering a chance to “Make \$\$\$ Now” may seem cheesy or unsophisticated, but television viewers respond to them.





Perhaps surprisingly, it's not just clever, highly sophisticated ads that entice viewers. Even those that are the butt of jokes are effective. For example, why do so many announcers on infomercials have British accents? The reason is that studies done by the producers of these commercials have shown that Americans perceive a person speaking with a British accent as more authoritative and so are more likely to believe what is being said about a particular product. Infomercial producers also found that Americans aren't very good at distinguishing a British accent from an Australian accent. As a result, many of those authoritative sounding "British" announcers shilling for infomercials are actually Australians.

Although most people may be naturally wary whenever someone is trying to sell them a product, much advertising is clearly persuasive and effective. Good critical reasoning skills can prevent us from succumbing to persuasive appeals that are neither rational nor reasonable. People are emotional creatures, and descriptions of cozy fireplaces, sounds of sizzling steaks, and images of frosty beer mugs all tug at our minds powerfully. Sadly, the result is too often the purchase of a product that we don't really need, with a luster that fades all too quickly. With polished reasoning skills, such as the ability to detect fallacious reasoning, you will be better able to assess the reasons you have been given to buy a particular product.

The world of politics also tries to grab your attention, your support, and your dollars. In many cases, it might seem wiser to let your favorite political party decide for you about whether or not healthcare reform, bank regulation, or additional money for a war is a good idea. However, if you want to think for yourself and make your own decisions about whom and what warrants your support, you need to have critical thinking skills. With so very much at stake, politicians and partisans of all stripes will use whatever they can to persuade you to support them and their causes. However, to make a smart decision you really must insist on looking at the evidence and making your own judgments.

The critical thinking skills you will find in this book will help you decide when it makes sense to buy an advertised product or support a politician and when it does not. We like to think of these skills as special tools to help you avoid being a sucker. With all the money and power used trying to influence us, we need all the strength we can muster to protect ourselves.

### EXERCISE 1.9

What emotional reactions are each of the following advertisements attempting to elicit?

1. It's 2 a.m. and you've just been awakened by the sound of breaking glass downstairs! Don't you wish now you had signed up with SECuroTech Armed Response specialists?
2. A picture of a beautiful woman appears beside the following words: "Zinn's Cosmetic Surgery Center. Now you can have the body nature *should* have given you."
3. An ad picturing two unshaven guys eating hamburgers at a construction site, accompanied by the slogan, "A real burger for real men!"
4. Sure, your child is only 2 years old. But he won't get into Harvard unless he is the best in his class. Give your child a head start with Creative Tutors. Turning 2-year-olds into future CEOs since 1999.
5. A photo of a serene beach at sunset with the following text: "Take a break at Oceanside Dunes Resort and Spa. You've worked hard and deserve the very best."



6. So, your daughter is going to be a bride! Show her how much you love her with Happily Ever After Wedding Planners. Give her away in grand style and she'll always know you care.
7. Have you made your final arrangements? Don't be a burden to your children. With a pre-sold plot at Garden of Eden, you can pass on without passing on a debt to your loved ones.
8. If Proposition 88 passes, illegal immigrants will soon be able to take your job. How can that be right? Let your representative know today how you feel about Proposition 88. It's just wrong!
9. Did you enjoy your dinner tonight? We're glad. But millions of children in the Third World didn't eat dinner tonight. Nor did they have lunch or breakfast. Yet a mere 20 cents a day will feed a child three nutritious meals a day. You have so much—won't you share just a little with those who have nothing?
10. Why spend years earning a college degree? With AcademicDegree.com, you can earn a degree in as little as three months and begin earning the good salary you deserve. Visit our website to begin your new life today.

## Living an Examined Life

One of the most celebrated critical thinkers in history is Socrates, the ancient Greek philosopher who taught Plato. He was executed because he questioned the wisdom of the authorities. Socrates famously declared at his trial that “The unexamined life is not worth living.” The kind of life Socrates advocated by this claim is one built on a sound foundation of knowledge, principles, and good habits. Rather than merely accepting what everyone else did and said, Socrates carefully interrogated the basis for his society's beliefs and practices. Although we hope that you would never face the same fate as Socrates, we believe his life offers an important lesson: Critical thinking is essential for living in a democratic society. Because you are responsible for making decisions that affect both your own life and the lives of your fellow citizens, you need to be able to think carefully about arguments so that you can make better choices. By providing instruction in argument recognition, analysis, and evaluation, this book offers a starting point for acquiring the skills needed for living an examined life.

### EXERCISE 1.10



**Your Turn!** Here's a philosophical question to think about: Is an easier life a better life? Why or why not?

### EXERCISE 1.11

Which of the following sayings and aphorisms best fit into your vision of an examined life? Briefly explain why.

1. Ignorance is bliss.
2. Don't cry over spilt milk.

3. He who hesitates is lost.
  4. Look before you leap.
  5. Do to others what you would like to be done to you.
  6. All's well that ends well.
  7. Life is short—eat dessert first!
  8. You win some, you lose some.
  9. All you need is love.—The Beatles
  10. Early to bed, early to rise, makes a man healthy, wealthy,  
and wise.—Ben Franklin
- 

## Developing Critical Thinking Skills

We hope that the evidence we've presented here has left you ready to begin improving your critical thinking abilities. However, you may wonder exactly how you will acquire these skills. In this book, you will learn to think critically about arguments by developing the skills of argument recognition, analysis, and evaluation. Those three skills are composed of many narrower skills, and you will learn them one step at a time. Acquiring skills is not like acquiring information. Rather, skill building is a matter of forming good habits. For example, if you want to master a musical instrument, a sport, or a language, you must practice scales, drills, and conjugations. You must repeat the same skills until they become second nature. Think about a time you watched someone who is extraordinarily good at something. His or her performance seems effortless, but we know that it's not. It took hours and hours of practice to get to that point. Similarly, learning critical thinking skills works the same way as learning any other skill. To become a better thinker, you will need to commit yourself to a practice regimen.

Fortunately, you're not alone. With the help of your instructor, we will coach you through this process. Because this book is devoted entirely to helping you develop critical thinking skills in a progressive fashion, each chapter includes the following features:

- A step-by-step explanation of each skill.
- Plenty of examples to demonstrate how each skill is to be applied.
- “Your Turn!” exercises, which provide opportunities for you to reflect on and apply a skill or concept immediately after it's described and explained.
- Lots and lots of exercises for you to practice on, progressing from easier to more challenging ones.
- Comprehensive exercises aimed at incorporating the acquired critical thinking skills into your writing.
- Answers to selected problems in the back of the book so that you can check your progress along the way.

Also, we have included a glossary of key terms at the end of the book, and several chapters are marked with Aplia icons, indicating that supplementary exercises are available online.

# Recognizing Arguments

Imagine that you are watching the evening news on television. Surveillance video footage of a gas station robbery begins playing, and a reporter describes the incident.

*Police are looking for a suspect who robbed a local gas station two weeks ago. Video from the station's security camera shows a man walking into the store with a gun, pointing it at the cashier, and exiting the store with cash from the register. No injuries have been reported.*

Next, you see the cashier describing what happened.

*I was terrified because all I saw was this gun, and I really thought that he was going to shoot me.*

The news report then cuts to a uniformed police officer.

*We believe that the suspect in this case is the same one responsible for two other gas station robberies that occurred earlier this month. The physical descriptions are very similar, and the same kind of weapon was used in all three incidents.*



Flying Colours Ltd/Digital Vision/Getty Images

This news report contains three different kinds of discourse, only one of which is an argument. When we talk about an argument in this text, we use the term differently than the way it is used in everyday language. If you say, “Maria and Jessie got into an argument,” what you typically mean is that Maria and Jessie were angry and exchanged insults or personal attacks. However, this is not how we will use the term. For our purposes, an **argument** is a set of claims, one of

which is supported by the others. In this chapter you will learn to recognize arguments and to distinguish them from other kinds of discourse. To do this, you must be able to distinguish claims from non-claims, determine whether you have a set of claims (i.e., more than one), and recognize when a set of claims constitutes an argument rather than an explanation or some other non-argument. Let's start with the first skill, distinguishing claims from non-claims.

## Identifying Claims

A **claim** is a statement that has **truth-value**, that is, it can be either true or false. Some examples of claims include the following.

*The state of California is bordered on one side by the Pacific Ocean.*

*The chemical symbol for hydrochloric acid is HCl.*

*Almond trees are biologically related to apricot trees.*

*The sun is in orbit around Earth.*

Most Americans, at least, would recognize the claim in the first sentence as obviously true. A smaller number of people would probably know that the second is true. Fewer people still may know that the third claim is true. And, hopefully, everyone understands that the last claim is false. All four of these statements, however, are *claims* regardless of whether they are true, whether they are false, or whether you know their truth-value (their truth or falsity).

Although claims are expressed in sentences, not every sentence is a claim. For example, questions, commands, exclamations, and greetings are not claims. This is because none of them could be true or false. For example, none of the following sentences is a claim.

*How are you?*

*Turn in your homework.*

*Hooray!*

*Hello.*

**Hint!** One way to determine whether or not a sentence expresses a claim is to use the phrase *It is true that* . . . before the sentence. Notice, “It is true that the sun is in orbit around Earth” makes grammatical sense, but “It is true that turn in your homework” does not.

### EXERCISE 2.1

**Your Turn!** List three of your own examples of sentences that are not claims.



When it comes to determining whether or not a sentence contains a claim, you may wonder how you should treat sentences that are commonly thought of as expressing opinions. Although the distinction between facts and opinions may be important in some instances, it is not useful in deciding what is a claim and what is not. Both opinions and facts can be expressed as claims. To see why, consider the following pairs of claims.

*A city councilmember was accused of taking kickbacks for construction projects.  
It is wrong for any councilmember to take kickbacks for construction projects.*

*Wes Anderson's new movie was released last week.  
Wes Anderson's new movie is the most boring movie released this year.*

*Susan is planning to play golf this afternoon.  
Susan should learn to keep her left arm straight on her backswing.*

In each of these pairs, the first claim looks to be factual. Each describes what already happened, what is currently happening, or what will happen. These kinds of claims are known as **descriptive claims** because they describe some situation or other. The second claim is what most people think of as an opinion. However, they are more accurately considered **evaluative claims** because they evaluate, or make a judgment about, whether something is good or bad, right or wrong, useful or useless, beautiful or ugly, or the like.

It shouldn't seem controversial that a description is a claim. A descriptive claim is true if it accurately describes the situation and false if it does not. However, whether evaluative judgments are claims may appear problematic. How can a person's judgment be true or false when disagreement so often exists about what's right or wrong, good or bad? One person thinks an action is wrong, whereas another might not think so. One person finds a movie boring; another loves it. Maybe Susan is perfectly content playing golf with her left arm crooked. Who knows who is right in such cases?

## EXERCISE 2.2



**Your Turn!** Give an example of an evaluative claim people in your family disagree about.

Although determining the truth of evaluative judgments reflects a legitimate philosophical problem, they still should be considered claims for two reasons. The first reason is that people typically make evaluative judgments because they believe they are saying something *true*. If you tell someone that the death penalty is immoral, you don't do so just to express your feelings about the issue. Instead, you say what you do because you think it's *true*.

The second reason that evaluative judgments are best thought of as claims is that they are exactly the kinds of statements that people are most likely to disagree about. People are likely to *disagree* about whether a movie is good or bad, or whether the death penalty, same-sex marriage, or taxes on polluters are right or wrong. People *disagree* about whether the football coach should have gone for the touchdown or settled for the field goal. That is, people disagree about the truth-value of evaluative claims.

Such disagreement can be dealt with in two distinctive ways. One way is with mere **dogmatic assertion**: making a judgment without providing reasons or justification. A better way to deal with disagreement is to offer good reasons or justification in the form of arguments. In doing so, you treat those who disagree as rational, responsible people.

### EXERCISE 2.3

Determine whether or not the following sentences express claims.

1. Please silence your cell phones during class.
2. Pine trees are evergreen.
3. The number 10 goes into 50 five times.
4. Has rain been predicted during the marathon?
5. Dogs are descended from wolves.
6. Dogs are descended from cats.
7. The hypotenuse of a triangle is the longest leg of the triangle.
8. Stop doing your homework now.
9. What color are blackberries when they aren't ripe?
10. Good for you!
11. Wherever there's smoke, there's fire.
12. In the future, people will live several hundred years.
13. It will rain today.
14. I hope that we will get rain today.
15. Geaux, Saints!!
16. The Seminoles are the best team in our region.
17. What was the score of the last Phillies game?
18. It's hot!
19. Brush your teeth after meals.
20. The major cities of the western states will suffer from water shortages if the drought continues.
21. How are you?
22. Many wars have been fought over religious differences.
23. Newspapers should try to print more good news and focus less on tragedies.
24. How much money did the newspaper lose this year?
25. You should do your schoolwork when you are rested and alert.
26. I *did* do my schoolwork when I was rested and alert!
27. Don't forget to do your homework.
28. I expect that all of my classmates will show up for the class pictures.
29. Never spank your child when you are angry.
30. I think that the music they play at most local clubs is just awful.

## Counting Claims

Once you are able to identify claims and distinguish them from non-claims, you are then in a position to count the number of claims presented in a passage. As you may recall, our definition specified that an argument is a *set* of claims, one of which is supported by the others. In this context, a *set* of claims means at least two claims. Thus, by definition, *an argument must contain a minimum of two claims*.

When counting claims, you must keep four considerations in mind. First, a single claim can be represented by more than one sentence. This is because sentences can express the same meaning in different ways. For example, each of the following three sentences expresses the same claim.

*Buffy staked Spike.  
She killed him with a stake.  
Ella estacó a Spike.*

#### EXERCISE 2.4



**Your Turn!** Express the claim made in the sentence “Gregg bought a new Mustang” by constructing a different sentence with the same meaning.

In arguments, you will most often encounter two sentences that represent the same claim when an arguer presents the conclusion at the beginning and at the end of the argument. Notice this technique in the following example.

*Spike was killed with a stake by Buffy Summers. The detective found Ms. Summers’ fingerprints on the weapon. Therefore, it was Buffy who staked Spike.*

You may notice that each sentence in the previous paragraph expresses a claim. However, how many claims are there? Although there are three sentences, there are only two claims. The sentences “Spike was killed with a stake by Buffy Summers” and “It was Buffy who staked Spike” express the same claim. That is, they mean the same thing.

A second consideration to remember when counting claims is that a single sentence may refer to more than one claim. For example, pronouns can substitute for many different nouns. The sentence “She is a writer” could refer to many different women. Perhaps the writer referred to is Virginia Woolf, Sue Grafton, or someone in class. This means that when the sentence “She is a writer” appears in one context, it may not represent the same claim as when “She is a writer” appears in another context.

Third, multiple claims can be expressed in a single sentence. For example, the two claims “Pine trees are evergreen” and “Birch trees are deciduous” may be expressed in two separate sentences, or they may be expressed in a single sentence like this.

*Pine trees are evergreen and birch trees are deciduous.*

This is called a **conjunction** because it joins two claims (called *conjuncts*) using the word *and*. Although, in one sense, a conjunction makes one claim—namely that both conjuncts are true (more on this point in Chapter 8)—for counting purposes, the sentence expresses two claims.

#### EXERCISE 2.5



**Your Turn!** Identify the two claims expressed in the sentence, “Dr. Newberry’s class is held in room 106, which is in the southern side of Dorothy Donahoe Hall.”



L' O R É A L PARIS

When I Put On My New Infallible Lipcolour,  
I Can Do Anything.

**NEW**  
**infallible**  
Never Fail Lipcolour Compact

Wear so reliable, it won't flake off or fade out mid-lip  
Lips so moisturized, they stay smooth, silky, soft  
Colour so fresh, you never need to refresh  
Application so precise, so portable,  
put it on anywhere and know it won't go everywhere

**The Proof Is In The Mirror**  
And We're Worth It™

1 Infallible  
Never Fail  
Lipcolour

2 Infallible  
Conditioning  
Lipgloss

In a range of 24 shades

Image courtesy of The Advertising Archives

This advertisement contains both claims and non-claims.  
How many claims can you find?

Multiple claims can also be combined in sentences using inference indicators. **Inference indicators** are words or phrases that tell us about the logical connection between the claims. For example, consider this sentence.

*Gary cannot study more than two hours for his midterm because he was called in to work this weekend.*

This sentence expresses two claims, “Gary cannot study more than two hours for his midterm” and “Gary was called in to work this weekend,” in a single sentence. The inference indicator *because* tells us that the first claim is supported by the second claim. Although it will later be important to determine exactly what the inference indicator means, for now you can understand inference indicators as signaling the presence of more than one claim.

Whereas normally indicator words are used to join a set of claims, some inference indicator words have alternate meanings. In these cases, the sentences express one truth-value, not two, and thus are single claims. The most common example is the word *since*. Compare the following two sentences containing the word *since*.



*You should vote for Jones since she is honest.*

*I haven't tasted cake this good since the last time I ate at your house.*

In the first example, the word *since* is an inference indicator connecting two claims: “You should vote for Jones” and “Jones is honest.” However, in the second example, *since* is used to indicate time. In this second case, there is only one claim made.

The most reliable way to check to see if *since* signals more than one claim is to substitute another inference indicator such as *because* in its place, and look to see whether the sentence retains the same meaning. In the previous example, the substitution helps us identify the first sentence as containing two claims and the second as containing only one claim. The sentence “You should vote for Jones because she is honest” works, whereas “I haven’t tasted cake this good because the last time I ate at your house” is nonsensical. The substitution fails in the second case because the word *since* in this sentence has a temporal meaning.

### EXERCISE 2.6



**Your Turn!** The word *for*, like *since*, also has multiple meanings. Demonstrate that the sentence “I haven’t eaten for a long time” expresses only one claim, not two.

A final consideration to keep in mind when counting claims is that sometimes claims are joined together in sentences in ways that transform the number of claims made in the sentence. Two culprits in particular are worth remembering. These are disjunctive claims and conditional claims, and both are single claims.

A **disjunctive claim** (or *disjunction*) is an *either . . . or . . .* claim. Although disjunctions have two parts (called *disjuncts*) that would count as two separate claims if they were on their own, joining them together in a disjunction creates a single claim. For example, combining the two claims “The Dodgers will acquire a power hitter” and “The Dodgers will continue to be outscored” using *either . . . or . . .* creates one claim.

*Either the Dodgers will acquire a power hitter or they will continue to be outscored.*

This sentence expresses one thing, not two, namely that one of the claims is true. If you were to slice the claim into two parts, treating the sentence as making two claims, you would miss the point of the word *or*. And that would be a big mistake! The relation between the two parts is what the disjunction is informing us about. For that reason, a disjunctive claim has only one truth-value, and thus is a single claim.

### EXERCISE 2.7



**Your Turn!** Why does the sentence “Sally owns a cat and Jim owns a dog” express two claims, whereas “Sally owns a cat or Jim owns a dog” expresses only one?

Another claim that may be mistaken as two is a conditional claim. **Conditional claims** (also called *hypothetical claims* or *implications*) are *if . . . then . . .* claims. Though they have two parts (called the *antecedent* and *consequent*), and thus may appear to contain two separate claims, conditional claims have only one truth-value and thus are single claims. For example, although “You want to get into the nursing program” and “You must take two years of prerequisites” are two claims, joining them in a sentence using *if . . . then . . .* creates a single claim.

*If you want to get into the nursing program, then you must take two years of prerequisites.*

This sentence makes one claim, not two—namely that taking two years of prerequisites is required for eligibility to the nursing program.

In some conditional claims, the *then* is only implied, or the order of the parts is reversed. For example, each of the following sentences expresses the same conditional claim.

*If you want to get into the nursing program, you must take the prerequisites.*  
*You must take the prerequisites if you want to get into the nursing program.*  
*You will get into the nursing program only if you take the prerequisites.*  
*You won't get into the nursing program unless you take the prerequisites.*

Conditional claims will be discussed more thoroughly in Chapter 8. For now, the important point is that conditional claims are single claims and each has only one truth-value.

### EXERCISE 2.8

**Your Turn!** List each of the four considerations to keep in mind when you are counting claims.



### EXERCISE 2.9

Identify the number of claims expressed by each of the following sentences.

1. Human existence has meaning if God exists.
2. A stitch in time saves nine.
3. Watch out for that snake!
4. If a tree fell in the forest and no one was around to hear it, would it make a noise?
5. Either Venus is a planet or Mars is in retrograde.
6. Hermione Granger isn't dating Neville Longbottom because she only dates good Quidditch players.
7. When you add the pasta to the pot, make sure the water is boiling rapidly.

8. This Halloween, the children are wearing costumes. Sebastian will dress as Spiderman, and Riley will dress as Tinkerbell.
9. Either Juan wants to go into the nursing program or he wants to become a psychologist.
10. Juan can become a psychologist only if he passes the statistical methods course.
11. The lunar eclipse will be visible from most of North America tomorrow night unless the skies are cloudy.
12. Weevils are in the flour, we are out of salt, and the milk has turned sour.
13. For a change of pace, try doing your logic homework standing up.
14. You should vote for Jones in the upcoming election.
15. You should be frugal with your paycheck, for the economy is awful and there's little hope for improvement anytime soon.
16. Paul looks great in that sweater.
17. Wanda is shorter than Bradley.
18. If Wanda is shorter than Bradley, then Bradley is taller than Felipe.
19. Bill went to the store for milk and butter.
20. Bill went to the store and Martha went swimming.
21. Tom can't access the library since he's not an Auburn student.
22. Since time is important, you should organize your day.
23. Since the holiday shopping season now begins in October, busy retailers will most likely hire part-time employees for two months instead of one.
24. Jerry will consider the truck a business expense for tax purposes.
25. Snakes have been considered evil since ancient times.
26. Baseball players really deserve higher salaries since they can have their entire careers ended at any time by a freak injury.
27. Capital punishment is not only cruel and unusual, it is also immoral.
28. Sue has come to every class meeting since the first day.
29. I think that abortion is wrong and that abortion doctors should have their medical licenses revoked.
30. Abby started having problems with motion sickness and, since then, she stopped coming with us on our annual trip to Europe.
31. If you get the flu shot, it is unlikely that you will get the flu virus this winter.
32. We should be bringing in more troops to serve in Iraq, not diminishing the troop levels.
33. Lowering payroll taxes may provide people with bigger paychecks, but it will reduce California's ability to fund higher education.
34. There are currently three major traffic delay areas in Spokane: Division Street, the corner of 3rd and Maple, and Sprague Avenue.
35. Brian's headaches were caused from using glasses with the wrong prescription. His eyeglasses had to be the problem since his headaches went away after he got new glasses.

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## Distinguishing Arguments from Explanations

Now that you know how to distinguish claims from non-claims and how to count the number of claims presented in a passage, the next step is to determine what kind of relationship, if any, exists between the claims. This is because not every set of claims

constitutes an argument. In order to recognize arguments, you must be able to differentiate them from sets of claims that are either explanations or some other non-arguments.

An argument, remember, is a set of claims, one of which is supported by the others. The claim being supported is called the **conclusion**, though it may be referred to as the *main point* or even the *thesis*. According to our definition, an argument can contain only one conclusion. (There are a few exceptions to this rule, and these will be covered in Chapter 3.) The claim or claims that support the conclusion are called **premises** (but could also be referred to as *reasons*, *evidence*, or *supporting statements*). When claims support a conclusion, they provide evidence that the conclusion is true.

Inference indicators are words and phrases signaling the presence of a premise or a conclusion. They are some of your most useful tools for recognizing arguments. Unfortunately, as just discussed, these words sometimes are used for alternative reasons, as when the word *since* is used to indicate time. However, when they are being used as inference indicators, you can rely on them as indications that there is a supportive relationship between two or more claims. That is, inference indicators signal that one (or more) of the claims is a reason supporting another claim.

Common Premise Indicators	Common Conclusion Indicators
because . . .	therefore . . .
since . . .	thus . . .
for . . .	consequently . . .
given . . .	so . . .
as . . .	hence . . .
follows from . . .	accordingly . . .

When an author provides you with a premise or conclusion indicator (or even both), you have a head start in your task of determining whether the passage is an argument or not. Unfortunately, authors often do not use inference indicators. They may just think that you can figure it out yourself. So, when indicator words are not given, you must pay close attention to the context and the content of the passage to figure out whether one claim is being supported by another claim. To be honest, in real life you can't always tell whether you're looking at an argument or not. People don't always write and speak clearly enough. But even though you'll encounter some tough examples as you work your way through this book, the passages you'll be given will always have an "answer."

One of the most significant challenges to recognizing arguments is that they are often difficult to distinguish from explanations. Like arguments, explanations have at least two claims, and often utilize indicator words such as *because*. However, the purpose of an argument is very different from the purpose of an explanation. Whereas an argument aims to convince us of the truth of some claim, explanations help us understand why or how some claim is true. In the case of an argument, there is a claim that is up for debate, namely the conclusion. In an explanation, however, there is no claim up for debate. Instead, the speaker assumes that the claim being explained is already accepted as true.

An **explanation**, then, is a set of claims, one of which offers an account of how or why some given claim is true. The fact being explained is called the **explanandum**, and the account offered for that fact is called the **explanans**. Since your task will be to decide whether a passage is an argument or an explanation, until you make the decision

you won't know whether to identify the parts as conclusion and premise or explanandum and explanans.

Let's look at a pair of examples, beginning with an explanation.

*I was late to class because my car wouldn't start.*

In this sentence, the word *because* tells us, first, that the sentence consists of two claims—one claim is located before the word *because* (“I was late to class”), and the other comes after it (“My car wouldn't start”). Secondly, *because* tells us that the claim that follows it is a reason. That's just what *because* means. Stuck in the middle of a sentence like this, it also signals to you that what comes before *because* is the claim that the reason supports. So far, this passage could be either an argument or an explanation—it has a premise/explanans and conclusion/explanandum, but that's all you know at this point.

Notice, however, that the purpose of this reason is not to convince the reader of the truth of the claim, “The person was late to class.” Instead, it assumes that this is true. It gives the reason that *explains* the lateness. Saying it another way, the fact being explained (the explanandum) is that “I was late to class,” and the reason given for that fact (the explanans) is that “My car wouldn't start.”

Now, let's examine an argument.

*You really need to get your car repaired because your car often doesn't start.*

This passage is similar to the first in a couple of ways. For one thing, they each present two claims joined together by the word *because*. Also, just as in the first example, what comes *after* the word *because* in this passage (“Your car often doesn't start”) is a reason for what comes *before* the word *because* (“You really need to get your car repaired”). Even though the two passages are set up similarly, the second passage is an argument because the speaker or writer is trying to *convince* you of something, namely that “you” should get your car repaired, whereas the previous example was not trying to convince you of anything. You also know that this is attempting to convince because the writer is trying to change your behavior: If you already knew the conclusion was true, you would presumably be doing something about it.

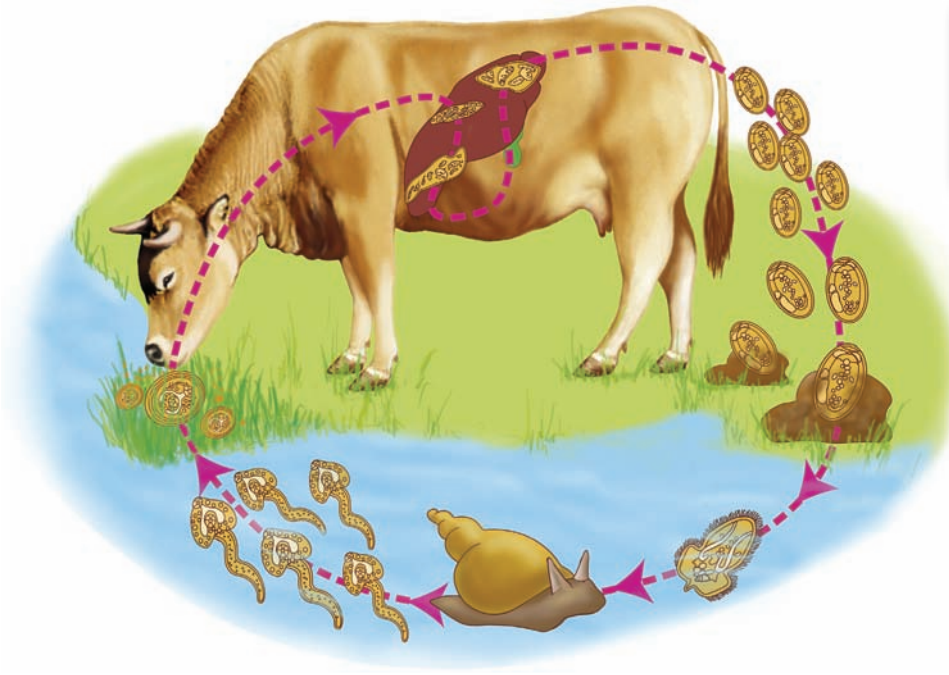
### EXERCISE 2.10



**Your Turn!** How can you tell whether the claim being supported is a conclusion or an explanandum?

As you can see, explanations often appear quite similar to arguments, but the difference lies in their divergent purposes. An explanation tries to *explain why* some claim is true, and an argument tries to *convince* the reader that some claim is true. Distinguishing between arguments and explanations can be difficult, but with practice you will find doing so easier.

BSIP/Photo Researchers, Inc.



This is an illustration of the life cycle of a liver fluke. What is its purpose? Does it attempt to prove or explain?

### EXERCISE 2.11

Determine whether each of the following is an argument or an explanation.

1. A hybrid car is a good idea because it gets good gas mileage.
2. I bought a hybrid car because it gets good gas mileage.
3. The Lakers will beat the Jazz tomorrow night because they beat them the last five times they played.
4. The Lakers beat the Jazz the last five times they played because the Lakers have more talented players.
5. You had better hire another member for the night shift because the crew that is on cannot keep up with the workload.
6. We hired another member for the night shift because the crew that is on cannot keep up with the workload.
7. Hawaii is a great choice for our vacation this summer because the scenery is unlike anything we will see here in Iowa.
8. We chose Hawaii for our vacation this summer because of the spectacular scenery.
9. Those photographs faded in the sunlight because they were printed on a computer.
10. Everybody hates me because I'm so universally liked.—Peter de Vries
11. Since the later revision of the *Lectura*, the *Ordinatio*, was never completed, it is the only Oxford commentary we have on certain parts of the *Sentences*.  
—Thomas Williams, *The Cambridge Companion to Duns Scotus*
12. The reason she killed him is that she loved him.
13. Because one of its ultimate aims is thorough understanding of living organisms including man, biology is entitled to be called the most vital of the sciences.

14. The most important objective of Lewis and Clark's expedition was its economic objective, for the incorporation of this vast tract of continent into the nation hinged on finding a way to exploit it.—Hine and Faracher, *The American West*
  15. The sight of the Indian woman, Sacajawea, convinced the Indians of our friendly intentions, as no woman ever accompanies a war party of Indians in this quarter.—William Clark
  16. I've been reading a lot of poetry by Browning lately and I've gone back to Shakespeare, with enormous pleasure, great pleasure because my appreciation of their technical facility is coming forward to me in a way it didn't before.—Shelby Foote
  17. The people in your office are complaining about the new computers because you didn't bother to train them how to use the new system.
  18. Since few men are wise enough to rule themselves, even fewer are wise enough to rule others.—Edward Abbey
  19. The academic success of students is due to the teacher's efforts, not those of the administrators. For this reason, teachers should be compensated at the same rate as administrators.
  20. Because the dog was abused, he bites, he's destructive, and he has anti-social behaviors.—Loeb and Hlavacek, *Smarter than You Think*
- 

## Distinguishing Arguments from Other Non-Arguments

You have now seen how arguments can be similar to explanations, and you've also acquired some skills at distinguishing one from the other. Therefore, it's now time to learn how to recognize a third and final category, one that captures discourse that is *neither* argument nor explanation. These passages may be neither an argument nor an explanation for one of two reasons. First, a passage may be neither an argument nor an explanation because it contains fewer than the two claims necessary for both arguments and explanations. For example, consider these passages.

*Even in the best economic conditions, it is difficult to make a small business successful.*

*The university library is four stories tall.*

*You should vote for Rudolph Giuliani for mayor.*

These three examples are neither arguments nor explanations because each contains only one claim. The definitions of both arguments and explanations specified that they required a minimum of two claims.

Alternatively, a passage may contain sufficient claims but be neither an argument nor an explanation because none of its claims provides reasons for believing or explaining another claim. That is, it lacks the kind of relationship that exists between claims in arguments and explanations. Let's consider a few examples.

*Even in the best economic conditions, it is difficult to make a small business successful. A small business is defined as one that operates on less than 10 million dollars per year.*



Although this passage contains two claims and the claims both refer to small businesses, neither claim gives a reason for the other. The author doesn't argue that it is difficult to make a small business successful, nor does he or she explain why it is difficult for small businesses to succeed.

*The university library is four stories tall. It was completed in 1995, and the money to build it was raised primarily from corporate sponsors.*

This passage is also neither an argument nor an explanation. It contains three claims, but none provides a reason to believe, or explain, any of the others.

*You should vote for Rudolph Giuliani for mayor. Also, you should vote for Lindsay Eason for sheriff.*

Passages like this one may cause you trouble since it contains at least two claims, and it does appear that the author is trying to persuade you to vote for Giuliani and Eason. However, notice that the passage lacks reasons. The author doesn't offer us any reasons to convince us to vote for Giuliani or Eason. It, too, is neither an argument nor an explanation.

### EXERCISE 2.12

**Your Turn!** What questions do you need to ask yourself in order to distinguish between arguments, explanations, and other non-arguments (neither)?



Movie picks									
		New review							
			Local critic	Chicago Tribune	Los Angeles Times	Miami Herald	Philadelphia Inquirer	Minneapolis Star Tribune	Seattle Times
★ Outstanding	■ Worthy effort								
▼ So-so									
💣 A bomb									
Babies	PG	—	—	▼	■	■	■	▼	■
The Back-up Plan	PG 13	—	—	💣	—	💣	▼	▼	💣
Iron Man 2	PG 13	—	—	▼	▼	▼	■	■	▼
Just Wright	PG	—	—	■	—	▼	■	💣	▼
Letters to Juliet	PG	—	—	■	—	▼	■	💣	▼
MacGruber	R	—	—	—	■	—	▼	—	—
Robin Hood	R	—	—	■	▼	💣	■	★	■
Shrek Forever After	PG	—	—	—	■	■	▼	▼	▼

mc/Newscom

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Although this chart tries to influence which movies you choose to see, it contains neither an argument nor an explanation. What is it lacking?



## Putting It All Together: Recognizing Arguments

In this chapter, you have learned the skills necessary for recognizing arguments. You have learned how to determine whether a sentence expresses a claim, how to count the number of claims expressed in a given passage, and how to distinguish arguments from explanations and other non-arguments (neither).

### How to Recognize an Argument

**Step 1:** Count the claims.

- ▲ If the passage has fewer than two claims, it is neither an argument nor an explanation.
- ▲ If it has two or more claims, proceed to Step 2.

**Step 2:** Determine whether one of the claims offers a reason for another claim.

- ▲ If no reason(s) are offered, the passage is neither an argument nor an explanation.
- ▲ If there is a reason offered, proceed to Step 3.

**Step 3:** Identify the purpose of the reason(s).

- ▲ Do the reason(s) offer proof to convince the reader to accept a conclusion? If the answer is “yes,” then the passage is an argument.
- ▲ Do the reason(s) offer an explanation for how or why a given fact is true? If the answer is “yes,” then the passage is an explanation.

Using the decision procedure above, let’s try a few examples. Consider this one.

*I have exclusively bought Dreyer’s ice cream for over 10 years.*

Step 1 of the decision procedure is to count the claims. Since this passage contains only one claim, it must be neither an argument nor an explanation.

*I bought Dreyer’s ice cream at Vons. Then, I stopped at Chevron to buy gasoline.*

Here there are two claims—“I bought Dreyer’s ice cream at Vons” and “I stopped at Chevron to buy gasoline”—but neither claim offers a reason to support the other. Thus, it is neither an argument nor an explanation.

*I bought Dreyer’s ice cream since it was the cheapest they had.*

This passage has two claims, and one offers a reason for the other. The second claim, “Dreyer’s was the cheapest they had,” is a reason for the first, “I bought Dreyer’s ice cream.” Now move to Step 3. Is the author trying to convince you that “I bought Dreyer’s ice cream”? Not at all. Rather, the author is explaining why he or she bought that brand of ice cream.

*You should buy Dreyer’s ice cream since it is the best.*

Here there are two claims, and one offers a reason for the other. “Dreyer’s ice cream is the best” is given as a reason for the claim “You should buy Dreyer’s ice cream.” Now, determine the purpose of the passage. Is the author trying to convince you that you should buy Dreyer’s ice cream? Yes! In this case, the passage is an argument.

### EXERCISE 2.13

**Your Turn!** Look back at the news report presented at the start of this chapter. Which of the three passages gives an argument? Which gives an explanation? Which is neither an argument nor an explanation?



### EXERCISE 2.14

Determine whether the following passages are arguments, explanations, or neither.

1. Gregg failed his Psychology course because he missed too many classes.
2. The nearest gas station is four blocks away. Go left at the stop sign up ahead, and then you will see the Shell station on your right at the large intersection.
3. The weather has been cold and clear since last weekend.
4. We need to replace the toilet because it doesn’t flush properly.
5. Dark chocolate contains antioxidants, and it goes perfectly with cappuccinos.
6. The boss is recommending you for a raise because you have exceeded your sales target for this quarter.
7. I had orange juice for breakfast because I’m giving up coffee.
8. Mike is happy because he got a new Mustang.
9. Mustangs are the hottest cars on the road today.
10. The reason your patient has a fever is that she has an infection.
11. I told you that your patient had an infection. Look, she has a fever again.
12. The democratic candidate will win the election because the economy is improving.
13. The democratic candidate won the election because he had the majority of electoral votes.
14. You should come to class for the exam next week.
15. You should come to class today, since the exam is next week and you want to do really well on it.
16. There are currently three major traffic delay areas in Spokane: Division Street, the corner of 3rd and Maple, and Sprague Avenue. The worst of these is Division Street, although, of course, traffic congestion is increasing all over the city.
17. Frankie either has two older brothers, or he is the middle child. I can never remember which it is.

18. This quarter there are eight offerings of English Composition. The classes that meet three days per week last for 90 minutes, and those that meet two days per week last for two hours and 15 minutes.
  19. If you have plenty of paint and plenty of rollers, then you have everything you need to paint your house.
  20. The defendant should be acquitted insofar as the evidence is weak and the witness is unreliable.
  21. The plane mirror is an important tool for modern astronomy and physics. The NASA space infrared astronomy program, for example, uses the plane mirror in its Infrared Astronomy Satellite (IRAS), Space Telescope (ST), and the Large Deployable Reflector (LDR).
  22. The misery of the present age is not in the intensity of men's suffering—but in their incapacity to suffer, enjoy, feel at all, wholly and profoundly, in their having one moment the commencement of a feeling, at the next moment the commencement of an imagination, and the external tumult of the world mingling, breaking in upon, hurrying away all.—Matthew Arnold
  23. Baseball is 90% mental, the other half is physical.—Yogi Berra
  24. Physician-assisted suicide is always wrong because it involves killing human beings. And killing humans is wrong.
  25. Advertisements aimed at increasing public awareness of identity theft really work. People become more cautious about giving out personal information, are more likely to work with established vendors, and frequently report suspicious e-mails to the authorities.
  26. More than 90,000 Chinese-made toys are being recalled because they contain excessive lead paint.
  27. I believe we find in the movement of revolt the common ground on which men can unite.—Albert Camus
  28. The Tea Party movement shares the basic tenets of libertarianism in that they decry big government, heavy taxation, and state-sanctioned welfare programs.
  29. I agree that every household should add \$5 to their taxes to help work the pumps to keep water in the Kern River during the summer, as long as the money goes to this purpose.—letter to the editor, *The Bakersfield Californian*
  30. You can rely on York. The Affinity Series Air Conditioners are always quiet, energy-efficient and dependable.—Ad for York Air Conditioners
  31. The Cubs' only Type A free agent would have gained the club two draft picks if he had been offered arbitration and signed elsewhere.—*Chicago Tribune*
  32. Since I was throwing the javelin further than I ever had, and since I do best at high altitude, I decided to see what I could do at the Olympic Trials in Denver.
  33. The number of miles driven per year on America's highways has risen every year since the statistics were first tracked in the 1950s.
  34. Moving into a community that has basic services within walking distance makes good sense. You get good exercise by walking, you become acquainted with more of your neighbors, and you save money on gasoline.
  35. Court officials say a Birmingham, Alabama woman who changed her name to Jesus Christ was excused from jury service because she was disruptive and kept asking questions instead of answering them.—*StarTribune.com*
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### Chapter Review Questions

1. What is an argument?
2. What does it mean to say that a claim has truth-value?
3. What kinds of sentences do not express claims?
4. What is the minimum number of claims for an argument?
5. What is an inference indicator?
6. What are the two uses of *since*?
7. How many claims are expressed in a conjunction?
8. How many claims are expressed in a disjunction?
9. How many claims are expressed in a conditional claim?
10. In an argument, what do we call the claim being supported?
11. In an argument, what do we call the claim, or claims, doing the supporting?
12. What is the purpose of an argument?
13. What is one way that arguments and explanations are alike?
14. What is one way that arguments and explanations differ?
15. What are the two ways that a passage can be neither an argument nor an explanation?

# Analyzing Arguments

Imagine that you are perusing personal finance self-help books at your local bookstore, and you read the following passage.

*Earning and saving money is hard work. So, be careful when it comes to investing what you have worked so hard to save.*

—Eric Tyson, *Personal Finances for Dummies*

Using the argument recognition skills you learned from Chapter 2, you may be confused about whether or not this passage contains an argument. On the one hand, Eric Tyson is trying to convince you to do something and offers a reason for doing so. Moreover, he uses an inference indicator, *so*, at the beginning of the second sentence. On the other hand, you can see that the passage contains only one claim; the second sentence is a command. Using the definition of an argument, you would have to conclude that this passage cannot, then, be an argument. After all, arguments must contain a minimum of two claims. Is this passage an argument or not? Can the second sentence express a conclusion when it is a non-claim?

In this chapter, you will learn how to analyze arguments, including ones that seem to violate our definition of an argument. To **analyze** something is to break it down into its most elementary parts. In the case of an argument, that means identifying the *issue*, *conclusion*, and *premise(s)*. Analyzing arguments is a foundational skill, since you cannot begin to determine how good an argument is until you understand exactly how the argument works.

Identifying the parts of an argument can be a daunting task. Arguments often fail to be as clearly constructed as we might like. This lack of clarity may result from the arguer's writing style or may be due to the complexity of the argument.



Arguers may or may not use inference indicators to assist you in argument analysis. Sometimes arguers provide arguments without stating their conclusion, or they give arguments that imply claims, making argument analysis more challenging. Other times arguers provide more than one argument, and you must sort out how, if at all, the arguments relate to one another. Ideally, an analysis will indicate how every claim in an argument contributes to convincing the reader of the truth of the conclusion. In longer, more complex arguments, identifying every part may not be practical (or even possible). However, in the majority of the arguments you will encounter here, you will learn how to identify the role played by every single claim.

## Analyzing Arguments with Inference Indicators

Recall from Chapter 2 that an **argument** is a set of claims, one of which is supported by the others. The claim being supported is the **conclusion**, and those claims doing the supporting are called **premises**. In order to determine which of the claims is a conclusion and which is a premise, you should take advantage of any clues provided by the author, such as inference indicators. **Inference indicators** are words or phrases that reveal the argument's structure. There are two kinds of inference indicators: premise indicators and conclusion indicators. A **premise indicator** signals that the claim following it is a premise, and a **conclusion indicator** signals that the claim following it is a conclusion.

Let's look at examples of each.

*Knowing how to apply first aid may help save someone's life some day; therefore, you should develop your ability to do so.*

This argument has a conclusion indicator, *therefore*. This word signals that the claim following it is the conclusion. It also indicates that the previous claim is the premise. You can restate the argument formally by listing the premise above a line and the conclusion below the line, and labeling each premise with the letter P and the conclusion with the symbol  $\therefore$  as done below. We call this technique a Formal Analysis.

P:      Knowing how to apply first aid may help save someone's life some day.  
 $\therefore$     You should develop your ability to apply first aid.

Notice that in the Formal Analysis of this example, the wording of the conclusion differs from the original. This is because the point of analysis is to clearly identify the claims in the argument and the role that is played by each of them. When the passage states "You should develop your ability to do so," what is actually claimed is that "You should develop your ability to apply first aid."

**Hint!** Although it is fairly common to have the conclusion stated in the first sentence or the final sentence of a passage, conclusions can occur *anywhere* in an argument. To find the conclusion, you must pay special attention to any and all inference indicators.



After you have identified the premise(s) and the conclusion, you should then identify the issue. The **issue** is what is up for debate or being questioned. Since the purpose of an argument is to support a position on one side or the other, this means that the issue is identical regardless of which side of the issue the arguer defends. For example, the issue of the previous argument can be stated as follows, by placing the word *whether* in front of the conclusion.

**Issue:** Whether you should develop your ability to apply first aid

However, if the arguer had concluded that you *should not* develop your ability to apply first aid, the issue is still the same. The issue should be stated positively, even when the conclusion is a negative claim.

### EXERCISE 3.1



**Your Turn!** How does identifying the conclusion help you identify the issue?

If instead of a conclusion indicator, the author utilizes a premise indicator, you can begin the analysis with the premise and then look to see what it supports. Here's an example.

*A couple of times in the past when my kitchen sink was draining more slowly than usual, I found that using a plunger fixed the problem. Since it is draining slowly again, it's probably a good idea to use the plunger once more.*

This argument has a premise indicator, *since*, signaling that the claim following it is a premise. Placed at the beginning of the sentence like this, *since* also indicates that the second claim in that sentence is the conclusion. Therefore, you can identify the two parts of the argument from just the one indicator word.

**P:**     My kitchen sink is draining slowly again.  
**∴**     I should use the plunger.

Notice that the wording of the conclusion is once again different from the original. When the arguer says "It's probably a good idea to use the plunger once more," he or she is concluding that "I should use the plunger."

What about the first sentence in the passage? It is a single claim citing what happened in the past: using the plunger cured the slowly draining sink. Thus, the claim makes sense as another premise supporting the conclusion.

**P1:**   A couple of times in the past when my kitchen sink was draining more slowly than usual, using the plunger fixed the problem.  
**P2:**   My kitchen sink is draining slowly again.  
**∴**     I should use the plunger.

## EXERCISE 3.2

**Your Turn!** Identify the issue in the preceding argument.



Sometimes, arguers utilize more than one inference indicator, as in the following example.

*When oil prices start falling, oil producers usually begin to limit supply. Thus, we can expect oil producers to begin limiting supply in the next month or two, because oil prices have been steadily falling for the past three months.*

This passage expresses three claims in these two sentences. The inference indicators signal the role each claim plays in the argument. First, *thus* not only signals that a conclusion follows, but it also indicates that the claim preceding it is a premise for that conclusion.

## EXERCISE 3.3

**Your Turn!** Identify the premise and conclusion indicated by *thus*.



Next, the premise indicator *because* signals that the conclusion is supported by an additional premise.

## EXERCISE 3.4

**Your Turn!** Identify the additional premise indicated by *because*.



The Formal Analysis should include both premises.

- P1:** When oil prices start falling, oil producers usually begin to limit supply.  
**P2:** Oil prices have been steadily falling for the past three months.  
**∴** Oil producers will begin limiting supply in the next month or two.

Now that you have identified the premises and conclusion, you can identify the issue.

## EXERCISE 3.5

**Your Turn!** Identify the issue of the argument.





Again, accurately recognizing premise and conclusion indicator words is the best tool for successful argument analysis. You should make a list of indicator words you encounter and commit them to memory if you are having *any* trouble recognizing them. These words and phrases may provide the only tangible clues to the argument structure. Also, remember that inference indicators reveal an argument's structure even if the content does not make sense. If a candidate should say, "You should vote for me for governor because the moon is made of cheese," this loony arguer is giving a conclusion and a supporting premise, even though the reasoning makes no sense. Premise and conclusion indicators *mean* what they say—"Here is a premise" or "Here is a conclusion."

### EXERCISE 3.6

Identify each blank as a premise or conclusion using the given inference indicators. A dictionary may help you understand any terms that are unfamiliar to you.

1. \_\_\_\_ because \_\_\_\_.
2. \_\_\_\_\_. Thus, \_\_\_\_\_.
3. Since \_\_\_\_\_, \_\_\_\_\_.
4. Given that \_\_\_\_\_ and \_\_\_\_\_, \_\_\_\_\_.
5. \_\_\_\_\_. Consequently, \_\_\_\_\_, for \_\_\_\_\_.
6. \_\_\_\_\_. In conclusion \_\_\_\_\_.
7. We can conclude that \_\_\_\_\_, based on \_\_\_\_\_.
8. \_\_\_\_\_ and \_\_\_\_\_, which implies that \_\_\_\_\_.
9. \_\_\_\_\_. As a result \_\_\_\_\_ inasmuch as \_\_\_\_\_.
10. \_\_\_\_\_ is indicated by \_\_\_\_\_ and \_\_\_\_\_.
11. \_\_\_\_\_. This proves that \_\_\_\_\_.
12. \_\_\_\_\_ and \_\_\_\_\_. This shows that \_\_\_\_\_.
13. \_\_\_\_\_ may be inferred from \_\_\_\_\_.
14. \_\_\_\_\_. We may infer that \_\_\_\_\_.
15. \_\_\_\_\_ in that \_\_\_\_\_ and \_\_\_\_\_.
16. \_\_\_\_\_ in view of the fact that \_\_\_\_\_.
17. \_\_\_\_\_. \_\_\_\_\_. \_\_\_\_\_. For all these reasons \_\_\_\_\_.
18. \_\_\_\_\_ may be derived from \_\_\_\_\_.
19. \_\_\_\_\_ for the reason that \_\_\_\_\_.
20. \_\_\_\_\_. This entails that \_\_\_\_\_.
21. \_\_\_\_\_. This demonstrates that \_\_\_\_\_.
22. The reason that \_\_\_\_\_ is that \_\_\_\_\_.
23. Because \_\_\_\_\_ and \_\_\_\_\_, \_\_\_\_\_.
24. \_\_\_\_\_, as \_\_\_\_\_ and \_\_\_\_\_.
25. \_\_\_\_\_. Accordingly, \_\_\_\_\_.

### Analyzing Arguments without Inference Indicators

Inference indicators, unfortunately, are not always supplied by arguers. When that is the case, read the passage carefully and ask yourself—"What is the main point?" "Could this claim be a reason?" "Could this other claim be the conclusion?" Without indicator

words to guide your analysis, the only way to figure out the argument's structure is from the content of the individual claims. Consider this example.

*I don't think that we should buy Lawrence a car. He is not responsible enough to own a car. And we don't have enough money to pay for an extra car.*

Although this argument lacks inference indicators, you can still understand that the author is trying to establish a conclusion, namely that "We shouldn't buy Lawrence a car." The remaining claims, then, make sense as two premises in support of it. Here is the argument with the premises and conclusions identified formally.

- P1:** Lawrence is not responsible enough to own a car.  
**P2:** We don't have enough money to pay for an extra car.  
 $\therefore$  We should not buy Lawrence a car.

Now, you can identify the issue.

**Issue:** Whether we should buy Lawrence a car

Notice that the issue is stated positively even though the conclusion is a negative claim.

Without the help of indicator words, it can sometimes be difficult to determine which claim in a passage is the conclusion and which is a premise. In these cases, you should try inserting your own inference indicator to see which interpretation of the passage makes the best, most logical sense.

Consider the following example.

*Infrastructure is extremely important. We must begin rebuilding it today.*

This sentence has two claims, but you may wonder which is the premise and which is the conclusion. Let's test the argument using the premise indicator *because* and the conclusion indicator *therefore*. Which of the following most accurately captures the logic of the passage?

- A:** Infrastructure is extremely important *because* we must begin rebuilding it today.  
**B:** Infrastructure is extremely important; *therefore*, we must begin rebuilding it today.

Out of the two options, the second works better. The first claim in the passage gives us a reason to believe the second claim.

### EXERCISE 3.7

**Your Turn!** Write out the previous argument using a Formal Analysis.



## EXERCISE 3.8

Using a Formal Analysis, set out all premises, conclusions, and issues. Be sure to write each claim so that it can stand alone. For example, replace pronouns with their correct referents.

1. You should buy your flowers from an FTD florist because they consistently deliver on time.
2. Basketballs are round. Consequently, you can roll them.
3. Figs are sweet; therefore, Janie is sure to like them.
4. Dolores will be good at tennis since she is good at playing the violin.
5. Given that all sailboats are expensive, a Hobie Cat will be an expensive purchase.
6. Cash may be in the process of becoming obsolete, because it is inconvenient.
7. Since chocolate contains sugar, it's surely bad for your teeth.
8. Jean-Paul Sartre must have been a brave man due to the fact that he was a member of the French resistance.
9. The reason that we should categorize mosquitoes as pests is that they spread disease.
10. Because a good dictionary is useful in every university course, it is a wise investment for all students.
11. Your gums are bleeding and your tooth aches. So, you should go to the dentist immediately.
12. The university trustees voted to raise student fees yet again. It follows that we can expect enrollment to drop, since many students cannot afford even a small increase in college costs.
13. Inasmuch as the military has had an increasingly difficult time meeting recruitment goals, and veteran soldiers are retiring at an unusually high rate, it is likely that the military will soon be much smaller than it was five years ago.
14. You should get your holiday shopping done early, because many stores are not re-stocking their shelves this year.
15. School sponsorship of a religious message is impermissible because it sends the ancillary message to members of the audience who are nonadherents that they are outsiders, not full members of the political community, and an accompanying message to adherents that they are insiders, favored members of the political community.—U.S. Supreme Court ruling, *Santa Fe v. Doe* (2000)
16. Video piracy has reached unprecedented levels, and the cost to make a Hollywood movie continues to escalate. As a consequence, studios will be increasingly hesitant to invest in films that are unlikely to be box office hits.
17. The study of religion is vital for understanding our world. Religious differences have been the cause of war throughout history, and they continue to promote conflict in the international arena.
18. We hope you agree that our fraternity is the best on campus. The majority of students who responded to a campus survey said our fraternity would have been their number one pick. And that many people could not possibly be wrong.
19. The reason that hybrid cars are the most important development from the automotive industry since the 1970s is that gasoline will become increasingly scarce in the years ahead.
20. Prohibition of alcohol didn't work. Prohibition of drugs hasn't worked. Prohibiting steroids and other performance enhancers won't work either.

## Analyzing Arguments with Extra Claims

One challenge to accurate argument analysis arises when claims are provided that may seem to be part of the argument, but in reality are not. This may occur for three reasons. First, authors sometimes go on tangents and include information only marginally related to the issue. Second, sometimes authors add something they believe is important for the reader to know or they insert an idea that is related to the main point, but in reality is neither a premise nor a conclusion. Finally, some arguments may actually include claims running *counter to* the conclusion. How are these claims to be treated? Let's look at an example of each of these problems.

*You should vote for Jones because she is honest. I certainly plan to.*

The premise indicator word *because* signals that the first sentence contains two claims (one before and one after the word *because*) and that the second is a premise for the first.

**P:**     Jones is honest.  
**∴**     You should vote for Jones.

**Issue:** Whether you should vote for Jones

That leaves you with one more claim: “I certainly plan to.” This claim doesn’t provide evidence that you should vote for Jones; instead, it merely states how the author plans to vote. The addition of this claim is for rhetorical effect. Since it is neither a premise nor a conclusion, it should be left out of your Formal Analysis.

In the next example, the author gives information related to the main topic but lying outside of the scope of the argument.

*Since the population of Texas consists of both English- and Spanish-language speakers, elementary school education should be bilingual. That's not to say that making it so would be easy.*

Notice the premise indicator *since* in the first sentence. This signals that what comes after that indicator word is the premise, and the claim following the comma is the conclusion.

**P:**     The population of Texas consists of both English- and Spanish-language speakers.  
**∴**     Elementary school education should be bilingual.

**Issue:** Whether elementary school education should be bilingual

The third claim, “That’s not to say that making it so would be easy,” is related to the topic of the argument, since it suggests that there may be problems with enacting bilingual education. However, it is not a premise in this argument because it doesn’t help support the conclusion, and it is not a conclusion in this argument because neither of the other claims supports it. Remember, when given a claim that does not play a role as a premise or conclusion, leave it out of your Formal Analysis.

The following is an example involving a claim on the opposite side of the issue from the main conclusion.

*Our opponents argue that large tax cuts would be bad for the economy. I disagree—we should enact large tax cuts because that is the best way to increase spending.*

When looking for arguments, phrases like “I disagree” can be quite helpful as they signal a dispute or clash of ideas. In this case, the arguer is taking a stance against what is said by the “opponents” in the first sentence. The arguer includes the opponents’ viewpoint in order to motivate his or her argument for the other side. The content of the disagreement comes directly after the dash: “We should enact large tax cuts.” The premise indicator *because* confirms that this is the conclusion and also signals that what follows the indicator word is a premise.

**P:**     Enacting large tax cuts is the best way to increase spending.  
**∴**     We should enact large tax cuts.

**Issue:** Whether we should enact large tax cuts

Notice that although the first claim describing the opponents’ view is not part of the argument, it does engage the same issue. Recall that the issue is what is up for debate or being questioned. The arguer’s conclusion is “We should enact large tax cuts” and the opponents’ view is “We should not enact large tax cuts.” Both positions debate the issue of whether we should enact large tax cuts.

### EXERCISE 3.9



**Your Turn!** How do you decide whether or not to include a claim in your Formal Analysis?

### EXERCISE 3.10

Using a Formal Analysis, identify the premises, conclusion, and issue for each passage, excluding any claims that do not belong in the arguments.

1. Francisco is most likely good at math because he has an analytical mind. He is one of the students in my English Composition class.
2. Last year you waited until the last minute to do your shopping. But this year you should get your holiday shopping done early, because many stores are not restocking their shelves this year.
3. Conrad is running for re-election. You definitely should vote for him. Why? He’s a visionary, that’s why.
4. Because Andrea speaks three languages, she should look for work in international business. At least, that’s what I think.
5. Schnauzers make the best family dogs. They are good with children, and they are naturally wary of strangers. You can get them as miniatures or standards.

6. Many political pundits believe that an increase in troop levels is the best means for fighting an insurgency. Not I. Increasing troop levels puts more of our troops at risk and increases the possibility of civilian casualties, both of which work against us in the long run.
7. Aiding big industrial giants like General Motors and Chrysler is a form of tampering with the free markets. I agree that such tampering is usually a bad idea. But right now, we should tamper with the market because otherwise the entire economy is liable to go into a disastrous free-fall.
8. The district attorney has presented many interesting and persuasive arguments. However, the case against my client, members of the jury, is based on inadmissible evidence because it consists of hearsay.
9. It would be a welcome relief to have a rainy year. I bet this year will be rainier than most due to the fact that tropical oceans are warming.
10. There's been a lot of talk lately about reforming our healthcare system. But, we should resist doing so for two important reasons. First, it is unnecessary. Second, it would be too expensive.

## Analyzing Arguments with Unstated Conclusions

A second challenge to accurate argument analysis arises when, instead of having extra claims, an argument is missing its conclusion. At first, this situation seems to violate the definition of an argument since arguments must contain a premise and a conclusion. However, in these cases, the author provides reasons for a conclusion but fails to state what that conclusion is because he or she thinks that the conclusion is so obvious that it doesn't need to be articulated.

Consider the following example. Notice that the arguer provides a conclusion indicator, but doesn't explicitly state the conclusion.

*The boss said yesterday that she would lay off anyone who has more than six unexcused days off this month. I see that yesterday was your eighth unexcused day off this month. You know what that means, don't you?*

By asking, "You know what that means, don't you?" the speaker is expecting you to draw the conclusion from the premises provided. All you have to do is consider the first claims as premises and the proper conclusion will be easy to see—especially if your job is at stake!

- P1:** The boss said yesterday that she would lay off anyone who has more than six unexcused days off this month.
- P2:** Yesterday was your eighth unexcused day off this month.
- ∴ You are going to be laid off.

**Issue:** Whether you are going to be laid off

Sometimes, arguers fail to indicate that the reader must draw an inference from the claims provided. Consider the following example.

*If you want to do well in this class, then you must work very hard. And I know you want to do well in this class.*

In this passage, two premises are given, but the author has left the conclusion unstated, confident that the reader will draw the conclusion on his or her own. Notice that the first premise is a conditional claim. And the second premise? It is a claim made from the part of the first premise between *if* and *then*. When you put the two premises together, you can see that the arguer intends for you to draw the conclusion, “You must work very hard.” Your argument analysis, then, should include this unstated conclusion. Set out formally, the argument looks like this.

**P1:** If you want to do well in this class, then you must work very hard.  
**P2:** You want to do well in this class.  
 ∴ You must work very hard.

**Issue:** Whether you must work very hard

Let’s try one more example. What conclusion does the author of the following passage intend for you to draw from the claims given?

*You say you want to hire a bright student, and Andrea is a bright student.*

Like in the previous example, this arguer provides two premises, but omits the conclusion. When you analyze this argument, identify the unstated conclusion as well as the premises.



### EXERCISE 3.11

**Your Turn!** Using Formal Analysis, identify the premises and unstated conclusion of the previous argument.

After you have identified the unstated conclusion, you can also identify the issue of the argument, namely whether you should hire Andrea.

Although it might seem counterintuitive that an arguer would present an argument without a conclusion, you can usually identify the unstated conclusion easily. This is because an author can only be assured that the reader will grasp the conclusion, which is his or her main point, if it follows rather obviously from the premises. The best way to avoid missing unstated conclusions like these is to read passages carefully and thoughtfully.

### EXERCISE 3.12

Using a Formal Analysis, identify the premises, unstated conclusion, and issue for each passage.

1. The scale shows that you are 20 pounds overweight, and no one who is overweight can get into the Police Academy. You do understand what follows, don’t you?
2. Johnson will take the management position in North Dakota if the company will pay his moving expenses, and he just heard that they will pay those expenses.

3. If you want to pass your Chemistry class, you really have to do your homework. But you are not doing any of your homework.
4. If you want to be qualified for a good career, then study as hard as you can. And I know you want to be qualified for a good career.
5. Wearing a suit to dinner is excessive, and the last thing I want to do is to be excessive.
6. That bird is a red-tailed hawk only if it has a red tail. Yet, she clearly has a brown tail.
7. It's a good idea to stay up late cramming for final exams as long as you have plenty of time to rest after the test. And you have all afternoon off.
8. Sebastian, the clock shows that it's 8:30! You know that your bed time is 8:00.
9. Student fees have been raised every year for the past decade. You can figure out what's going to happen next year, can't you?
10. Either the Saints or the Colts will win the Super Bowl. However, there's no way that the Colts will win.

## Analyzing Arguments with Implied Claims

A third challenge to accurate argument analysis arises when arguments use non-claims such as questions and commands in a *rhetorical* fashion. You may recall from Chapter 2 that questions, commands, and phrases are not claims, and for this reason they are not part of arguments. However, when these non-claims are used rhetorically, they *imply* claims. Therefore, you must identify the claim that is implied when completing your analysis.

Consider the following example.

*You should select Chapman for CEO. Don't you want someone who is an innovative leader?*

In this passage, the claim, “You should select Chapman for CEO” is followed by a question, “Don't you want someone who is an innovative leader?” At first, you may think that this cannot be an argument because the passage contains only one claim.



This billboard does not contain any claims, nevertheless it tries to persuade. What conclusion does it imply?



However, when the author asks the question, he or she is not really looking for an answer. Instead, the question is *rhetorical*; the author is trying to persuade you to believe something. By offering this rhetorical question, the author is *implying* that Chapman is an innovative leader and, thus, giving a premise in support of the conclusion.

P: Chapman is an innovative leader.  
 ∴ You should select Chapman for CEO.

**Issue:** Whether you should select Chapman for CEO

### EXERCISE 3.13



**Your Turn!** How is it possible that a sentence that is not a claim can play a role in an argument?

In the previous example, a non-claim implies a claim that serves as a premise in an argument. An implied claim can also serve as a conclusion in an argument. Consider the following example.

*Don't move. You're about to step right on a rattlesnake.*

In this passage, there is a command and a claim. However, that doesn't mean that whoever is speaking isn't trying to convince the listener of a serious point. After all, the speaker provides a reason, "You're about to step on a rattlesnake," to convince us of another claim.

Although "Don't move" is a command, not a claim, it implies a claim, namely "You shouldn't move." With this implied claim identified, you can analyze the argument as follows.

P: You're about to step right on a rattlesnake.  
 ∴ You should not move.

**Issue:** Whether you should move

Besides rhetorical questions and commands, arguers may imply claims using other non-claims. Consider this example containing a command and three words.

*Vote for Lopez. Experience; Honesty; Integrity.*

During election years, this kind of message on yard signs and bumper stickers is common. In this case, no claims are given, and thus you may think that this cannot be an argument. Nonetheless, most people would easily recognize that the person who created this message wants the reader to be persuaded to do something—to vote for this candidate. Therefore, a conclusion, "You should vote for Lopez," is implied. What seems to act as reasons are three election-year buzzwords. By using these words, the arguer is implying that the candidate

This sign implies an argument even though it contains no claims. How many premises does it have?



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has these three attributes, and thus they serve as the reasons that you should vote for this candidate. So, in this case, a command implies the conclusion, and three isolated words imply three separate premises.

- P1:** Lopez has experience.  
**P2:** Lopez is honest.  
**P3:** Lopez has integrity.  
 $\therefore$  You should vote for Lopez.

**Issue:** Whether you should vote for Lopez

**Hint!** We are not saying that rhetorical questions, commands, and so on, are sometimes claims and sometimes not. These statements always remain non-claims. Instead, a non-claim can be used for rhetorical purposes to imply a claim, and this implied claim can be a premise or a conclusion in an argument.

### EXERCISE 3.14

**Your Turn!** Look back at the passage presented at the start of this chapter. Provide a Formal Analysis of the argument.

### EXERCISE 3.15

Using a Formal Analysis, identify the premises, conclusion, and issue of each argument, including any claims that are implied by non-claims.

1. Pay a attention. If you don't, you might miss something important.
2. Since we are planning a long trip this summer, the car needs a safety inspection. Aren't you concerned about your family's safety?
3. The best man for the job is a woman. Vote Councilwoman Hagen for mayor.
4. The animal shelter needs to be modernized. How can we treat our animals humanely with outmoded facilities?
5. Vitality and poise. Power and elegance. The new Alturus just may be the best mid-size sedan on the market.
6. The university is sending a mixed message to the community. Aren't we trying to encourage all students to apply at the same time as we are limiting enrollment?
7. Help us! You're the only one we know who can understand the tax code language.
8. Study harder! Don't you want to pass?
9. Which program should you choose? The one that will make you happiest over the long haul. This is because no amount of money will make up for a boring, unsatisfying career.
10. Bigger. Better. Barbie's Burgers.

**EXERCISE 3.16**

Using a Formal Analysis, identify the premises, conclusion, and issue for each passage, including any unstated conclusions and/or implied claims, and excluding any claims that are not part of the argument.

1. Electricians make good money, and they are highly sought-after workers. Shouldn't you consider this fascinating career?
2. Don't you deserve a total makeover? Choose Sirius Professional Makeover Service. Open 9–5 daily.
3. Obviously, we don't want to ban all cell-phone use when driving: What if you need to report a drunk driver on the highway?
4. Some people claim that insider trading is inevitable. If that were true, then there wouldn't be laws against it. However, insider trading is illegal.
5. I've noticed that Anna's new espresso maker makes the worst coffee I've ever tasted. So, don't even consider buying one.
6. Don't drive over the speed limit! What's to keep you from breaking other laws?
7. The only people who can be hypnotized are those who are easily persuadable, and you aren't persuadable at all.
8. Don't quit your job. Jobs are hard to come by, and you don't have a great resume.
9. We must pass laws to curtail hate speech. Would you want someone to disparage *your* race?
10. Green. Inexpensive. American. Try corn-based ethanol.
11. Frozen food is not as healthy as fresh food, and athletes must be sure to eat only healthy food.
12. Will you stop being so squeamish? Surely, you have seen blood before, and besides that, you're wearing gloves.
13. Low fat. Inexpensive. Fun to eat. Why not take cottage cheese for lunch tomorrow?
14. Get new tires for your car right now. With those threadbare tires you could have a blowout on the freeway.
15. Stop staying up late studying; it's ruining your health.
16. Move right now! Local realtors suggest that rents will climb as much as 25% next month.
17. Studies show that children do better in school when they have a chance to get exercise on the playground every couple of hours. And I know you want the children in this school to do well.
18. Stop whining! Dizziness is not a medical emergency.
19. Why should your children listen to you? Because you're the mom, that's why.
20. Persist! That's what successful people do.

**Analyzing Multiple Arguments**

Up to this point, our discussion of argument analysis has revolved around various strategies for identifying the parts of an argument. However, sometimes after you identify the parts, there appears to be *too many* of them. Two types of arguments—arguments with multiple conclusions and chain arguments—have more than the one conclusion allowed under our definition. Although this may seem to violate the definition of an argument (a set of claims,

one of which is supported by the others), these are actually multiple arguments. Completing a Formal Analysis of the passage can help you identify that these passages contain more than one argument, and can help you understand how the arguments relate to one another.

Consider, first, this example.

*Rafael has been given more responsibility at his job. I bet they intend to give him a promotion. He'll probably also get a raise.*

### EXERCISE 3.17

**Your Turn!** How does the previous argument appear to have too many parts?



Let's analyze this argument by identifying all premises and conclusion(s).

- P: Rafael has been given more responsibility at his job.
- ∴ They intend to give Rafael a promotion.
- ∴ Rafael will probably get a raise.

Next, let's set out each conclusion with its supporting premise.

- P: Rafael has been given more responsibility at his job.
- ∴ They intend to give Rafael a promotion.
  
- P: Rafael has been given more responsibility at his job.
- ∴ Rafael will probably get a raise in pay.

Separated like this, you can see that these two conclusions *have the same premise*. When a passage contains more than one conclusion following from the same premise(s), as in this case, it is known as an **argument with multiple conclusions**. Although we will informally talk about this kind of argument as a single argument, it is more accurately analyzed as two related, but separate, arguments.

**Argument 1:** Rafael has been given more responsibility at his job. I bet they intend to give him a promotion.

**Argument 2:** Rafael has been given more responsibility at his job. He'll probably also get a raise in pay.

Thus, seen in this light, an argument with multiple conclusions really does conform to our original definition.

### EXERCISE 3.18

**Your Turn!** What are the two issues of the previous argument with multiple conclusions?



Another kind of argument might also appear to contradict our definition of an argument as having one conclusion, one issue, and one or more premises. **Chain arguments** consist of a *chain* of reasoning, with conclusions drawn earlier in the passage serving later as premises for subsequent conclusions. Those claims that do double duty as conclusions and premises are called **intermediate conclusions**. They stand between the initial premises and the ultimate conclusion. All chain arguments contain intermediate conclusions, and it is by recognizing intermediate conclusions that you will be able to identify chain arguments. Although we may informally speak of a chain argument as a single argument, you can see in the following example that it actually consists of two or more distinct arguments forming a chain of reasoning leading to one main conclusion. The intermediate conclusions and the premises that support them are known as **subarguments**. Thus, chain arguments are still consistent with our definition of an argument.

Consider this example.

*This year is predicted to be warmer and drier than normal throughout most of the country, so the drought in the southeast will most likely continue. Therefore, Georgia's farmers face another poor season.*

First, notice that the word *so* is a conclusion indicator, which means that the first claim is a premise and the second claim is a conclusion.

P:	This year is predicted to be warmer and drier than normal throughout most of the country.
∴	The drought in the southeast will most likely continue.

Next, see that the word *therefore* is also a conclusion indicator. So, the claim that follows *therefore* is a further conclusion. It is supported by the preceding conclusion, the claim directly following the word *so*.

P:	The drought in the southeast will most likely continue.
∴	Georgia's farmers face another poor season.

Unlike the first example in this section, these two conclusions do *not* share a premise. That means this is *not* an argument with multiple conclusions. Notice that the premise supporting the final conclusion is the same claim as the first conclusion. Thus, this is a chain argument consisting of one argument and one subargument.

### EXERCISE 3.19



**Your Turn!** Which of the two conclusions above is the *intermediate* conclusion?

To continue with the analysis of this argument, you must identify the issue. The issue for a chain argument will be based on whatever is the main point, or main conclusion, of the argument.

## EXERCISE 3.20

**Your Turn!** Determine which of the two previous conclusions is the *final* (or main) conclusion. Then state the issue of the argument.



**Hint!** When you present chain arguments in a Formal Analysis, you should place the subargument first and the main argument last to emphasize the chain of reasoning used in the passage. For arguments with multiple conclusions, the order of presentation doesn't matter.



Intermediate conclusions sometimes occur with one or more other premises to support the main conclusion, as in the following example.

*You should be a good candidate to win the essay contest. This is because you made a powerful argument due to the fact that you presented important evidence for your thesis. Furthermore, your essay was clearer than any of the others submitted.*

Here is the main argument.

P1: You made a powerful argument.  
 P2: Your essay was clearer than any of the others submitted.  
 ∴ You should be a good candidate to win the essay contest.

The premise indicator *due to the fact that* signals that the third claim, “you presented important evidence for your thesis,” supports the claim immediately preceding it. Since this supported claim already serves as a premise in an argument, it is part of the following subargument.

P: You presented important evidence for your thesis.  
 ∴ You made a powerful argument.

## EXERCISE 3.21

**Your Turn!** Present the complete Formal Analysis of the previous chain argument, including the issue.



Once you have completed a Formal Analysis for a passage that contains multiple arguments, it should be easy to determine whether the passage is an argument with multiple conclusions or a chain argument. When the two conclusions share the same premise, the passage is an argument with multiple conclusions. When the conclusion of one argument serves as a premise for another argument, the passage is a chain argument.

**EXERCISE 3.22**

Using a Formal Analysis, identify the premises, conclusion, and issue for each argument in the following passages. Then, determine whether the passage is a chain argument or an argument with multiple conclusions.

1. John graduated summa cum laude from a fine university. That means he should get a good job. In addition, won't he be more likely to get into a good grad school?
2. John graduated summa cum laude from a fine university, so he should get a good job. Thus, he should be quite successful.
3. Because Maria tore up all her credit cards, she will again be living within her means. Accordingly, she should be able to earn back an excellent credit rating. Her FICO score used to be over 700.
4. This winter has already been colder than normal. Thus, we can expect more snow, and we can expect more damage to our fruit trees.
5. You should move to Arizona since it is much warmer. Therefore, you should give two weeks' notice at your office.
6. Prohibition of alcohol didn't work, so it's pointless to try to prohibit recreational drug use and equally pointless to try to prohibit steroids and other performance enhancers.
7. The recent study concerning the health consequences of diabetes drugs for young people is not to be believed. This is because the survey was flawed, given that the sample size was too small.
8. Spiders are quite beneficial to the ecosystem. Accordingly, don't squash them, and don't spray poisons on them.
9. You and your family have paid a great deal of money for your college education. So, you really must take your studies more seriously. Therefore, you should quit working 40 hours a week.
10. Given that spiders are beneficial, you should try to encourage them to live in your garden. So, you should grow spider-friendly plants whenever you can.
11. Horatio took little care of his teeth when he was a teenager, so he will probably have dental problems when he gets older. Consequently, he should always buy dental insurance. Dental insurance typically costs less than \$30 per month.
12. You should be frugal with your paycheck, and you should put more money in savings, for the economy is awful, and there's little hope for improvement anytime soon.
13. Because a good dictionary is useful in every university course, it is not only a wise investment for all students, but also a wise investment for anybody wishing to be better educated.
14. Nearly six million American citizens, those with a felony conviction, are barred from voting and excluded from jury service. However, ex-felons should be allowed to vote, and they should be allowed to serve on a jury. This is because once a person has fully repaid his or her debt to society, that person should have his or her full citizenship rights reinstated.
15. Inasmuch as the military has had an increasingly difficult time meeting recruitment goals, and veteran soldiers are retiring at an unusually high rate, it is likely that the military will soon be much smaller than it was five years ago, and it will remain smaller for years to come.
16. The European Union has a bloated bureaucracy, so it needs to resist the urge to add new member states. Accordingly, the vote on adding the Ukraine should be postponed.



17. Anderson will soon be getting a raise. This is because she is likely to get a promotion, since she was so successful with the Hamer project.
18. The city zoo is heavily in debt and it is poorly managed. It follows that extreme measures must be taken. Thus, the town council should take charge right away.
19. Since Natalie wants to save more money, she should open a money market account at the bank, and she should cancel her credit cards.
20. Belonging is a primary goal in life since all of us want to know we are important to family, friends, class, and school. When that goal is not reached, students tend either to withdraw or to misbehave, neither of which is good for the teacher, student, or class. Therefore, teachers should foster a sense of belonging in every member of the class.—Charles and Senter, *Elementary Classroom Management*

## Putting It All Together: Writing a Basic Analysis

In Chapter 2 you developed skills for recognizing arguments, distinguishing them from explanations and passages that are neither arguments nor explanations. In this chapter you've learned the art of analyzing arguments. Now is the time to put this all together in one package. In this section, we introduce a writing exercise that will be employed for the remainder of the text. It's called a Basic Analysis, and with it you will be able to combine both argument recognition and analysis in paragraph form. In a Basic Analysis, you will first identify the passage as an argument, explanation, or neither. Afterwards, you will identify the parts of the passage depending on its type.

### Directions for Basic Analysis

In *paragraph form*, use complete sentences and proper English grammar and spelling to do the following.

**Step 1:** In the *first sentence*, identify the passage.

- ▲ Completely and correctly identify the author and the source (whenever such information is given), and
- ▲ Identify the passage as an argument, explanation, or neither argument nor explanation. (You may want to refer to *How to Recognize an Argument* in Chapter 2, page 26, for help with this decision.)

**Step 2:** In the *subsequent sentences*, analyze the passage.

- ▲ If the passage is *neither an explanation nor an argument*, identify what features of an argument and an explanation it fails to have.
- ▲ If the passage is an *explanation*, clearly and completely identify the claim being explained (the explanandum) and the reason given for it (the explanans).
- ▲ If the passage is an *argument*, clearly and completely identify the issue, conclusion, and premise or premises *in that order*.
- ▲ If the passage is a *multiple argument*, write *separate paragraphs* for each separate argument.



Before trying a Basic Analysis on your own, let's examine several examples, starting with passages that are not arguments. Consider this one.

*Whatever you do, don't tell any of your secrets to your best friend.*

This passage contains only one claim. Since arguments and explanations require at least two claims, this passage is neither. Therefore, the Basic Analysis should read as follows.

**This passage contains neither an argument nor an explanation. It contains only one claim, and both arguments and explanations require at least two claims.**

Now, consider this one.

*Spiders are extremely beneficial in the garden, but few people appreciate them in their homes.*

Unlike the first passage, this one has two claims, so you cannot immediately categorize it as neither an argument nor an explanation. Instead, you need to determine how the claims are related. Does one of the claims attempt to explain or prove the other? No. Since neither claim offers a reason for the other, the passage cannot be an argument and cannot be an explanation. Therefore, the Basic Analysis should read as follows.

**This passage contains neither an argument nor an explanation. It has two claims, but neither claim attempts to explain or prove the other, as is necessary in explanations and arguments.**

Notice that, in both of these examples, the Basic Analysis not only identifies the passage as neither an argument nor an explanation, but also explains why the passage fails to be an argument or explanation.

Now, let's consider another passage that fails to be an argument.

*Mozilla has a low employee turn-over rate because of its cooperative attitude between management and labor.*

In this passage, there are two claims joined together with the word *because*. This signals that one claim offers a reason for the other. But what kind of reason is given? Does one claim attempt to explain or prove the other? If the passage were an argument, the claim following the word *because* would be the premise and the claim before it would be the conclusion. Is "Mozilla has a cooperative attitude between management and labor" an attempt to prove that "Mozilla has a low employee turn-over rate"? It is not. Instead, the cooperative attitude is cited to explain why Mozilla has such a low employee turn-over rate. Since the passage is an explanation, you need to decide which of the claims is the explanandum and which is the explanans. Recall from Chapter 2 that the explanandum is the fact that is being explained, and the explanans is the account given for that fact. Therefore, the Basic Analysis should read as follows.

**This passage contains an explanation. The explanandum is that Mozilla has a low employee turn-over rate. The explanans is that Mozilla has a cooperative attitude between management and labor.**

Notice that each claim is stated clearly as a claim and in such a way that it makes sense on its own.

Let's now turn to some examples of passages that are arguments. As you construct your Basic Analysis for an argument, you may find it useful to first analyze the argument formally since a Basic Analysis differs from a Formal Analysis only in presentation. Rather than outlining the argument formally, in a Basic Analysis you analyze the argument in paragraph form and explicitly state the role played by each claim in the argument.

Just as in a Formal Analysis, your Basic Analysis should identify the premises and conclusion of the argument so that they make sense on their own. That means that you should write each claim as a complete sentence and replace pronouns with their correct referent. Moreover, you should not attach inference indicators to any of the claims. Instead, you must explicitly state what role each claim plays in the argument. Finally, extra claims should be excluded from your Basic Analysis, and implied claims and unstated conclusions should be included, just as they are in a Formal Analysis.

Let's now apply these skills to a few passages that are arguments, beginning with this one.

*I think, therefore I am.*—René Descartes, *Discourse on Method*

First, notice that the passage contains two claims, “I think” and “I am,” and the conclusion indicator signals that the first claim proves the second one. This means that the passage is an argument. If you were providing a Formal Analysis of the argument, it would read as follows.

P:     I think.  
∴     I am.

**Issue:** Whether I am

Now, you can present the analysis of the passage in paragraph form. In your first sentence, you must identify the passage as an argument, and since the passage is accompanied by its source, you should also include that information. In the subsequent sentences, you should identify the issue, conclusion, and premise.

**This passage from Rene Descartes' book *Discourse on Method* contains an argument. The issue is whether I am. The conclusion is that I am. The premise is that I think.**

Notice that the Basic Analysis does not provide any new information; it only presents the information differently than it is presented in the Formal Analysis. The Basic Analysis places the most important information first, namely the issue, then the conclusion, then the premises.

Let's consider another passage.

*We must stop the construction of the proposed nuclear waste depository. Would you want nuclear waste in your backyard?*

This passage contains a claim and a question. However, even though there is only one claim given, the passage is an argument because the question is only rhetorical and *implies* a claim. This implied claim offers a reason supporting the claim given in the first sentence.

When the author asks, “Would you want nuclear waste in your backyard?” he or she isn’t really asking a question. Instead, he or she is implying the claim that “You would not want nuclear waste in your backyard.” A Formal Analysis of the argument would read as follows.

**P:**     You would not want nuclear waste in your backyard.  
**∴**     We must stop the construction of the proposed nuclear waste depository.

**Issue:** Whether we must stop the construction of the proposed nuclear waste depository

Once you have identified the passage as an argument and identified its parts, you can present this information in a Basic Analysis.

**This passage contains an argument. The issue is whether we must stop the construction of the proposed nuclear waste depository. The conclusion is that we must stop the construction of the proposed nuclear waste depository. The implied premise is that you would not want nuclear waste in your backyard.**

What about arguments with multiple conclusions and chain arguments? Let’s consider a couple of examples to see what a Basic Analysis of passages containing multiple arguments should look like.

*He was defending himself against an attack, so my client, William Marshall, is innocent of the charge of murder. Thus, he should be released from jail immediately.*

The passage contains three claims and uses two conclusion indicators. A Formal Analysis of the argument should read as follows.

**P:**     William Marshall was defending himself against an attack.  
**∴**     William Marshall is innocent of the charge of murder.

**P:**     William Marshall is innocent of the charge of murder.  
**∴**     William Marshall should be released from jail immediately.

**Issue:** Whether William Marshall should be released from jail immediately

Because there are two arguments, the Basic Analysis should contain two paragraphs. Starting at the bottom of our Formal Analysis, our Basic Analysis will begin with the issue, conclusion, and premise of the main argument, and the second paragraph will analyze the subargument.

**This passage contains an argument. The issue is whether William Marshall should be released from jail immediately. The conclusion is that William Marshall should be released from jail immediately. The premise is that William Marshall is innocent of the charge of murder.**

**This passage contains a subargument. The intermediate conclusion is that William Marshall is innocent of the charge of murder. The premise is that William Marshall was defending himself against an attack.**

Notice that because the passage is a chain argument, there is only one issue, and it corresponds to the conclusion of the main argument.

Consider this multiple argument next.

*Satellite photos show increased traffic of heavy trucks on both sides of the Pakistan/India border. This proves that each side is stockpiling weapons in its arsenal and that tensions are higher than normal.*

This passage is also a multiple argument. However, once you complete a Formal Analysis, you can see that it is an argument with multiple conclusions, not a chain argument. This also means that each argument will have its own issue.



AP Photo/Channi Anand

Soldiers from the Indian Border Security Force (BSF) patrol along the India-Pakistan border.

- P:** Satellite photos show increased traffic of heavy trucks on both sides of the Pakistan/India border.  
**∴** India and Pakistan are stockpiling weapons in their arsenals.

**Issue:** Whether India and Pakistan are stockpiling weapons in their arsenals

- P:** Satellite photos show increased traffic of heavy trucks on both sides of the Pakistan/India border.  
**∴** Tensions between India and Pakistan are higher than normal.

**Issue:** Whether tensions between India and Pakistan are higher than normal

The Basic Analysis will again contain two paragraphs, one for each argument. Because it is an argument with multiple conclusions, the order of presentation is unimportant.

**This passage contains an argument. The issue is whether India and Pakistan are stockpiling weapons in their arsenals. The conclusion is that India and Pakistan are stockpiling weapons in their arsenals. The premise is that satellite photos show increased traffic of heavy trucks on both sides of the Pakistan/India border.**

**This passage contains another argument. The other issue is whether tensions between India and Pakistan are higher than normal. The conclusion is that tensions between India and Pakistan are higher than normal. The premise is that satellite photos show increased traffic of heavy trucks on both sides of the Pakistan/India border.**

Now that you have seen several examples, you are ready to try some on your own. Remember that a Basic Analysis does not involve any new skills. You are only presenting what you have learned about recognizing and analyzing arguments in a new, written format.



**Hint!** In your Basic Analysis, remember the following rules:

- ▲ Your Basic Analysis should be written in proper paragraph format.
- ▲ The content of each claim must make sense on its own. This means, for example, that each claim should be written in a complete sentence, and that pronouns should be replaced with their referent.
- ▲ Inference indicators should not be included with the statement of any claim.
- ▲ Issues should be phrased positively, even when the conclusion is negative.
- ▲ Intermediate conclusions, unstated conclusions, implied conclusions, and implied premises should be labeled as such in your analysis.
- ▲ Extra claims should not be included in your analysis.
- ▲ Chain arguments have only one issue.

### EXERCISE 3.23

Write a Basic Analysis for each of the following passages.

1. It is a very good idea to buy savings bonds because when you buy them you are investing in the future.
2. Despite all the hype, the Smart car did not generate as much profit as we had hoped. Sales were lower than projected and production costs were higher.
3. If it is permissible to euthanize dying animals, then it is permissible to euthanize dying humans.
4. Since Gabriella is not in favor of our project, she must be extremely pessimistic. I wonder how many people like *her* project.
5. The defendant can't be the person who murdered the detective, because he was in Arizona at the time of the murder, and the murder took place in North Carolina.
6. Changes are real. Now, changes are only possible in time, and therefore time must be something real.—Immanuel Kant, *Critique of Pure Reason*
7. Because the limbic system has a primary function in emotions such as pain, pleasure, anger, rage, fear, sorrow, sexual feelings, docility, and affection, it is sometimes called the 'emotional' brain.—Gerard Tortora, *Principles of Human Anatomy*
8. The only way to get a bill through Congress is by sweet-talking legislators, and the president refuses to do any such sweet-talking.

9. We need to enforce the death penalty for all murders without exception. Don't murderers deserve death after what they've done?
  10. Don't skip class. The exam is soon, and you might miss something important.
  11. The United States of America is the only industrialized Western country that has the death penalty. Shouldn't the United States also outlaw the death penalty? The primary reason for doing so is that it does not deter horrible crimes. Also, it is hypocritical because it brings our society down to the level of the murderers themselves.
  12. In the stratosphere the air temperature begins to increase with height, producing a temperature inversion. The reason for the inversion in the stratosphere is that the gas ozone plays a major part in heating the air at this altitude.—C. Donald Ahrens, *Essentials of Meteorology*
  13. What the country needed, argued the Whigs, was improvement, vigorous federal support for economic development. No, countered the Democrats, what the country needed was expansion, vigorous federal action to buy more land.—Hine and Faracher, *The American West*
  14. People tend to choose to live in a community based on their economic conditions. Accordingly, people who need similar public services will tend to live in the same community. Thus, new communities will tend to have internally similar public service demands.
  15. Because mortality rates are lower in urban areas than in rural areas, the process of urbanization will inevitably lead to lower mortality rates.
  16. Employees should be given feedback as soon as possible after a specific event. Information they receive while the event is still fresh in their minds will encourage them in the proper direction.
  17. In addition to holding few decision-making positions at work, many women in developing countries also have poor access to basic safety, security, nutrition, or healthcare resources. Thus, advancing women to managerial positions is but one of a number of challenges women in developing countries may face.—Barbara Parker and Ellen A. Fagenson, "An Introductory Overview of Women in Corporate Management," in Davidson and Burke (eds.), *Women in Management: Current Research Issues*
  18. There is no need for a legal definition of death. There is no assurance that it would accomplish its intended purpose, and such legislation would lead directly to euthanasia.—The National Conference of Catholic Bishops, Committee for Pro-Life Activities
  19. Airline pilots ought to carry firearms while on duty. This is because airliners are increasingly targeted by terrorists, and arming pilots would provide a last line of defense to keep hijackers out of the cockpit.
  20. Why did President Obama win the Nobel Peace Prize? According to Obama himself, he was awarded the prize because of his vision for change, not because of any particular accomplishment.
-

### Chapter Review Questions

1. What are the three parts of an argument that must be identified in an analysis?
2. What is the “best tool” for analyzing arguments?
3. What are inference indicators?
4. How does the word *because* signal which claim is the premise and which is the conclusion?
5. How do you identify the issue of an argument?
6. How do you analyze an argument that lacks inference indicators?
7. What are three situations in which claims in a passage are not part of the argument?
8. How can an argument be missing a conclusion and still fit the definition of an argument?
9. How can a non-claim be part of an argument?
10. What are the two types of multiple arguments?
11. What is an intermediate conclusion?
12. In a chain argument, which conclusion determines the issue?
13. How can you tell the difference between a *subargument* and the *main argument*?
14. What is included in the Basic Analysis of an explanation?
15. How do you analyze multiple arguments in a Basic Analysis?



# Diagramming Arguments

## CHAPTER

# 4

Imagine that you and your classmates are studying together for an upcoming Criminology exam. One of your fellow students presents the following argument against the death penalty.

*It's clear that we should eliminate the death penalty. First, the financial costs of capital punishment are significantly greater than those of keeping someone in prison for life. Second, the death penalty has no greater deterrent value than life in prison without parole.*

You accept the student's first premise as true based on evidence presented in your Criminology textbook. However, you are not convinced that the second premise is true. Should you, then, accept or reject the conclusion? One factor in making your decision is the structure of the argument; that is, whether the premises are dependent on or independent of each other. This chapter will provide you with the skills for making this decision by introducing you to a technique for identifying an argument's structure, called an argument diagram. Sometimes also referred to as argument mapping or argument trees, an **argument diagram** provides a visual representation of the argument's structure. It indicates whether the premises provide dependent or independent support for the conclusion, and whether the argument contains one or more subarguments supporting the premise(s) of the main argument. After learning the basics of the diagramming technique, you will utilize the skills you learned in Chapter 3 to diagram a variety of arguments including those with unstated conclusions and implied premises, multiple arguments, and extended arguments.

## Diagramming Arguments

The first step in diagramming an argument is to identify each of the claims given in the passage by underlining and numbering them in the order in which they appear. This step relies on the skills you learned in Chapter 2 for identifying and counting claims. First, you learned that, although claims are expressed in sentences, not every sentence



### The Cost of Capital Cases

A death penalty case in Maryland costs about three times more than a case in which the prosecutor does not seek the death penalty, according to a study by the Urban Institute. The study evaluated all 1,227 homicides that occurred in the state from 1978 to 1999 in which the defendant was eligible to receive the death sentence.

	DEATH SENTENCE NOT SOUGHT	DEATH SENTENCE UNSUCCESSFULLY SOUGHT	DEATH SENTENCE
Trial	\$ 158,000 ■	\$601,000 ■	\$775,000 ■
Penalty phase	0	\$71,000 ■	\$263,000 ■
State appeals	\$83,000 ■	\$175,000 ■	\$565,000 ■
Federal appeals		0	0 ■ \$96,000
Prison	\$862,000 ■	946,00 ■	\$1,318,000* ■
<b>Total</b>	<b>\$1,103,000</b>	<b>\$1,793,000</b>	<b>\$3,017,000</b>

\*Defendants sentenced to death have higher prison costs because supervising them is more expensive, and not all are actually executed.

Source: © 2009 The New York Times Company

is a claim. Because the following sentence is not a claim, it would not be underlined or numbered.

*What evidence can be provided for the defendant's guilt?*

Secondly, when identifying a claim, do not include inference indicators or any other words that are not part of the claim. Notice that only the claim is underlined and that the indicator word is left out in the following example.

Consequently, ① the defendant is guilty of murder.

### EXERCISE 4.1



**Your Turn!** Underline and number the claim in the following sentence.

*It is clear that the alibi witness cannot be trusted.*

You also learned in Chapter 2 that multiple claims are sometimes expressed in a single sentence. Whenever a sentence contains more than one claim, underline each claim and assign each claim its own number. For example, the following sentence contains two claims, and thus they are each underlined and given different numbers.

① Cocaine is a drug, and ② drugs are addictive.

## EXERCISE 4.2

**Your Turn!** Underline and number the claims in the following sentence.

*Cocaine is a drug because it is addictive.*



Another thing you learned in Chapter 2 is that two claims can be joined together in ways that transform them into single claims. Whenever this occurs, be sure to treat the claim as a single claim rather than breaking it into parts. The following conditional claim is a single claim, and thus should be underlined and numbered as such.

① *If cocaine is a drug, then it is addictive.*

Although “Cocaine is a drug” and “It is addictive” would be separate claims if they appeared on their own, because they are joined together to make a single conditional claim, they should be underlined and numbered as a single claim.

## EXERCISE 4.3

**Your Turn!** Underline and number the claims in the following sentence.

*Count Dracula was either killed by Jonathan Harker or he was killed by Professor Van Helsing. Either way, he is dead.*



Sometimes it may be challenging to identify when a single sentence contains more than one claim because the sentence uses a parenthetical phrase or buries one claim within another. Consider this example.

① *Your house must be infested with termites.* ② *There are mud tubes running from the soil into cracks of masonry on the house.* ③ *which could only be caused by termites.*

When underlining and numbering, you might think “which could only be caused by termites” isn’t a complete claim and thus shouldn’t be numbered. But thinking more carefully, notice that the word *which* works like a pronoun, referring to the mud tubes. The third claim would then be “These mud tubes could only be caused by termites.”

## EXERCISE 4.4

**Your Turn!** Underline and number the three claims in the following passage.

*The realtor said that if your house is infested with termites—which it is—then you need to have it fumigated. That means, then, that you need to get the house fumigated.*



A final lesson you learned about counting claims that is relevant to diagramming is that a single claim can be represented by more than one sentence. Whenever you encounter a claim that is repeated in this way, you should underline each claim and assign the *same number* to each additional phrase that makes the same claim. Although it may occur in other circumstances, a claim is most often repeated when the arguer presents the conclusion at both the beginning and end of the argument. Since the first and third sentences in the following example express the same claim, they are underlined and given the same number.

- ① The victim, Erika Silverman, was stabbed by the defendant, Joe Belser.  
 ② Detective Stokes identified Mr. Belser's DNA on the weapon used to kill the victim. Therefore, ① it was Joe Belser who killed Ms. Silverman.

Once you have all the claims underlined and numbered, the next steps in diagramming an argument require that you utilize the skills you learned in Chapter 3, namely identifying the conclusion and the premises that support it. The number that corresponds to the conclusion should be placed at the bottom of your diagram, and the number(s) corresponding to the premise(s) for that conclusion should be placed above the conclusion with an arrow pointing to the conclusion from the premise(s). Consider the following example.

- ① The detective found the defendant's DNA on the weapon, thus ② the defendant must be the killer.

Although there is only one sentence, there are two claims, so each claim is underlined and given its own number. Now, notice the indicator word. *Thus* tells us that claim ② is the conclusion and that claim ① is the premise. Therefore, you should place the

Forensic evidence for DNA (deoxyribonucleic acid) analysis. The blood and other biological material on this knife can be analyzed for traces of genetic material, and compared to the DNA of suspects or to DNA profiles held in databases.



Pascal Goetgheluck/Photo Researchers, Inc.

number corresponding to the conclusion at the bottom of the diagram and the number corresponding to the premise above it with an arrow drawn from the premise to the conclusion.



### EXERCISE 4.5

**Your Turn!** Underline and number the claims in the following sentence. Then draw a diagram of the argument.

*The defendant must be the murderer since his DNA was on the murder weapon.*



Most arguments have more than one premise supporting the conclusion. For arguments of this sort, you will need to determine the relationship between those premises and then draw the diagram in a way that reflects this relationship. Some arguments have premises that independently support the conclusion whereas others have premises that are dependent on each other to support the conclusion. When premises are independent, we call them **convergent**. If one of the premises is false, the conclusion is still supported because the remaining premises provide independent support for the conclusion. The following argument has convergent premises.

*Cocaine is addictive, and it is illegal. Consequently, you should not use cocaine.*

The conclusion of this argument is “You should not use cocaine.” There are two premises given: “Cocaine is addictive” and “Cocaine is illegal.” These premises provide independent support for the conclusion. If cocaine was not addictive, the conclusion could still be supported by the remaining premise.

When premises depend on each other to support the conclusion, we call them **linked**. In arguments with dependent premises, all of the linked premises must be true in order to support the conclusion. That means that if one of the premises is false, the conclusion is no longer supported. The following argument has linked premises.

*Cocaine is a drug, and drugs are addictive. Therefore, cocaine is addictive.*

The conclusion of this argument is that “Cocaine is addictive.” There are two premises given: “Cocaine is a drug” and “Drugs are addictive.” These premises are dependent on each other to support the conclusion. If cocaine was not a drug, then the conclusion could no longer follow because “Drugs are addictive” cannot support the conclusion on its own. Likewise, if “Drugs are addictive” were false, “Cocaine is a drug” would not be enough to support the conclusion that cocaine is addictive.

## EXERCISE 4.6

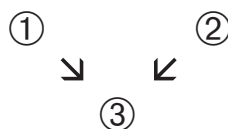


**Your Turn!** Look back at the argument about the death penalty presented at the start of this chapter. Did the student in the study group present an argument with linked or convergent premises?

Once you have determined whether the premises are dependent or independent, you will signal this relationship in the way you draw your diagram. Convergent premises are indicated by drawing an arrow from each independent premise to the conclusion, whereas linked premises are indicated by using a “+” to join the dependent premises, underlining them, and drawing a single arrow from the group of linked premises to the conclusion.

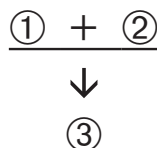
Let’s diagram the two arguments from above.

① Cocaine is addictive, and ② it is illegal. Consequently, ③ you should not use cocaine.



This diagram tells us that the third claim is the conclusion, and that the first and second claims provide independent support for it. Notice how this diagram differs from the next one.

① Cocaine is a drug, and ② drugs are addictive. Therefore, ③ cocaine is addictive.

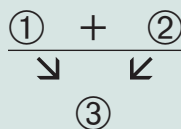


This diagram tells us that the third claim is the conclusion, and that the first and second claims depend upon each other to support it.

## EXERCISE 4.7



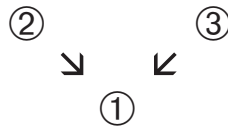
**Your Turn!** What has gone wrong with the following diagram?



**Hint!** Each of the claims in the previous example is a categorical claim because it relates two terms or concepts: cocaine/drug, drugs/addictive, and cocaine/addictive. Watch for categorical claims because they are usually linked together in arguments. Similarly, two kinds of claims you encountered in Chapters 2 and 3 will help you spot arguments with linked claims. **Conditional** claims (if . . . then claims) are commonly linked with another premise when they appear in arguments. **Disjunctive** claims (either . . . or claims) also typically link with another premise in arguments.

In Chapter 3, you learned that sometimes arguments are given in passages that contain claims which are not part of that argument. Since these claims are neither premises nor conclusions, you do not include them in your analysis. When diagramming these arguments, you will make a similar move. Let's look at a passage containing an extra claim. Notice that every claim, including the extra one, is underlined and given a number.

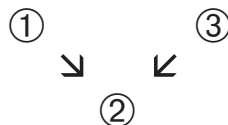
① You should be frugal with your paycheck, for ② the economy is awful, and  
③ there's little hope for improvement anytime soon. ④ That's not to say that the  
economy was all that great the previous year.



Although there are four claims in the passage, only three are in our diagram. This is because the fourth claim is neither a conclusion nor a premise. Even though it is not part of the argument, it is still underlined and numbered in the passage because it is a claim.

The final step in diagramming an argument is to confirm that all claims that are part of the argument have been diagrammed, and to check your work by presenting the argument to yourself using the diagram. In checking your work, begin with the conclusion, ensuring that the arrows leading to it provide the reasons for believing that it is true. For example, suppose you have arrived at the following diagram.

① Hurricane season begins in June. Therefore, ② hurricane season will begin soon since ③ it's the end of April.



This diagram tells us that claims ① and ③ offer independent support for the conclusion. To check this diagram, begin with the conclusion and ask yourself whether the claim(s) pointing to it offer adequate evidence. Since there are two arrows, you should do this twice.

- ② Hurricane season will begin soon because ① it's the end of April.  
 ② Hurricane season will begin soon because ③ hurricane season begins in June.

You should be able to see that something is wrong with the diagram. The problem is that claims ① and ③ cannot support claim ② on their own; they depend upon each other to support the conclusion. That means that the diagram must show that the premises are linked, not convergent.

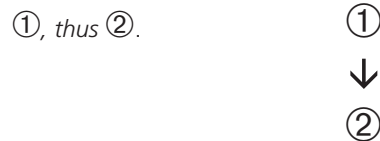
### EXERCISE 4.8



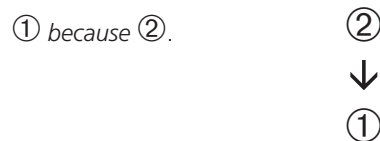
**Your Turn!** Draw the correct diagram for the previous argument.

### Utilizing Inference Indicators

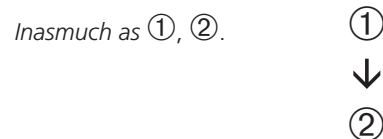
Inference indicators are your best guide for identifying the argument's structure; they are like big signs exclaiming, "Hey! Here is a premise!" or "This is a conclusion!" Indicator words tell you what elements must be present in your diagram even before you find out the content of the claims. Consider the following examples.



Here, *thus* indicates that ② is the conclusion and ① is the premise.



In this sentence, *because* indicates that ② is the premise for ①.



*Inasmuch as* indicates that ① is a premise, but what about ②? The sentence states that since ① is true, ② is also true. That means that ② is the conclusion.

① and ②, therefore ③.

① and ②

?

③

*Therefore* indicates that ③ is the conclusion, and that ① and ② are the premises. Are these premises linked or convergent? At this point, you cannot tell. The word *and* does not mean that the premises are linked. The only way to determine whether they are linked is to look at the content of the claims. Just using the indicator words, there are two possible ways the argument could be diagrammed; you won't know which of the two is correct until you look at what the claims say.

Although *and* cannot tell you whether premises are dependent or independent, there are a handful of indicators that signal that a claim is independent from other claims in the passage. A few examples of these are *besides*, *furthermore*, and *additionally*. When followed by a premise, these indicators usually signal that the following premise or premises provide support for the conclusion independently of any of the previous ones. Be sure to verify this by checking the content of the claims.

Unfortunately, some authors do not utilize inference indicators in their arguments. In these cases, you must test each of the claims one-by-one to pick out which claim is the conclusion, and which claims are the premises. It's best to start by finding the conclusion before trying to pick out the premises. Consider this one.

*The Giants beat Florida last week. They'll most likely beat Houston when they play tomorrow.*

Without indicator words, you must determine which of the claims is the conclusion by examining their contents. Is it more likely that the author of the argument is trying to prove something about what happened last week or about what will happen tomorrow? To help you decide, you can write a sentence with the two claims using the indicators *because* or *therefore*, as you did in Chapter 3 when arguments lacked indicator words.

#### EXERCISE 4.9

**Your Turn!** Rewrite the previous argument by adding the premise indicator *because* in the two ways possible. Which of the two describes the author's intent?



It should sound quite strange to say that what will happen tomorrow proves something about what happened last week. Instead, what happened last week offers evidence for what will happen tomorrow. The diagram, then, will look like this.



① *The Giants beat Florida last week.* ② *They'll most likely beat Houston when they play tomorrow.*



### EXERCISE 4.10

Diagram each of the following arguments using the inference indicators as your guide. Note: If you cannot tell whether the premises are linked or convergent, provide a diagram of each possibility.

1. ①. Thus ②.
2. ① because ②.
3. Given that ①, ②.
4. ①. This proves that ②.
5. ① follows from the fact that ② and ③.
6. ①, accordingly ②.
7. ①. It follows that ②.
8. ① as ②. Besides, ③.
9. ①. Therefore, in view of the fact that ②, ③.
10. ① and ②. This means that ③.

### EXERCISE 4.11

Diagram each of the following arguments.

1. People have been smuggled into the United States since the slave trade was outlawed in the early 19th century. Therefore, smuggling of persons is unlikely to be easily eliminated.
2. The patient has amnesia. She must begin hypnotherapy as soon as possible.
3. Because implanting a computer chip in the brain could vastly increase anyone's knowledge, cyborgs may be a reality in the not-so-distant future.
4. You should get your holiday shopping done early because many stores are not restocking their shelves this year.
5. All sportscasters are athletes, and no athletes are college professors. Accordingly, no sportscasters are college professors.
6. Inasmuch as the military has had an increasingly difficult time meeting recruitment goals, and veteran soldiers are retiring at an unusually high rate, it is likely that the military will soon be much smaller than it was five years ago.
7. Tomlin would make the best mayor. She is honest, and she knows how to work with people who disagree with her.

8. You should vote to re-elect Judge Wilson. She is tough on crime, and we really need a judge on the bench who will fully enforce the law. Besides, she is the candidate with the most experience.
9. There are several reasons why you should stop smoking cigarettes. First, cigarette smoking causes serious health problems. Second, cigarette smoke makes you stink, and it also makes your teeth yellow. Finally, cigarettes are very expensive.
10. You clearly have a case of the fungal infection called ringworm. You have a red, elevated, ringlike sore on your arm, and only ringworm causes sores like that.
11. If the economic picture does not improve soon—and it won't—there will be large-scale unemployment within the next few months. So, many people will be out of work before the end of the year.
12. If the defendant has an alibi, then you should vote not guilty. Since the defense has not provided an alibi for the defendant, you must vote guilty.
13. The recent outbreak of food poisoning among CSUB students was caused by corndogs served at the Club Fair yesterday. The corndogs must have been the problem, because corndogs were served at the Club Fair, and all of the students who became ill ate lunch at the Club Fair yesterday.
14. Alberto Giacometti was one of the most splendid 20th century sculptors, for his human figures captured an existential pessimism, and his plastic technique influenced many subsequent sculptors.
15. The university trustees voted to raise student fees yet again. It follows that we can expect enrollment to drop, since many students cannot afford even a small increase in college costs.
16. No Republicans are Democrats, so no Republicans are big spenders, since all big spenders are Democrats.
17. *The War of the Worlds* can be considered the most enduring science fiction movie of all time. This is because only it and *King Kong* are contenders for that honor, and *King Kong* has not lasted as well.
18. The First Amendment must not be seen as allowing total freedom to act. After all, violent protestors can be arrested. Furthermore, hate speech is against the law.
19. Young children have increasingly large amounts of money to spend, and they exert an ever larger influence on their parents' buying. Accordingly, marketers will spend even more money in the coming years attempting to attract young consumers.
20. If you go to the party tonight, then you will end up on academic probation. Why? Well, if you go to the party tonight, you won't be able to finish writing your paper. And, if you don't finish writing your paper, you will fail your English Composition class. And, if you fail your English Composition class, you will be put on academic probation.

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## Diagramming Arguments with Unstated Conclusions

In Chapter 3, you learned that arguments are sometimes presented without their conclusions being explicitly stated. When you analyze these arguments, you use the given premises to determine the unstated conclusion, and you supply the missing conclusion in your analysis. A complete argument diagram also requires that you

provide the missing conclusion since a diagram needs a conclusion for the arrow to point toward.

Consider this example. This argument contains an inference indicator in a question, serving as a clue that there is an unstated conclusion.

*Unless NASA gets congressional approval for its plan to send a new mission to the moon, the space program will most likely disappear. And congressional approval seems highly unlikely. The result of this is obvious, isn't it?*

This passage contains two claims and a question. At first, the passage does not appear to be an argument because neither of the claims given in the passage supports the other. However, notice that the question following the claims requires that you provide the conclusion by utilizing the two given claims as premises.

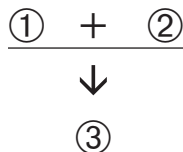
### EXERCISE 4.12



**Your Turn!** What is the conclusion that follows from the premises in the previous passage?

Although the question at the end of the passage is not a claim, it acts as a placeholder for a claim. You should therefore underline and number it, and then, beneath the argument, identify the claim that the author intends the reader to conclude. Your diagram, then, should look like this.

① Unless NASA gets congressional approval for its plan to send a new mission to the moon, their space program will most likely disappear. And ② congressional approval seems highly unlikely. ③ The result of this is obvious, isn't it?  
③ The NASA space program will most likely disappear.



Let's try a second example. Notice that this one does not use indicator words as a placeholder for the conclusion.

*If you want to do well in this class, then you must work very hard. And I know you want to do well in this class.*

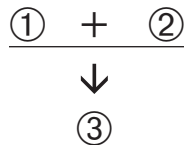
### EXERCISE 4.13



**Your Turn!** What is the conclusion that follows from the premises in the previous passage?

Two premises are given, but the author has left the conclusion for you to draw yourself. If you were to only use the two given claims in the diagram, the arrow from the premises would have nothing to point toward. For this reason, you must provide an additional number for the missing conclusion, and you must identify the claim to which the number corresponds.

- ① If you want to do well in this class, then you must work very hard. And I know  
 ② you want to do well in this class.  
 ③ You should work very hard in this class.



## Diagramming Arguments with Implied Claims

You also learned in Chapter 3 that arguments can contain implied claims signaled by rhetorical questions, commands, or phrases. When analyzing these arguments, you identify the implied claim by utilizing the clues provided by the nonclaims. Similarly, when diagramming the argument, you should identify the claims implied by any nonclaims provided in the passage. Let's examine a few examples of how to do this.

First, consider the following argument containing a command that indicates an implied claim.

*Stop playing video games all night. Otherwise, you may develop carpal tunnel syndrome.*

At first glance, you might doubt whether this is an argument at all. You know that arguments must have a minimum of two claims, but there is only one claim in the passage, "Otherwise, you may develop carpal tunnel syndrome." Notice, however, that the command given in the first sentence implies a claim, namely that "You should stop playing video games all night." To diagram this argument, then, you should treat the command as a placeholder for the claim it implies by underlining and numbering it along with the claim given in the argument. Then, for clarity, you should state the implied claim underneath the passage. Your argument diagram will look like this.

- ① Stop playing video games all night. ② Otherwise, you may develop carpal tunnel syndrome.  
 ① You should stop playing video games all night.



Let's examine one more before you complete some on your own. Consider this argument with a claim implied by a rhetorical question.

*We should keep the death penalty. How could a brutal murderer be allowed to live?*

Like the previous example, this argument offers only one claim. However, the second sentence is a rhetorical question implying a claim, namely that "Those who brutally murder others should not be allowed to live." Your underlining and numbering should appear as follows.

- ① We should keep the death penalty. ② How could a brutal murderer be allowed to live?  
 ② Those who brutally murder others should not be allowed to live.

#### EXERCISE 4.14



**Your Turn!** Diagram the previous passage.

#### EXERCISE 4.15

Diagram each of the following arguments. Be sure to state and number any unstated conclusions or implied claims.

1. Why vote for Conrad? He's a visionary, that's why.
2. You should hire Elka Schmidt since she is a hard worker.
3. Francisco is most likely good at math because he has an analytical mind.
4. Since you are having headaches, you ought to have your eyes tested.
5. If you want to be qualified for a good career, then study as hard as you can.  
And I know you want to be qualified for a good career.
6. All sailboats are expensive to buy, and a Hobie Cat is a sailboat. You know what follows from that, right?
7. Since chocolate contains sugar, it's bad for your teeth.
8. Gay marriage? No way. If we allow gay marriage, then we will have to allow polygamy, and there's no way we can allow polygamy.
9. Obviously we don't want felons to have the right to vote: Would you want a convicted murderer to choose the next president?
10. There is clearly a healthcare crisis in the United States. If there are people in need of health care who can't afford it, then the United States would have a healthcare crisis. And, aren't there lots of people who need health care but can't afford it?
11. I heard that Toyota has recalled many of their 2009–2010 vehicles for mechanical problems. So, you should bring your car to the dealership to fix the problem. Isn't your car a 2010?

12. We hope you agree that our fraternity is the best on campus. The majority of students who responded to a campus survey said our fraternity would be their number one pick. How could they be wrong?
13. George would change parties only if Jones is elected. But, there is no chance Jones is going to be elected. So, you know what George is going to do.
14. Legalize marijuana now! There are important medical uses for it. Besides, most people smoke it anyway.
15. Video game players shouldn't become surgeons. Haven't you seen how many gamers have jittery nerves?
16. This cat has no tail, and the only kind of cat without a tail is a Manx. You know what that means, right?
17. The government has two choices: either raise taxes or decrease spending. And, there is no way that they can decrease spending.
18. Don't get your children vaccinated! After all, I read on the Internet that some vaccines contain mercury, and mercury has been linked to autism. You surely don't want your child to develop autism, do you?
19. Which charity should you donate to? The one that supports projects in your community. This is because you will be able to see the benefits directly.
20. Don't cheat on your exam! What's to keep you from committing terrible violent crimes?

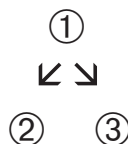
## Diagramming Multiple Arguments

In Chapter 3 you learned how to analyze two kinds of passages that contain multiple arguments: arguments with multiple conclusions and chain arguments. Although such passages technically constitute two distinct arguments, they can be represented in a single diagram. Let's first look at an example of an argument with multiple conclusions.

*Nurse anesthetists are able to replace physicians in the operating room. That means that they can demand higher salaries than the typical RN, and they can save hospitals money.*

This passage contains more than one conclusion. The indicator *that means that* signals to us that “They can demand higher salaries than the typical RN” and “They can save hospitals money” are both conclusions, and these two conclusions share the same premise, namely that “Nurse anesthetists are able to replace physicians in the operating room.” Although you could diagram each of the arguments separately, you can also use a single diagram to show that the one premise supports two different conclusions.

- ① Nurse anesthetists are able to replace physicians in the operating room.  
 That means that ② they can demand higher salaries than the typical RN, and  
 ③ they can save hospitals money.



More often, a passage has multiple arguments because there are one or more subarguments. Remember that a **subargument** is an argument whose premise(s) provide support for a premise of another argument. In these cases, the conclusion of the subargument is a premise of the main argument. Consider the following example.

*I studied more than 10 hours for my final exam, thus I should do well on it.  
Consequently, my semester grade will be up to passing level.*

When looking for the conclusion, you should notice that there are two conclusion indicators. *Thus* and *consequently* signal that both the second and third claims are conclusions. Let's take up each separately. What is the premise for the second claim, "I should do well on my final exam"? The indicator word *thus* tells us that the claim preceding it is the premise for what follows. The diagram for that argument will look like this.

① I studied more than 10 hours for my final exam, thus ② I should do well on it.



Now, what about the third claim, that "My semester grade will be up to passing level"? The indicator word *consequently* signals that ③ is a conclusion.

*Consequently, ③ my semester grade will be up to passing level.*



Does the first or the second claim support ③? The indicator *consequently* signals that what comes before it is the premise. Since what comes before ③ is an argument, the premise for ③ will be the conclusion of that argument. By putting the two preliminary diagrams together, you can show that the passage is a chain argument.

① I studied more than 10 hours for my final exam, thus ② I should do well on it. *Consequently, ③ my semester grade will be up to passing level.*



Notice that the conclusion of the first argument is also the premise of the second argument. In Chapter 3 you learned that this is called an intermediate conclusion.

### EXERCISE 4.16

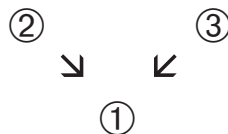
**Your Turn!** Diagram the following argument.

*The Jones family will soon lose their house. This is because they won't be able to make their mortgage payments due to the fact that Mr. Jones was laid off from his job last month.*

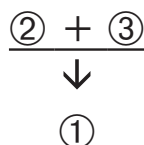


### Checking Your Work

When you were learning algebra, your instructor probably emphasized the importance of checking your work. Although doing so doesn't always tell you where your errors occur, it does help you determine if the steps you have followed led to the wrong answer. Similarly, checking your diagram will often help you identify possible mistakes. Reading the argument aloud using your diagram as a guide can help you hear when the connection between the premises and conclusion shown in your diagram doesn't work. The trick is, though, to make sure you understand exactly what the diagram means. Let's compare the following diagrams containing three claims.



This diagram has convergent premises; the premises provide independent support for the conclusion. It states that claim ① is true because claim ② is true, and that claim ① is true because claim ③ is true. Consider how this differs from the following argument with linked premises.





The premises in this diagram are dependent on one another. The diagram tells us that claim ① is true because both claims ② and ③ are true. Notice how in the diagram with convergent premises, the conclusion still follows if one of the premises is false, whereas in the diagram with linked premises both the premises must be true for the conclusion to be true.

When first learning the diagramming technique, many people have difficulty distinguishing between an argument with linked premises and a chain argument. However, once you understand what an argument diagram says, the difference should become much clearer. Let's compare the previous argument with linked premises to the following chain argument.



This diagram tells us that there are two arguments. In the main argument, claim ① is true because claim ② is true, and in the subargument, claim ② is true because claim ③ is true.

### EXERCISE 4.17



**Your Turn!** Are chain arguments more like arguments with convergent premises or arguments with linked premises? Explain.

Notice that the chain argument contains two arguments—the main argument and a subargument—whereas the argument with linked premises is only one argument. Also notice that in the one with linked premises, claim ② cannot prove claim ① on its own; it is dependent upon claim ③. But, in the chain argument, claim ② provides independent support for claim ①, and claim ③ provides support for claim ②, not for claim ①.

Before trying some exercises on your own, let's recap the steps for diagramming an argument.

### How to Diagram an Argument

**Step 1:** Underline and number each claim.

- ▲ Do not include indicator words. Consider circling or highlighting them.
- ▲ Remember that more than one claim can appear in a single sentence.
- ▲ If a claim is repeated, assign it the same number each time.
- ▲ If a conclusion is unstated, write the claim underneath the passage and assign it a number.

- ▲ If a nonclaim serves as a placeholder for a claim, underline and number the nonclaim, and state the claim it implies after the passage.

**Step 2:** Pay attention to indicator words.

- ▲ Break down the passage into smaller, more manageable parts.

**Step 3:** Identify the main conclusion of the argument.

- ▲ Place the main conclusion at the bottom of the diagram.
- ▲ Do not confuse an intermediate conclusion with the main conclusion.

**Step 4:** Identify the premise(s) that support the main conclusion.

- ▲ Place the premise(s) above the conclusion.
- ▲ For convergent premises, place an arrow from each premise to the conclusion. Linked premises should be underlined and connected with a “+” with a single arrow from them to the conclusion.

**Step 5:** Diagram any subarguments.

- ▲ Look for claims that support any premise of the main argument.

**Step 6:** Check your work.

- ▲ Confirm that all claims relevant to the argument have been diagrammed.
- ▲ Present the argument aloud to yourself and listen for errors.

### EXERCISE 4.18

Diagram each of the following arguments using the inference indicators as your guide. Note: If you cannot tell whether the premises are linked or convergent, provide a diagram of each possibility.

1. ① accordingly ②. So ③.
2. ① for ②. Consequently, ③.
3. Assuming that ①, ②. As a result, ③.
4. ①. Thus, ② and ③.
5. ①, ②, and ③. For all these reasons, ④.
6. ① since ② and ③. Moreover, ④.
7. ① as ②. We must then conclude that ③.
8. ① and ② given that ③.
9. ① due to the fact that ② and ③. Therefore, ④.
10. There are several reasons that ①. First, ②. Second, ③. Third, ④.

### EXERCISE 4.19

Diagram each of the following arguments.

1. If this is a dinosaur, then it is extinct. Therefore, it must be a dinosaur inasmuch as it is extinct.
2. I'm certain that this tree is deciduous. First, it has leaves that don't look at all like pine needles, and, second, I think my botany professor said that we don't have evergreens around here.

3. It is important for university students to use their education to help people who never had the opportunity to go to school, since they have benefited from others who came before them. Also, making their community better will help students develop the wisdom necessary to apply their knowledge.
  4. John graduated summa cum laude from a fine university, so he should get a good job. Thus, he should be quite successful.
  5. Because Maria tore up all her credit cards, she will again be living within her means. Accordingly, she should be able to earn back an excellent credit rating.
  6. We should raise the speed limit on I-5 to 80 mph. The highway was designed for high-speed travel, and cars get better gas mileage at high speed. Besides, everyone drives that fast anyway. So, let's raise the limit.
  7. You should move to Arizona since it is much warmer. Therefore, you should give two weeks' notice at your office.
  8. You should go into teaching, for you should go into teaching if you want to help your community, and you do want to help your community.
  9. More and more people are becoming infected with HIV in underdeveloped countries, and the cost of the only effective drugs rises each year. Hence, the war on HIV/AIDS is unlikely to be won in the near future.
  10. Prohibition of alcohol didn't work, so it's pointless to try to prohibit drug use and equally pointless to try to prohibit the use of steroids and other performance enhancers.
  11. Spiders are quite beneficial to the ecosystem. As a result, you should never squash them, and you shouldn't spray poisons on them.
  12. You should consider working fewer hours while attending college full-time. Since you and your family have paid a great deal of money for your college education, you really must take your studies more seriously. Therefore, you should stop working so much.
  13. Horatio took little care of his teeth when he was a teenager, so he will probably have dental problems when he gets older. Consequently, he should always buy dental insurance.
  14. Only airplanes have wings, and everything that flies has wings, so all things that fly are airplanes.
  15. I do more work than anybody else in the shipping department, and I haven't gotten a raise in five years. Thus, I should get a raise this year.
  16. Anderson will soon be getting a raise. This is because she is likely to get a promotion since she was so successful on the Hamer project.
  17. The city zoo is heavily in debt and it is poorly managed. It follows that extreme measures must be taken. Thus, the town council should take charge right away.
  18. The European Union has a bloated bureaucracy, so it needs to resist the urge to add new member states. Hence, the vote on adding the Ukraine should be postponed.
  19. I got the new job! That means that I will be able to afford my mortgage payments, and I can start replenishing my savings account.
  20. If the Iranians really had perfected their long range missiles, then they wouldn't have needed to alter the photos of their missile tests. Therefore, the Iranians couldn't have perfected their long range missiles, since it's clear that the photos of their missile tests were altered.
-

Sepah News/Handout/  
Document Iran/Corbis



A composite of two images released by Iran's Revolutionary Guard via Sepah News show an altered photograph (left) and unaltered version, of the same long-range missile test launch, in southern Iran.

## Diagramming Extended Arguments

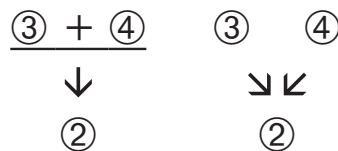
Thus far, you have considered relatively simple arguments. In this section, you will apply your diagramming skills to extended arguments. An **extended argument** contains several subarguments. Diagramming these longer arguments will not require learning any additional skills. Although these arguments may be intimidating to diagram, you will be successful if you take your time; break the passage down into smaller, more manageable parts; and pay very close attention to indicator words. Let's start with one that is only slightly longer than the arguments that you have diagrammed thus far.

*Look, if you don't get to the gate by 5:45, you will miss your flight. And, frankly, there's no way you will get to the gate by 5:45, since it's 5:40 and you haven't yet made your way through security. So, you have to accept that you will miss your flight.*

The first step is to underline and number each claim in the passage. Next, write out the argument using the numbers to replace the claims in order to focus closely on the indicator words in each sentence.

*Look, ①.  
And, frankly, ②, since ③ and ④.  
So, you have to accept that ⑤.*

Notice that the passage utilizes two inference indicators, *since* and *so*. These indicators tell you a lot about the structure of the argument before you start to examine the content of the claims. You should diagram each sentence containing indicators, starting first with “And, frankly, ②, since ③ and ④.” *Since* tells us that claims ③ and ④ are premises and that they support claim ②. Because you do not yet know whether the premises are linked or convergent, you should diagram both possibilities.



To decide which of these diagrams is correct, you must return to the content of the claims. One strategy is to imagine that one of these premises is false, and then see if the conclusion is still supported. If the conclusion follows from the remaining premise,

then the premise is independent. However, if the conclusion doesn't follow, the premise is dependent. So, imagine that ③ is false. Does claim ④—"You haven't yet made your way through security"—provide sufficient reason for concluding that "There's no way you will get to the gate by 5:45"? It does not. If the time was 5:00 instead of 5:40, you may still have plenty of time to get to the gate even if you haven't yet cleared security. This means, then, that ③ and ④ are linked premises.

### EXERCISE 4.20



**Your Turn!** Draw the correct diagram for claims ②, ③, and ④.

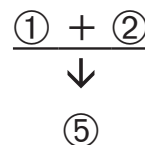
Now, turn to the other sentence in the passage with an inference indicator, "So, you have to accept that ⑤." This indicator tells us that claim ⑤ is a conclusion. "But, wait!" you might be thinking, "That means there are two conclusions!" Since there are two conclusions in the passage, ② and ⑤, one of them is likely a conclusion of a subargument, and hence, a premise of the main argument. Which of the two is the overall conclusion: "There's no way you will get to the gate by 5:45" or "You will miss your flight"? Generally, the main conclusion will appear after the intermediate conclusion in the passage. Let's check it. Does ② offer a reason for ⑤? Yes. "You will miss your flight" is the overall conclusion of the argument, and "There's no way you will get to the gate by 5:45" offers a reason to accept this conclusion.

### EXERCISE 4.21

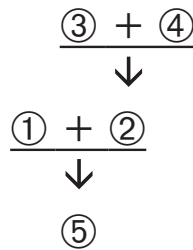


**Your Turn!** Draw the preliminary diagram for claims ② and ⑤.

Now you must consider whether ② is sufficient reason for ⑤, or whether it depends on another premise. What other premise is available? Since ③ and ④ are already premises for ②, they cannot be premises for ⑤. That only leaves ①. Is "There's no way you will get to the gate by 5:45" enough to support that "You will miss your flight"? It is not. It depends upon "If you don't get to the gate by 5:45, you will miss your flight." You can now complete the diagram of this argument.



The last steps are to put the two pieces together, and then check your work. Your final diagram should look like this.



Notice that the diagram tells us that there are two arguments: a main argument and a subargument. To check the diagram, begin with the conclusion and ask yourself whether the claim(s) pointing to it offer adequate proof. First, start with the main argument.

⑤ You will miss your flight because ① if you don't get to the gate by 5:45, you will miss your flight and ② there's no way you will get to the gate by 5:45.

This works well. Next, check the subargument.

#### EXERCISE 4.22

**Your Turn!** Check the subargument by substituting the claims represented by each number. Does it work? Why or why not?

② because ③ and ④.



Let's now try a significantly longer argument. Although its length can be quite daunting, don't panic. Remind yourself that you already have all the tools you need to successfully diagram arguments of this size and even larger.

#### EXERCISE 4.23

**Your Turn!** Highlight or circle all of the indicator words. Then, underline and number each claim in the passage.

*The Galaxy Corporation wants to build a casino in St. Louis, but we should not allow it to be built. First, gambling is immoral, since gambling is motivated by greed, and greed is an immoral desire. Second, communities with casinos have higher crime rates. This is because casinos attract people who take risks, and risk-takers are more likely to break the law. Finally, studies show that people living within 10 miles of a casino have a 90% increased risk of becoming pathological gamblers; thus, casinos encourage psychological problems for the people who live near them. For all these reasons, the proposed casino should be opposed.*



You are likely wondering, "How in the world am I ever going to tackle this? It has 10 separate claims!" The key is to pay close attention to the indicator words and to break down the argument into smaller, more manageable parts. The first step is to

rewrite the argument by substituting the assigned numbers for each claim so that you can pay closer attention to the inference indicators.

①, but ②.  
 First, ③ since ④, and ⑤.  
 Second, ⑥.  
 This is because ⑦, and ⑧.  
 Finally, ⑨; thus ⑩.  
 For all these reasons, ②.

Notice that the indicator words tell you a great deal about the structure of the argument before you even begin to examine its contents. For each sentence, you can draw a preliminary diagram using the inference indicators. Remember that whenever there are multiple premises given, you cannot tell immediately whether the premises are linked or convergent. For these preliminary sketches, you should provide all possibilities.

#### EXERCISE 4.24



**Your Turn!** Diagram the sentence.

First, ③ since ④, and ⑤.

#### EXERCISE 4.25



**Your Turn!** Diagram the sentences.

Second, ⑥. This is because ⑦, and ⑧.

#### EXERCISE 4.26



**Your Turn!** Diagram the sentence.

Finally, ⑨; thus ⑩.

#### EXERCISE 4.27

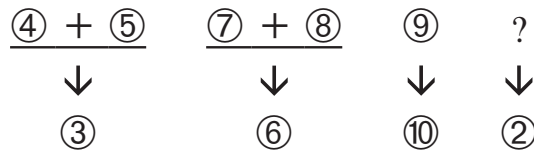


**Your Turn!** Diagram the sentence.

For all these reasons, ②.

Notice that there are four conclusions—a valuable clue that you are working with subarguments. Before trying to identify which of these four conclusions is the overall conclusion, first determine whether the premises that you have found for each conclusion are linked or convergent.

Starting with the first diagram above, do claims ④ and ⑤ work independently or do they depend upon each other to support claim ③? Now, move on to the second diagram. Do claims ⑦ and ⑧ work independently or do they depend upon each other to support claim ⑥? The third diagram has only one premise for the conclusion. Check to make sure that ⑨ can, by itself, provide support for ⑩. Your four diagrams should look like these.



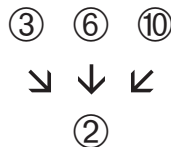
Which of our four conclusions, if any, is the overall conclusion of the argument? It should be clear to you that ② is the overall conclusion of the argument. The arguer wants to convince you that you should oppose the construction of a casino in St. Louis by Galaxy Corporation. What are the premises for this claim? To answer this question, you should identify which claims could possibly serve as premises for ②, and which cannot.

#### EXERCISE 4.28

**Your Turn!** Why can't claims ④, ⑤, ⑦, ⑧, and ⑨ be premises for ②?



Claims ①, ③, ⑥, and ⑩ are the only possibilities as premises for our overall conclusion. Let's consider each of these individually. Does ① provide a reason to accept ②? It does not. What about ③? Does it provide independent support, or does it need to be linked with another claim? What about ⑥ and ⑩? Test each one separately. You can now draw the diagram for the fourth argument. It should look like this.



#### EXERCISE 4.29

**Your Turn!** Put the four arguments together in a single diagram of the entire extended argument.





Finally, you can complete the last step of the diagramming technique—to check your work! First, check the main argument. There are three independent premises for our conclusion, so you should treat each as a separate argument.

- ② We should not allow the Galaxy Casino to be built in St. Louis  
because ③ gambling is immoral.
- ② We should not allow the Galaxy Casino to be built in St. Louis  
because ⑥ communities with casinos have higher crime rates.
- ② We should not allow the Galaxy Casino to be built in St. Louis  
because ⑩ casinos encourage psychological problems for the people that live near them.

After checking the diagram, you should be able to see that each of these premises does offer independent support for the conclusion. Now you can check the subarguments.

### EXERCISE 4.30



**Your Turn!** Rewrite each of the three subarguments by substituting in the claims represented by each number.

- ③ because ④ and ⑤.  
⑥ because ⑦ and ⑧.  
⑩ because ⑨.

What about claim ①? We should not include it in the argument diagram. Why? Claim ① does not support any claim in the passage nor does any other claim support it; thus, it does not appear in the diagram, even though it is a claim.

### EXERCISE 4.31

Diagram each of the following arguments.

1. You are going to end up on academic probation. Why? Because you are going to the party tonight, and if you go to the party tonight, you will end up on academic probation, in that you won't have time to finish your term paper.
2. Without a tax increase, community college tuition will go up again. But the governor refuses to raise taxes inasmuch as he promised voters that he wouldn't when he ran for election. For these reasons, we'll be paying more to go to school next year.
3. You won't graduate this year unless you complete senior seminar. Accordingly, you won't graduate since you can't complete senior seminar. After all, you didn't even enroll in it!
4. The Purdue football team beat Notre Dame in 2007; they beat Florida State in 2008; and they beat UT in 2009. They will certainly beat Gonzaga in 2010.
5. Pteranodons are not Hadrosaurs. This follows from the fact that if Pteranodons are Hadrosaurs, then Corythosaurus would have horns, and Corythosaurus doesn't have horns. Therefore, since Stygimoloch have horns if Pteranodons are not Hadrosaurs, it must be that Stygimoloch have horns.

6. Portugal is a country, and all countries are on a map. Hence, Portugal is on a map. Assuming that all things on a map can be identified by satellite, Portugal can be identified by satellite.
7. We won't have good government unless qualified people are elected. This proves that we won't have good government, for no good people are elected. If we don't have good government, then life will be harder, so it appears that life will be harder.
8. Given that clowns perform in rodeos, we can conclude that they get paid. This is because anyone who performs in a rodeo gets paid. This entails that clowns should pay taxes, in view of the fact that if clowns get paid, we should make them pay taxes.
9. Tomas will be left behind if he forgets to make reservations, and he probably will forget to make reservations. As a result, it's very likely Tomas will be left behind. Besides, he is always spacing out, and people who space out usually get left behind.
10. There are three strong reasons you should vote to re-elect the governor in the next election. First, she has done an excellent job of balancing the state budget. Second, she is trustworthy, due to the fact that the policies that she has recommended and supported are those she promised to support during her election campaign. Finally, she has vowed to defeat any attempt by the legislature to increase university tuition costs.
11. Because Jack has started the Atkins diet, and people on the Atkins diet lose lots of weight, it follows that Jack will lose lots of weight. And anyone who loses lots of weight is likely to get a date. So you know what that means for Jack, don't you?
12. If George marries Sally, he will be ecstatic. George will marry either Sally or Sue. But there is no way he is going to marry Sue. As a result, he will marry Sally, and we can conclude that he will be ecstatic.
13. All self-employed workers are professionals. Beauticians are self-employed; hence, they are professionals. Now, all professionals need licenses. This proves that beauticians need a license.
14. The CEO of American Paper Products, Inc., said that his company would stop harvesting old growth forests only if doing so threatened the habitat of an endangered species. But, harvesting old growth forests does not threaten the habitat of an endangered species. Of course, you know what that means. In addition, if American Paper Products does not stop harvesting old growth forests, then environmental activists will sabotage their operations. From all of this it follows that environmental activists will sabotage their operations.
15. Good afternoon, ladies and gentlemen of the jury. It is evident that my client, Janie Jacobson, is not guilty of kidnapping Prince Michael Jackson. Since Prince Michael was taken from his mansion in the Hamptons on December 20, 2010, Ms. Jacobson could not be guilty of kidnapping him if she was in Las Vegas at that time. And she was in Las Vegas on that day, as is evidenced by the casino surveillance footage.
16. Don't get Lonnie a dog! Look, he is not responsible, as he has shown by not caring for his things. And anyway, we don't have enough money to provide food and medical care for a dog in view of the fact that even now we have trouble making ends meet. This is true because last week you yourself complained about getting all the bills paid, and you never complain without a really good reason.

17. We should legalize prostitution in Portland. Legalized prostitution will create new job prospects for many of our city's unemployed residents. Legalized prostitution will also generate new revenue for the city due to the fact prostitution is currently illegal and the city cannot collect taxes on income that is earned illegally. Finally, legalizing prostitution can help stimulate the local economy in that tourists from neighboring cities will spend their money at local restaurants and other local businesses when they come to Portland to visit prostitutes.
18. If your children watch a lot of television, then they are more likely to believe in racial and gender stereotypes. You don't want your children to believe these harmful stereotypes, so you should turn off the television more often. Besides, if you limit the amount of TV your children watch, then they are more likely to engage in constructive activities, and I know you want your children to engage in more constructive activities.
19. It was Maggie Simpson who shot Mr. Burns last night. How do I know? Well, obviously Mr. Burns was shot by one of the Simpsons—Homer, Marge, Bart, Lisa, and Maggie—because they are the only people that have a vendetta against Burns. And, there's no way that Homer or Marge could have done it. After all, they were at a marriage retreat at Catfish Lake, and Catfish Lake is 200 miles from where the crime took place. It also could not have been Bart or Lisa since they were visiting their aunts Patty and Selma last night. Besides, they were watching *The Itchy and Scratchy Show* at the time Burns was shot. That means that Maggie must have been the shooter.
20. It's clear that Miguel will be chosen for the lead in the upcoming musical production of *Cyrano de Bergerac*, because only theater students are eligible for lead roles, and there are currently only six theater students interested. But, why must the role go to Miguel? Well, it can't be either of the two female theater students since the lead is for a male role. It also can't be Steven or Dudley in view of the fact that neither of them can dance, and there's no way that they can learn to dance in time for the auditions. Finally, it can't be Richard for the reason that he has a terrible voice. In conclusion, it must be Miguel who will be starring in *Cyrano*.

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### EXERCISE 4.32

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Diagram each of the following arguments.

1. Severe hurricanes will not develop unless the ocean water is warm. Accordingly, severe hurricanes won't develop this season as the ocean water is not expected to be warm. Consequently, those who live in "hurricane alley" will breathe easier this year.
2. Given that the battle of the Somme took place in World War I, we can conclude that it occurred around the time of the Russian Revolution. This is because whatever took place in World War I occurred around the time of the Russian Revolution. Consequently, the battle of the Somme took place in the 20th century, since if the battle of the Somme occurred around the time of the Russian Revolution, then the battle of the Somme took place in the 20th century.

3. George won't be happy unless Peabody is elected. But Peabody won't get elected, since he is not on the ballot; so you can see for yourself what will follow from that. Now if George is unhappy, then Grace will be unhappy, too. Thus, it is clear that Grace will be unhappy.
4. Since Europeans were divided in the 1930s, and anytime Europeans are divided it will become a "dishonest decade," we can conclude that the 1930s were a dishonest decade. And a dishonest decade is liable to cause trouble in the long run. Thus, the results of the 1930s are obvious.
5. Precipitation is not sunshine. This is due to the fact that if precipitation were sunshine, then humidity would be dry, and humidity isn't dry. So, given that the vernal equinox is in the fall if precipitation is not sunshine, it must be that the vernal equinox is in the fall.
6. Benzene is a hydrocarbon, and all hydrocarbons are volatile organic compounds. Therefore, benzene is a volatile organic compound. Because all volatile organic compounds can be harmful to human health when released into the atmosphere, benzene can be harmful to human health when released into the atmosphere.
7. If meteorites are the rarest materials found on Earth, then they are the oldest things humans have touched. Either meteorites are the rarest materials found on Earth or flawless diamonds are the rarest, and diamonds aren't the rarest things found on Earth. Therefore, meteorites are the rarest things found on Earth and, consequently, are the oldest things humans have touched.
8. All opiates are pharmaceuticals. Vicodin is an opiate, so it is a pharmaceutical. Now, all things that are pharmaceuticals require a prescription. So, vicodin requires a prescription.
9. Infants may be programmed for fear. Thus, they will feel fear even without being taught about what is dangerous, because a programmed emotional response requires no teaching. And if infants feel fear even without being taught about what is dangerous, then parents need not be surprised when children express separation anxiety. Consequently, parents need not be surprised by children's separation anxiety.
10. Otto von Bismarck will unite Germany if he can keep Prussia dominant, and he probably can keep Prussia dominant. Accordingly, it is very likely that Otto von Bismarck will unite Germany. Moreover, he will be able to promote trade and growth, and any leader able to promote trade and growth will be able to unite Germany.
11. The teeth of a recently discovered species of dinosaur known as *Asilisaurus kongwe* suggest that it evolved from a meat eater to a plant eater. Since an ecosystem can support far more plant eaters than meat eaters, the ability to eat plants may have allowed this dinosaur a wider range of areas in which to survive. Thus, it's possible that this shift conferred an evolutionary advantage.
12. If both parents carry a gene for a serious hereditary disorder, then it is likely that the child will develop that disorder. Since both my husband and I carry the gene for a serious hereditary disorder, our child is likely to develop this disorder. Given that genetic counseling helps people make decisions about what to do in cases where children are likely to inherit serious genetic disorders, we should consider getting genetic counseling.

13. If art is something that any person can learn to appreciate, then art must be able to be judged by an objective measure. Now it's unlikely that art can be judged by an objective measure, given that what is called art varies so widely, so art must not be something that any person can learn to appreciate. Besides, if merely a few people get an emotional feeling from art, then art must not be something that people can learn to appreciate, and only a few people can get an emotional feeling from art.
14. All reasoning creatures have a self-concept, and children are reasoning creatures. You can see what follows from that, I'm sure. Now, since any creature with a self-concept has desires and preferences, it's clear that children must have desires and preferences.
15. Who ate the last slice of cheesecake from the office workroom? Well, there's no doubt that it had to be one of the office workers, since only they have keys to the workroom. But, it couldn't have been any of the secretaries. After all, they are all on low-fat diets. It also couldn't have been any of the custodians, because they are on vacation this week. This all proves that the last slice of cheesecake must have been eaten by one of the members of the management team—CEO Jackson or President Gamboa. But there's no way President Gamboa would have eaten the cheesecake, since he's diabetic. We can conclude that it had to be CEO Jackson.

### Putting it All Together: A Basic Analysis with Argument Diagram

In Chapter 3, you learned how to complete a Basic Analysis of an argument in paragraph form. Now that you also know how to diagram arguments, you can include an argument diagram with your Basic Analysis when the passage you are analyzing is an argument. That means that if the passage is an explanation or some other non-argument, you will not include a diagram.

#### Directions for Basic Analysis with Argument Diagram

In *paragraph* form, use complete sentences and proper English grammar and spelling to do the following:

**Step 1:** Write a Basic Analysis of the passage. (You may want to refer to the Directions for Basic Analysis, Chapter 3, page 49.)

**Step 2:** If the passage contains an argument, diagram it and verify that the diagram is consistent with your Basic Analysis.

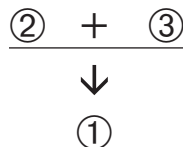
The most important thing for you to remember when completing a Basic Analysis of an argument is that the information in your analysis must be consistent with your diagram. That means that if your diagram shows two premises for the conclusion, then there must be exactly two premises identified in your analysis. It also means that if your diagram shows there are two subarguments, your analysis must include three paragraphs: one for the main argument and one for each of the subarguments. Additionally, the premises in the subargument(s) should not be included in the first paragraph since they are not premises for the main conclusion.

Let's look at a couple of examples before you try some on your own.

*The suspect should be released from police custody immediately. There is no evidence that she committed a crime, and a person can only be detained if there is evidence that he or she committed a crime.*

First, identify this passage as an argument, an explanation, or neither. It has three claims, one of which is supported by the others, so it must be an argument or an explanation. Does the passage attempt to prove some claim, or does it explain a claim that is already accepted as true? It attempts to prove that "The suspect should be released from police custody," and it offers two premises to support this conclusion, namely that "There is no evidence that she committed a crime" and "A person can only be detained if there is evidence that he or she committed a crime." Are these premises linked or convergent? Because the premises depend upon each other to support the conclusion, the argument diagram and Basic Analysis should appear as follows.

- ① **The suspect should be released from police custody immediately.**  
 ② **There is no evidence that she committed a crime, and** ③ **a person can only be detained if there is evidence that he or she committed a crime.**



**This passage contains an argument. The issue is whether the suspect should be released from police custody immediately. The conclusion is that the suspect should be released from police custody immediately. The first premise is that there is no evidence that the suspect committed a crime. The second premise is that a person can only be detained if there is evidence that he or she committed a crime.**

Notice that the diagram and analysis match exactly. The claim identified in the diagram as the conclusion is the same claim identified as the conclusion in the analysis, and the claims identified as the premises in the diagram are the same claims identified as the premises in the analysis.

Let's try another.

*Your Honor, my client, Ms. Cromwell, should be released from police custody immediately. This is because there is no evidence that she committed a crime due to the fact that her DNA doesn't match the sample collected at the scene of the crime.*

First, identify this passage as an argument, an explanation, or neither. It is an argument attempting to prove that "Ms. Cromwell should be released from police custody." What premise(s) are offered for this conclusion? Notice that the second sentence contains two premise indicators: *this is because* and *due to the fact that*. They signal that there is a subargument. The argument diagram and Basic Analysis should appear as follows.

*Your Honor, ① my client, Ms. Cromwell, should be released from police custody immediately. This is because ② there is no evidence that she committed a crime due to the fact that ③ her DNA doesn't match the sample collected at the scene of the crime.*

③



②



①

This passage contains an argument. The issue is whether Ms. Cromwell should be released from police custody immediately. The conclusion is that Ms. Cromwell should be released from police custody immediately. The premise is that there is no evidence that Ms. Cromwell committed a crime.

This passage contains a subargument. The intermediate conclusion is that there is no evidence that Ms. Cromwell committed a crime. The premise is that Ms. Cromwell's DNA doesn't match the sample collected at the scene of the crime.

Notice that the diagram and analysis match perfectly. The diagram shows that there are two arguments, and the analysis provides two paragraphs, each analyzing one of the arguments. Also notice that the premise of the subargument is only identified in the analysis of the subargument; it is not included in the first paragraph since it is not a premise for the main conclusion.

### EXERCISE 4.33

Complete a Basic Analysis with an argument diagram (when appropriate) for each of the following passages.

1. The recent study concerning the health consequences of diabetes drugs for young people is not to be believed. This is because the survey was flawed given that the sample size was too small.
2. Look, Natalie. Since you want to save more money, you should open a money market account at the bank, and you should cancel all of your credit cards.
3. It is interesting to note that the number of children with severe disabilities is on the rise. Some screening and early intervention have led to a reduction in causes, but the number of children being born exposed to drugs and alcohol is increasing. In addition, medical advances have also resulted in more high-risk and low-birth-weight babies surviving and living longer.—Vaughn, Bos, and Schumm, *Teaching Exceptional, Diverse, and At-Risk Students*
4. Good compost makes any garden better, and yours needs all the help it can get.



5. Capital punishment, also referred to as the death penalty, is the lawful infliction of death as a punishment. Currently 36 states in the United States have death penalty statutes. Out of the five methods legalized, lethal injection is the method used most often.
6. I've noticed that Michael is becoming quite brawny. Clearly he is taking steroids again.
7. Should the Food and Drug Administration (FDA) continue to allow direct-to-consumer advertising of prescription drugs? Absolutely not! Direct-to-consumer prescription drug ads, like all advertisements, are aimed at selling a product, and we all know that advertisers notoriously use tactics that manipulate, create false impressions, and otherwise mislead consumers.
8. Gestational diabetes is a form of diabetes that appears in pregnant women, but goes away after delivery. "Gestational diabetes has increased over the past few decades because more women have problems with obesity prior to becoming pregnant," says Mark Landon, Professor of Obstetrics and Gynecology at Ohio State University College of Medicine.
9. Many people say they aren't very good with shape or that they have poor spatial sense. The typical belief is that you are either born with spatial sense or you are not. This simply is not true! We now know that rich experiences with shape and spatial relationships, when provided consistently over time, can and do develop spatial sense.—John A. Van De Walle, *Elementary and Middle School Mathematics*
10. The detective couldn't have been the one who leaked the DNA information to the press. If he had done so, he would have been undermining his own case. And, you don't think he would undermine his own case, now, do you?
11. Thousands of people have reported sightings of UFOs, so UFOs must exist, since it is impossible that all of those thousands of people are crazy or lying. Consequently, we aren't the only intelligent beings in the universe, given that UFOs can only have been created by highly intelligent beings.
12. If we want to produce excuses for lying to someone, these excuses should be capable of persuading reasonable persons, not merely some particular public locked in hostility to a particular group.—Sisela Bok, *Lying*
13. We need to stop eating fast food. Fast foods contain lots of chemical additives such as aspartame and MSG (monosodium glutamate), and studies show that these chemical additives lead to obesity, and obesity leads to many serious health diseases. Besides, fast foods have little nutritional value, so let's just stop eating them altogether.
14. If, like truth, the lie had but one face, we would be on better terms. For we would accept as certain the opposite of what the liar would say. But the reverse of truth has a hundred thousand faces and an infinite field.—Montaigne, *Essays*
15. Some children are *mastery oriented*: they attribute their successes to their high ability but tend to externalize the blame for their failures ('That test was unfair'), or attribute them to unstable causes that they can easily overcome ('I'll do better if I try harder'). These students are called 'mastery oriented' because they persist in the face of failure, believing that their increased effort will allow them to succeed.—Schaffer and Kipp, *Developmental Psychology: Children and Adolescents*



### Chapter Review Questions

1. What is an argument diagram?
2. What is the purpose of an argument diagram?
3. What lessons from Chapter 2 do you need to remember when identifying claims in a passage?
4. How can you tell the difference between premises that are independent and those that are dependent on one another?
5. How does the diagram for premises that are convergent differ from one with linked premises?
6. What does the arrow mean in an argument diagram?
7. Why are inference indicators so important when diagramming arguments?
8. How do you diagram arguments with implied claims and unstated conclusions?
9. What is a chain argument?
10. Why is it so important to check your diagram? How do you do so?
11. What are the six steps to diagramming an argument?
12. What is an extended argument?

# Detecting Fallacies

## CHAPTER 5

We started this book with a discussion about whether to support the Smoke-Free Campus Initiative. Among the arguments presented is one we identified as committing a fallacy.



Andrew Rich/vistockphoto

**Veronica says** Are we living in a fascist state now??? The only people who would support this are uptight nonsmokers who want to take away my freedom to express myself and enjoy life. I know smoking is bad for me, but it's my choice!

When you first read this argument in Chapter 1, you may have realized that something isn't quite right with it. In this chapter, you will learn exactly what has gone wrong with this argument as well as other arguments that commit fallacies. A **fallacy** is a mistake in reasoning of some sort, one that is rhetorically persuasive, but that on closer inspection is a bad argument. There are many different ways that an argument can go wrong, and learning to detect fallacious reasoning is an important part of critical thinking, because such mistakes are notoriously common and easily overlooked. In this chapter, you will learn about six of the most common fallacies. In later chapters you will learn how to recognize other common mistakes in reasoning, which are often taken for good arguments.

### Begging the Question

The fallacy of **begging the question** occurs when the conclusion of an argument is assumed by the argument's premises. Although technically the conclusion of the argument must follow if the premises are true (after all, the conclusion is in the premises), an argument that begs the question isn't much of an argument at all. It states, in effect, that "some claim is true because that claim is true." This kind of argument is fallacious because it offers no evidence for its conclusion. The premise doesn't offer a reason to accept the truth of the conclusion; it merely restates it. Consider this example.

*Healthcare reform in the United States will not work since our healthcare system simply cannot be reformed.*

Using the skills you learned from Chapter 3, let's take a closer look at this argument using a Formal Analysis.

**P:**     Our healthcare system cannot be reformed.  
**∴**     Healthcare reform in the United States will not work.

**Issue:** Whether healthcare reform in the United States will work

Notice that the premise does not offer a reason to accept that the conclusion is true. Instead, it offers a restatement of the conclusion in a different sentence. To say that our healthcare system cannot be reformed is just another way of saying that healthcare reform in our country will not work. The mistake in this argument is particularly clear if you attempt to diagram it.

① Healthcare reform in the United States will not work since ① our healthcare system simply cannot be reformed.

①

↓

①

Recall from Chapter 2 that an argument is a set of claims, one of which is supported by the other, and that different sentences can express the same claim. Given that the two sentences in this passage express the same claim, this passage contains only one claim. This means that it doesn't really qualify as an argument at all.



**Hint!** You may be familiar with the phrase *begs the question* from everyday speech. Often when someone says, "That begs the question . . .," he or she means that there is some unanswered question that needs to be addressed. This should not be confused with the fallacy of begging the question.

Although sometimes it is easy to spot arguments that beg the question, most cases of question begging are not as obvious as in the previous example. Arguers may disguise the conclusion in a premise by using synonyms for terms used in the conclusion. Consider this example.

*I just can't believe it! Nick Newman can't be guilty of murder since there's no way Mr. Newman could kill someone.*

Let's first present a Formal Analysis of the argument.

**P:**     There is no way Mr. Newman could kill someone.  
**∴**     Mr. Newman is not guilty of murder.

**Issue:** Whether Mr. Newman is guilty of murder

In this passage, the defense attorney wants to convince the jury that Nick Newman is not guilty of murder, and offers as a premise the claim that Nick Newman couldn't be a killer. However, since the issue is *whether* Nick Newman is guilty of killing someone, the premise assumes that the issue has been resolved. The arguer commits the fallacy of begging the question by substituting the term *kill* for *murder*. As it stands, this is a lousy argument. There are no reasons offered for accepting the claim that Mr. Newman is not guilty of murder. Instead, the defense attorney simply restates the conclusion in a different sentence.

### EXERCISE 5.1

**Your Turn!** Why are arguments that beg the question bad arguments?



### EXERCISE 5.2

For each of the following, complete a Formal Analysis of the argument. Then, determine whether the argument commits the fallacy of begging the question.

1. It's clear that smoking is bad for you because it is so harmful to your health.
2. Smoking is bad for you because it causes lung cancer, heart disease, stroke, and other cardiovascular diseases.
3. No, I do *not* believe that serial killers ought to be allowed to live. They have forfeited their right to live because anyone who kills lots of people has lost that right.
4. We need to apply the death penalty for all violent murderers. This is because death is the only way to make sure that these dangerous criminals never hurt another person.
5. James is a murderer because he wrongfully killed someone.
6. James is a murderer because he has been shown to have motive, opportunity, and no alibi for the time when the murder took place. Besides, his fingerprints are all over the murder weapon.
7. Adultery cannot be justified. The reason is that it is simply never acceptable for a married person to have sex with someone who is not his or her spouse.
8. Adultery is always wrong. This is because it breaks a promise made to one's spouse at the time of marriage. It also undermines the nuclear family, which is the foundation of our civilization.
9. A psychology course should be required of all college students, because obviously every university student should have to take at least one course in psychology.
10. An anatomy course should be required of all college students, because obviously every university student should know how the body works.

## Appeal to Ignorance

The **appeal to ignorance** fallacy is committed when the arguer illegitimately shifts the burden of proof. An appeal to ignorance argument states, in effect, “I am right, because no one has proven otherwise.” This kind of argument is fallacious because it offers no evidence for its conclusion. The fact that your conclusion hasn’t been proven false does not establish that it is true. To convince someone that your conclusion is true, you must offer reasons for that conclusion; otherwise, you won’t convince anyone of anything.

Consider this example.

*Clearly, God exists. After all, atheists have never proven that there is no God.*

Here is the argument presented formally.

**P:**     Atheists have not proven that God does not exist.  
**∴**     God exists.

**Issue:** Whether God exists

Notice that we could easily provide a comparable argument for the opposite conclusion.

*No one has ever proven that God exists; therefore, God does not exist.*

Here is the argument presented formally.

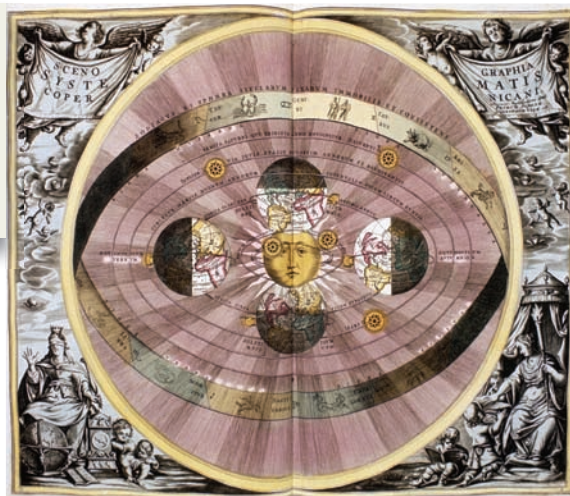
**P:**     No one has ever proven that God exists.  
**∴**     God does not exist.

**Issue:** Whether God exists

The first argument concludes that God exists, and the second concludes that God does not exist. Notice that both of these arguments deal with the same issue, namely whether God exists. Also notice that neither of these arguments are good arguments; neither offers reasons to support its conclusion. Instead, they both illegitimately shift the burden of proof to the other side of the issue. Thus, they are both examples of a fallacious appeal to ignorance. If you want to prove that some claim is true, you must supply evidence for it.

Identifying who has the **burden of proof** with regard to an issue is the first step in determining whether the argument commits the appeal to ignorance fallacy. This can sometimes be tricky. Generally speaking, anyone trying to establish the truth of a claim has the responsibility to offer reasons for that claim. This burden of proof is placed on the arguer, even when the arguer’s conclusion is a true claim. Consider the case of Galileo, the famous philosopher, astronomer, and

A depiction of the Copernican system by Andreas Cellarius (1661) showing the heliocentric (sun-centered) view of the universe.



Photos.com/Jupiter Images

mathematician. When he offered support for the *heliocentric* view of the universe (the view that Earth orbited around the sun), Galileo had the burden of proof. At the time, pretty much every other philosopher and astronomer, as well as the powerful Catholic Church, accepted the *geocentric* view of the universe (that the sun orbited around Earth). To establish his claim that Earth orbited the sun, and not the other way around, Galileo had to offer evidence (which he did in his *Dialogue Concerning the Two Chief World Systems*, published in 1632). Imagine if instead of offering reasons to support his view, Galileo had given the following argument.

*There should be no doubt that our glorious Earth, full of life, encircles the blazing sun, perched at the center. After all, no astronomer has ever adequately established the contrary.*

### EXERCISE 5.3

**Your Turn!** Complete a Formal Analysis of the previous argument.



Even though this conclusion is true, the argument commits a fallacious appeal to ignorance. The failure of an opponent to prove that your belief is wrong is no evidence that you are right. If you want your reader to accept your conclusion, you must offer reasons to do so.

There are some cases in which an argument resembling an appeal to ignorance does not commit a fallacy. (That is why we say that the appeal to ignorance fallacy occurs when the arguer *illegitimately* shifts the burden of proof.) When the burden of proof does not lie with the arguer, the fallacy is not committed.

Consider, for example, this courtroom speech.

*Ladies and gentlemen, the district attorney has not provided a shred of evidence of my client's guilt. Therefore, you must declare the defendant "not guilty" of the charges.*

In this example, the arguer claims that the defendant is "not guilty" of the charges on the basis that the defendant's guilt has not been established. Let's examine the argument formally.

- P:**     The district attorney has not proven that the defendant is guilty.  
**∴**     The defendant should be declared not guilty.

**Issue:** Whether the defendant should be declared guilty

Although the arguer is saying, in effect, "You should accept my conclusion as true because it hasn't been proven false," this argument does not commit a fallacy. This is because in criminal proceedings all defendants are presumed innocent until proven guilty; the burden of proof always lies with the prosecution. In this way, when we say that a defendant should be declared "not guilty," what we mean is that his or her guilt has not been proven, not that he or she is innocent.

## EXERCISE 5.4



**Your Turn!** When is an argument that shifts the burden of proof to the other side not a fallacy?

## EXERCISE 5.5

For each of the following, complete a Formal Analysis of the argument. Then, determine which side has the burden of proof. Finally, decide whether the arguer has committed the fallacy of appeal to ignorance.

1. Of course you should buy a life insurance policy! Why shouldn't you?
2. Look, you can't prove that extraterrestrials don't exist. So, that means that they are real!
3. Should the Ten Commandments be engraved onto the courthouse? Certainly. Why shouldn't they?
4. Angelina Jolie and Brad Pitt are having marital problems. After all, they haven't publicly denounced the magazine reports about their fights.
5. After-death experiences are a reality. Despite years of attempts at debunking, no one has ever been able to show that reports from beyond the grave are all due to error, deception, or wishful thinking.
6. Rape was extraordinarily rare in the American West in the nineteenth century. You can argue that it simply wasn't reported, but I've never seen evidence of that.
7. It's clear that Santa Claus exists. Every Christmas Eve, the cookies and milk we leave for Santa are eaten and packages are under the tree that weren't there when we went to bed.
8. Listening to music on headphones is harmful to your hearing. After all, no one has shown evidence that headphones promote healthy ears!
9. The governor is clearly guilty of lying to his constituents about not providing high paying government jobs for his cronies. Not once has he shown that he was telling the truth.
10. Ghosts don't exist, because if they did, they would exist outside the boundaries of the universe science describes, and nothing can live outside those boundaries.

The fallacies of begging the question and appeal to ignorance are closely related. They both fail to do what arguments should do, namely offer reasons in support of a conclusion. Arguments that commit the fallacy of begging the question fail to offer reasons by simply restating the conclusion, typically in a disguised fashion. Arguments that commit the fallacy of appeal to ignorance fail to offer reasons by illegitimately shifting the burden of proof. The templates for these fallacies are described below, using *C* to symbolize the claim that is offered as the conclusion and the symbol  $\sim$  to represent the rejection of a claim.

**Begging the Question**

P: C  
 $\therefore$  C

**Issue:** Whether C is true

**Appeal to Ignorance**

P:  $\sim$  C hasn't been proven  
 $\therefore$  C

**Issue:** Whether C is true

**EXERCISE 5.6**

For each of the following, complete a Formal Analysis of the argument. Then, determine whether the argument commits the fallacy of begging the question, the fallacy of appeal to ignorance, or no fallacy is committed.

1. The government should not let the deficit rise, because it would be bad to let it get any higher.
2. If you don't eat your meat, you can't have any pudding. Because, how can you have any pudding, if you don't eat your meat?—Pink Floyd, "Another Brick in the Wall"
3. Australian shepherds must be the easiest dogs to train, because no one has ever shown that another kind of dog is easier.
4. Learning by memorization is an extremely effective way to learn. Has anyone ever shown a better way? The answer is no.
5. People with cases of the flu should be kept in quarantine, because it's never been disproven as the best means of keeping the disease from spreading.
6. It's clear that my child is smart, because he is so intelligent.
7. My child is clearly smart enough to do well in school, since he scored above average on the IQ test last year.
8. The senator must be taking illegal campaign contributions from wealthy donors because he has never disclosed documents to show that his campaign donations are legal.
9. You should believe what the palm reader tells you, since no one has ever shown that her readings aren't accurate.
10. Older siblings can be a good source of emotional support for the younger ones. This is because the bigger brothers and sisters can help the little ones with their feelings.

**Appeal to Illegitimate Authority**

Since it is impossible for any one person to have knowledge about every subject, we commonly appeal to authorities to confirm or disconfirm claims, or to determine the best course of action. For example, when your car is not running properly, you rely on the expertise of a mechanic to diagnose the problem and return your car to working order. When you disagree with your housemate about the year that the Treaty of Versailles was signed, you rely on the authority of your history textbook, or perhaps the *Internet Encyclopedia of History*. Notice that, in these cases, your best bet is to trust someone who is an expert on the subject in question. You do not ask your history



professor about auto repair, and you do not ask your auto mechanic for a lesson in European history. An argument that appeals to authority states, in effect, “You should accept this claim because an expert said it.” This kind of argument commits the fallacy of **appeal to illegitimate authority** when the referenced authority is not an authority on the subject in question.

The use of illegitimate authorities is notoriously prevalent in advertising. Famous athletes, musicians, and other celebrities regularly endorse products and political campaigns for which they have no expert knowledge. Consider this famous 1986 example featuring actor Peter Bergman, well-known to audiences for playing Dr. Cliff Warner in the daytime drama *All My Children*.

*I’m not a doctor, but I play one on TV. If your child had a cough, she would get just what the doctor ordered. But for your cough, you play doctor at home, even playing doctor with the medicine you bought for your child. You need one of the adult formulas from Vicks, for the coughs that adults get, with the strength adults need. Formula 44 for coughs. Formula 44D for coughs with congestion. Formula 44M for coughs with congestion and a raw, irritated throat. The adult formulas. You can’t buy anything more effective.*

Now, imagine you are talking with your grandmother on the phone and after hearing you cough, your grandmother offers the following argument using Peter Bergman as an authority.

*Honey, you should use Vicks Formula 44, since that handsome fella who plays Dr. Warner says it’s the best.*

Let’s examine the argument formally.

**P:** Peter Bergman says that Vicks is the best treatment for a cough.  
**∴** You should use Vicks cough medicine when you have a cough.

**Issue:** Whether you should use Vicks cough medicine when you have a cough

This is a clear example of an argument that commits the fallacy of appeal to illegitimate authority. Although it is appropriate for someone to rely on a physician’s expertise when choosing medicine to treat his or her illness, it would be foolish to rely on the testimony of an actor, even one who plays the role of a doctor. Of course, even legitimate experts can be wrong, and they often disagree with each other. But, if someone has no more expertise than you do on a particular issue, his or her word is not a good enough reason to accept his or her conclusion.

Note that in arguments that appeal to authority, the authority’s testimony substitutes for reasons in support of the conclusion. This means that the credibility of the authority is essential to the argument. If the authority is, in fact, an expert on the subject in question and is likely to be unbiased, then his or her testimony is credible. However, if the cited authority is not an expert on the subject in question, then his or her testimony is not credible, and the argument commits the fallacy. Compare the previous fallacious argument from your grandmother to this legitimate appeal to authority from your mother.

*That cough of yours sounds really bad. You should take Vicks Formula 44 since that’s what your primary care physician recommends.*

## EXERCISE 5.7

**Your Turn!** Provide a Formal Analysis of the previous argument.



Although arguments that appeal to an illegitimate authority are fallacious, this does not mean that all arguments given by non-experts are fallacies. Consider this example from a commercial against a 2008 Washington State ballot measure.

*Hello. I'm Martin Sheen with a message about Initiative 1000. It's a dangerous idea that could be imposed on the poor, disabled, and most vulnerable in our society. Initiative 1000 tells doctors that it's ok to give a lethal drug overdose to a seriously ill person even if they are suffering from depression. Additionally, your spouse could die by assisted suicide and you wouldn't have to be told. People who are ill need real medical care and compassion, not lethal drugs. I'm Martin Sheen, and I'm urging you to vote "no" on Initiative 1000. Thank you.*

Like your grandmother's argument for using Vicks, this argument also involves a celebrity endorsement, namely one provided by an actor who played a U.S. president. However, when you perform a Formal Analysis on Martin Sheen's argument, you can see an important difference between the two arguments.

- P1:** Initiative 1000 could be imposed on the poor, disabled, and most vulnerable in our society.  
**P2:** Initiative 1000 allows doctors to give a lethal drug overdose to seriously ill persons even if they are suffering from depression.  
**P3:** Initiative 1000 allows a person to die by assisted suicide without informing his or her spouse.  
 $\therefore$  You should not vote for Initiative 1000.

**Issue:** Whether you should vote for Initiative 1000



Actor Martin Sheen is well-known for his role as President of the United States on *The West Wing* television series.

Unlike your grandmother's Vicks argument, this argument does not appeal to authority. Although a famous actor, Martin Sheen, is the speaker, he does not use his testimony as a substitute for reasons in support of a conclusion.

### EXERCISE 5.8

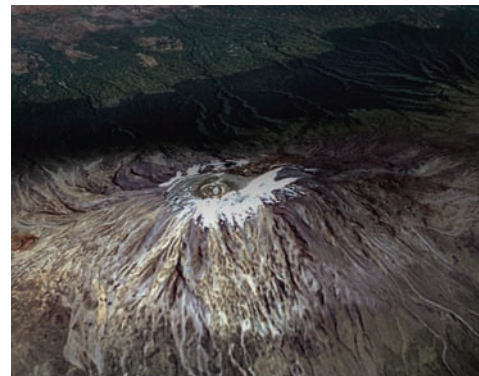


**Your Turn!** How can you determine when an argument that specifies the identity of the speaker appeals to authority?



**Hint!** On many important issues, those who are experts on the subject in question disagree. Take, for example, the topic of global warming. There has been considerable debate in the United States media over whether the documented rise in global temperatures over the past 200 years is attributable to human activities. Although a large majority of scientists finds evidence that global warming is a result of human influence as evidenced in statements by national science academies and other bodies, there are many individual scientists who disagree. These dissenters include experts on the subject in question: people with degrees and careers in the fields of geography, geology, chemistry, meteorology, astronomy, physics, environmental science, climatology, and so on. On topics like this, in which experts disagree, it is all the more important that reasons be given to support conclusions rather than relying on appeals to authority.

Satellite images from NASA's Earth Observatory show Tanzania's Mount Kilimanjaro on February 17, 1993 (left) and February 21, 2000.



Nasa/AFP/Newscom

### EXERCISE 5.9

For each of the following, complete a Formal Analysis of the argument. Then, determine whether the argument commits the fallacy of appeal to illegitimate authority.

1. Vitamin water must be a great, healthy alternative to sodas. After all, I saw rapper 50 Cent drinking it in a commercial.

2. Harald zur Hausen, winner of the 2008 Nobel Prize in Medicine, says that the human papilloma virus (HPV) is the leading cause of cervical cancer. So, you should consider getting screened for HPV during your annual gynecological exam.
3. Dow Constantine, who is running for King County Executive in this November's election, was publicly endorsed by the rock band Pearl Jam. Therefore, Mr. Constantine must be the best candidate for the job.
4. Dr. Bradshaw, our family physician, has stated that the creation of muonic atoms of deuterium and tritium holds the key to producing a sustained nuclear fusion reaction at room temperature. In view of Dr. Bradshaw's expertise as a physician, we can conclude that this is indeed true.
5. According to the Centers for Disease Control (CDC), getting the seasonal flu vaccine is one of the best means of protection from the influenza virus. Sounds to me like a good reason to get vaccinated!
6. Aldous Huxley, the celebrated author of *Brave New World*, was convinced that wearing eye glasses actually makes the eyes weaker. Therefore, we should not get corrective glasses to improve our sight.
7. According to the American Dental Association, the best way to preserve healthy teeth and gums is by daily flossing. Therefore, it's a good idea for us all to floss every day.
8. You really ought to try out for the basketball team because my uncle says you have real potential.
9. The *National Enquirer* reported that Madonna claims that heart disease can be avoided by meditation. Thus, taking up meditation should be your New Year's resolution.
10. Meditation slows down the heart rate, and slowing the heart rate makes the heart stay free of disease. Consequently, practicing meditation should help prevent heart disease.

## Ad Hominem

The term *ad hominem* translates as “toward the person,” and so the ad hominem fallacy is also known as a fallacious argument against a person. The **ad hominem** fallacy occurs when an arguer rejects his or her opponent's conclusion on the basis of some characteristic of that person, typically his or her circumstances, social position, history, or personal associations. This kind of argument is fallacious because *who* gives the argument is irrelevant to whether or not the argument is a good one. Bad people can give great arguments just as good people can give terrible arguments. When evaluating an argument, you should examine the truth of the premises and the logical connection between the premises and conclusion, not the source of the argument.

**Hint!** In an appeal to authority, whether legitimate or not, the conclusion is supported by the authority being appealed to. Thus, whether that person is a legitimate authority is relevant to whether we should accept the argument. In an ad hominem fallacy, however, the person attacked has given an *argument*, and the ad hominem fallaciously criticizes the arguer instead of the premises of his or her argument.



There are three common ways that fallacious ad hominem arguments are constructed. A person may be attacked because of his or her perceived bias, because of inconsistency in his or her words and deeds, or because of his or her psychological make-up. Some critical thinking instructors differentiate between these different types of ad hominem arguments as ad hominem abusive, ad hominem circumstantial, and ad hominem tu quoque. Although it can be helpful to recognize these different ways of attacking a person, the important lesson is that these are all fallacious attacks against the person rather than the argument itself. If you want to show that someone's argument is flawed, you must find errors in his or her reasoning. Attacking the person may sometimes be rhetorically persuasive, but it is not critical thinking.

Consider this example.

*Jack argues that we should abolish capital punishment because it has no proven deterrent effect, and it has a severely negative psychological impact on the prison staff involved in executions. But, did you know that Jack's younger brother is on death row right now? When you consider Jack's special interest in the matter, you can see that he is wrong.*

Notice that the passage contains two arguments that should not be confused. One of these is the view that the arguer opposes, and the other is the one the arguer defends. Recall from Chapter 3 that when you analyze an argument, a passage may contain extra claims that provide background information to motivate the argument. Therefore, when you analyze this passage, you should treat the argument opposed by the arguer as you would extra claims—that is, as the motivation for the argument being defended.

Moreover, since these arguments are in conversation with each other, they are engaging the same issue—in this case, whether we should abolish capital punishment. You should keep this in mind when you identify the conclusion of the argument. When the arguer writes, “He is wrong,” what exactly is he or she trying to prove? Since “he” refers to Jack, and Jack argues that we should abolish capital punishment, the conclusion advanced by the author of the passage must be that we should not abolish capital punishment. The Formal Analysis of the passage can then be presented as follows.

- |            |  |
|------------|--|
| <b>P1:</b> | Jack argues that we should abolish capital punishment. |
| <b>P2:</b> | Jack's younger brother is currently on death row.      |
| <b>∴</b>   | <hr/> We should not abolish capital punishment.        |

**Issue:** Whether we should abolish capital punishment

In this case, the arguer commits the ad hominem fallacy. Rather than finding a flaw in Jack's argument, the author attacks Jack himself as biased. However, the fact that someone may have a personal stake in an issue does not mean that his or her argument is bad. You must examine his or her reasons, not his or her motivations.

Let's consider another example.

*Bill has argued that you shouldn't smoke cigarettes. Ha! There's no reason to listen to him; I saw him smoking at a party last weekend.*

Like the previous example, this passage refers to two arguments. One is the argument that is opposed by the author of the passage, and the other is the argument advocated by the author of the passage. Although the arguer does not provide Bill's premises, the use



of the word *argued* signals that Bill elsewhere gives an argument for the conclusion, “You shouldn’t smoke cigarettes.” So, again this is an example of the ad hominem fallacy.

### EXERCISE 5.10

**Your Turn!** Present a Formal Analysis of the previous argument.



Rather than finding a flaw in Bill’s argument, the speaker attacks the source of the argument, this time by pointing to Bill’s hypocrisy. However, the fact that Bill does not follow his own advice does not mean that Bill’s argument is flawed. His argument stands or falls on its own merits.

Technically, not every argument which attacks a person is fallacious. To distinguish between arguments that commit the ad hominem fallacy and those that legitimately criticize a person, you must pay careful attention to the issue. If the issue is about the person, then the criticism is relevant. If it is not, then focusing on the person is irrelevant to the conclusion of the argument. Consider the use of testimony in a court case. When a witness testifies, that person’s credibility is crucial to whether or not the jury accepts his or her claims. This does not mean that the jury should simply accept the reports of all credible witnesses, since credible sources can lie or misinform, just as unreliable sources can be truthful. It does, however, mean that whether a person is credible or not is deeply relevant to whether the jury should accept his or her testimony. In any situation in which all you have to go on is a person’s word, you can regard the argument as one involving testimony.

Consider this example.

*Jack Masters testified that there’s no way the defendant could have committed murder. But, did you know that the defendant is Jack’s younger brother? Given his strong incentive to help his brother avoid prison time, we should question his claim.*

In the earlier example about capital punishment, Jack gave evidence for his conclusion. Here, however, the only evidence given is his word. Notice the difference in the Formal Analysis of the argument.

- P1:** Jack testifies that the defendant is not capable of murder.  
**P2:** The defendant is Jack’s younger brother.  
 $\therefore$  We should not accept Jack’s testimony.

**Issue:** Whether we should accept Jack’s testimony

Whenever a source is not credible, we lack sufficient reason to accept the person’s claims. This, of course, does not mean the testimony is false. Indeed, the witness may be telling the truth. However, since the only evidence that is offered is his or her testimony, we cannot accept that testimony as convincing when the person giving it is biased.

Other arguments that legitimately focus on a person are ones in which the person's character is what is at issue. Consider this one.

*We should not hire John Greene for the position of chief accountant, the person responsible for managing all of our company's accounts. This is because he has been convicted of embezzling funds from his last two employers.*

Here is the argument analyzed formally.

- P:** John Greene has been convicted of embezzling funds from his last two employers.  
**∴** We should not hire John Greene for the position of chief accountant.

**Issue:** Whether we should hire John Greene for the position of chief accountant

Although this argument does attack a person, it is not an example of the ad hominem fallacy. John Greene's character is what is at issue, and so the focus on him is a legitimate one.

### EXERCISE 5.11



**Your Turn!** How do you decide whether an ad hominem argument is a fallacy or a legitimate argument?

### EXERCISE 5.12

For each of the following, complete a Formal Analysis of the argument. Then, determine whether the argument commits the ad hominem fallacy.

1. Samuel argues that extraterrestrial creatures exist. He cites the 1965 UFO crash in Roswell, New Mexico; the inexplicable crop circle phenomenon; and the hundreds of stories of abduction from people across the globe. But, this can't be believed. Did you know that he has been diagnosed with schizophrenia?
2. Samuel told me that he was abducted by "little green men" and subjected to "experiments" when he was 12. But, this can't be believed. Did you know that he has been diagnosed with schizophrenia?
3. Mr. Johnson's argument that the oil deposits in Warren County will last another 100 years must be discounted. Didn't you realize that he is the president of Lone Star Oil Company?
4. The manager of the local baseball team should be fired immediately. He doesn't motivate the players and he has a terrible work ethic. Besides that, he's not honest with the fans.
5. Professor Hardy has argued that Suzy's Law will not prevent suicides. We can ignore his argument because he is always looking for attention.
6. The economist John Flamingo may have given some pretty good reasons why we should all invest in the stock market. I, for one, don't accept that conclusion because he hasn't invested any of his money in the stock market.

7. Becky's argument that concludes we should pay nurses higher salaries can't be accepted. After all, her own husband just graduated from nursing school.
8. Don't pick Frank's Landscaping Service because they do terrible work. The last time they trimmed my trees, they killed five of them.
9. Frank has argued that planting trees near your home will reduce summertime energy use. But, don't listen to him. He owns Frank's Landscaping Service and is just looking to increase his business.
10. William Shakespeare could not possibly have written all the plays that are attributed to him. He was only an illiterate, slow-witted actor who spent most of his time drunk. Also, he could never have had the life experiences necessary to write a play like *Hamlet* or *Julius Caesar*.

The fallacies of appeal to illegitimate authority and ad hominem have similar features in that they both refer in their premises to what someone else says. Arguments that appeal to illegitimate authority are fallacious because the source referenced is not a genuine authority on the issue. This means that when the source is a legitimate authority, the argument does not commit the fallacy. Ad hominem arguments are fallacious because they reject a person's argument based on features of that person rather than the reasons the person offers for his or her conclusion. If the referenced person gave testimony rather than an argument, the attack would not commit the ad hominem fallacy.

To distinguish between these two fallacies, you must pay close attention to whether the person referenced in the premises asserts a claim or offers an argument. When someone merely *asserts a claim*, all we have to go by is his or her reliability as a good source of information. But when someone *offers an argument*, he or she provides us with reasons that can be assessed, and so the source of the argument is irrelevant. The templates for these fallacies are described below, using C to symbolize the claim that is offered as the conclusion, P to symbolize the person referred to in the argument, and the symbol  $\sim$  to represent the rejection of a claim.

#### Appeal to Illegitimate Authority

**P:**     (Illegitimate) P says C  
 **$\therefore$**     C

**Issue:** Whether C is true

#### Ad Hominem

**P1:**    P argues for C  
**P2:**    P is biased, hypocritical,  
           crazy, or the like  
 **$\therefore$**      $\sim$  C

**Issue:** Whether C is true

### EXERCISE 5.13

For each of the following, complete a Formal Analysis of the argument. Then, determine whether the argument commits the appeal to illegitimate authority fallacy, the ad hominem fallacy, or no fallacy at all.

1. You argue that I should not eat so much red meat. That's clearly unconvincing, since you're no vegetarian yourself.
2. The Chinese government has been arguing that the United States should give more support to developing countries. But we should urge our legislators



to discount this argument. Since when did the Chinese government provide substantial aid to developing countries?

3. The Russian government recently argued that the West should not set up a missile defense system in Eastern Europe. We should not give weight to that argument, because Russia is still locked into a Cold War mentality.
4. Former Secretary of State Henry Kissinger has urged the United States to maintain close ties with the state of Israel. Since he has so much experience in foreign relations, we should do as he says.
5. Inexpensive gasoline will be plentiful in the United States for decades yet to come. I know this because my car salesman assured me not to worry that the new car I bought gets low gas mileage. He works with cars every day, so he ought to know what he's talking about.
6. The National Dairy Board's argument that milk producers must be granted subsidies is completely wrongheaded. The Dairy Board just wants its members to make more money while you pay more for groceries.
7. The Roman leader Julius Caesar was not an enlightened ruler as we have been taught. In fact, his acts and exploits were merely to satisfy his enormous ego and to increase his power, not to improve the lives of the Roman people. He should be compared to Napoleon or even Hitler.
8. Claire should not be promoted to the vice president of sales position at corporate headquarters. She does not have an MBA, she is not committed to the future of the company, and the people who currently work under her complain about unfairness and favoritism. She's not a good choice.
9. Since the quarterback of our university's football team says that athlete's foot can be cured by not washing your feet more than twice a week, it must be true. He's an athlete, after all.
10. A team of archaeologists found evidence that there is an ancient graveyard on the site selected for the new Engineering building on campus. Therefore, the university has to find a new location for the building.

## Strawman

The **strawman** fallacy occurs when an arguer misrepresents the conclusion of an opposing view and then attacks that view in its misrepresented form. This fallacy is committed in an effort to make an opponent's view seem ridiculous or patently false, and hence easily rejected. Although this strategy may be rhetorically persuasive to those who are inclined to disagree with the opposing view, it does nothing to show that the opponent's view is actually wrong. To show that someone's conclusion is mistaken requires that an accurate representation of that conclusion be refuted.

Arguments that commit the strawman fallacy typically misrepresent their opponent's position by exaggerating the claims it makes, by presenting an extremist version of the position as representative of the general position, or by taking claims out of context. In each of these cases, the arguer substitutes a distorted version of the opposing conclusion.

Consider this example.

*There is a growing movement for the recognition of a right to pray in public schools. But we should not require every child to recite the Lord's Prayer at mealtimes. Protestants and Catholics say the prayer differently. Some children don't even know the prayer. And the parents of non-Christians might not want their children to learn it.*

Like arguments that commit the ad hominem fallacy, an argument containing a strawman fallacy can be difficult to analyze because the passage will refer to two different conclusions—one that is associated with the original argument being opposed, the other that is the straw, or distorted, version. Therefore, you must take care to recognize the original argument and identify the issue from that. In this case, the issue being debated is whether we should recognize a right to pray in public schools. Next, you can analyze the argument. When you compare the original issue to the straw conclusion, the distortion becomes apparent. The Formal Analysis of the argument is as follows.

- P1:** Protestants and Catholics say the Lord's Prayer differently.  
**P2:** Some children don't even know the Lord's Prayer.  
**P3:** The parents of non-Christians might not want their children to learn the Lord's Prayer.  
 ∴ We should not require every child to recite the Lord's Prayer at mealtimes.

**Issue:** Whether we should recognize a right to pray in public schools

In this example, all of the premises are relevant to whether we should require all students to recite the Lord's Prayer at mealtimes. However, this is not the conclusion relevant to the original issue. The arguer substitutes the conclusion "We should not require every child to recite the Lord's Prayer at mealtimes" as if it countered the opposition's conclusion that "We should recognize a right to pray in public schools." But, it does not. Instead, the distortion of the main conclusion commits the strawman fallacy.

Here's another example.

*Colin Powell, former Secretary of State and Chairman of the Joint Chiefs, has argued that the United States should never engage in torture. It's clear that Powell thinks we shouldn't even be allowed to ask dangerous terrorists simple questions. Such a "hands off" attitude will be a disastrous foreign policy, and it will lead to more brazen attacks against the United States. I think Powell is really wrong on this one.*

### EXERCISE 5.14

**Your Turn!** What is Powell's conclusion? What, then, is the issue up for debate?



Once you have the issue identified—the one from Colin Powell's argument—the Formal Analysis of the argument reveals the distortion of his conclusion.

- P1:** Not being allowed to ask dangerous terrorists simple questions will be a disastrous foreign policy.  
**P2:** Not being allowed to ask dangerous terrorists simple questions will lead to more brazen attacks against the United States.  
 ∴ The United States should be able to ask dangerous terrorists simple questions.

**Issue:** Whether the United States should engage in torture

This argument commits the strawman fallacy. The arguer provides reasons to support the claim that “The United States should be able to ask dangerous terrorists simple questions.” However, this claim is not the rejection of the opposing view; instead, it distorts Powell’s conclusion. The arguer, thus, does not address what’s at issue, yet acts as if he or she has done so when claiming that “Powell is really wrong on this one.”

### EXERCISE 5.15

For each of the following, complete a Formal Analysis of the argument. Then, determine whether the argument commits the strawman fallacy. When the fallacy is committed, explain how the arguer distorts his or her opponent’s conclusion.

1. Look, maybe you think it’s okay to legalize tribal casinos, but I don’t. Letting every random group of people in the country open a casino is a ridiculous idea, and one that is bound to cause trouble.
2. Look, maybe you think it’s okay to legalize tribal casinos, but I don’t. More casinos means more gambling, and more gambling means more gambling addicts. Also, organized crime is never far away from casinos, and that’s the last group we need to subsidize. I say, let’s stop the casinos on the reservations.
3. Anti-abortion groups have given a number of reasons why they oppose abortions. But what these groups really want to do is outlaw every form of birth control, and that is clearly a bad idea. Not everyone can afford to have a child, and legal birth control allows families to plan their pregnancies. Clearly, we should oppose the anti-abortion conclusion.
4. Many people criticize television as being the major cause of ADHD (Attention Deficit Hyperactivity Disorder) among children. Maybe this once was true, but it isn’t any longer. Children are now surfing the Internet and playing video games instead of watching television.
5. Old-school soccer fans argue that using instant-replay technology to resolve questionable referee calls will slow down the game. But, this isn’t necessarily true. Teams could be limited to one challenge per half, and many challenges would involve disputed goals, when play is already stopped.
6. I know that education experts argue that a multicultural curriculum in elementary school will lead to more tolerance and fewer biases toward those perceived as “different.” But we should reject teaching nothing but multicultural dogma. It would leave our students deficient in the basic skills they need to learn such as math, reading, and science.
7. Some feminists argue that the traditional model of marriage and family is oppressive to women. However, it is clearly a ridiculous idea to get rid of families. This would mean that our children would either be raised by government bureaucrats and housed in prison-like facilities, or they would be left to roam the streets and raise themselves.
8. Psychologists claim that research shows the Rorschach inkblot test reveals a person’s unconscious motivations and drives, and for that reason want to test children who are disruptive in school. But psychoanalyzing everyone in the country would be foolish. It would be too invasive and expensive for a nation like ours.

9. Some employers argue that they have the right to monitor employee Internet use. I completely disagree. Why should employers be allowed to spy on the private lives of their employees and learn everything about them? No one supports such an intrusion by Big Brother.
10. You argue that we should increase our military force in Afghanistan. Clearly you don't care about Americans. If you did, you wouldn't want them to go die overseas.

## Red Herring

The **red herring** fallacy is a fallacy in which the arguer provides premises that do not support the conclusion they claim to support; instead, the arguer deliberately attempts to distract you by providing reasons that are irrelevant to the issue in question. Determining whether a passage commits the red herring fallacy requires that you first identify the conclusion. Once you have the conclusion identified, you can ask whether the premises provided are actually relevant to it.

**Hint!** The term *red herring* comes from the practice of taking a fish that has been cured in brine or heavily smoked and dragging it across a trail to throw tracking dogs off the scent of the person or animal they are pursuing.



Occasionally arguments that commit the red herring fallacy contain premises that are obviously irrelevant. However, in most cases the fallacy is not so blatant. These arguments often involve topics which evoke a strong emotional response, and it is this response that distracts you from the issue and tricks you into accepting the conclusion. Consider this argument.

*Environmentalists argue that the construction of 30 new dairies in Tippecanoe County will endanger public health, worsen our air quality, and contaminate the ground and surface water. However, the fact of the matter is that each new dairy will create hundreds of new jobs for our county's residents, and the property taxes paid by the dairies will provide us with the revenue needed to fund important programs for our community. When you consider the benefits to come, it's clear that the environmentalists are wrong.*

Notice that, as in the ad hominem and strawman fallacies, there are two different views presented in the passage. The arguer begins by stating the view of his or her opponent. You must be sure that you do not confuse the opponent's argument with that of the author of the passage. At the end of the passage, the arguer states the environmentalists are wrong. But what exactly are they wrong about? The environmentalists contend that the proposed dairies will endanger public health, worsen air quality, and contaminate

the water. Since the arguer disagrees with the environmentalists, the conclusion of the argument, then, is that the proposed dairies will *not* endanger public health, worsen air quality, or contaminate the water supply. Let's present the argument formally.

- P1:** Each new dairy will create hundreds of new jobs for the residents of Tippecanoe County.
- P2:** Each new dairy will provide property tax revenue needed to fund important community programs.
- 
- ∴** The new dairies will not endanger public health, worsen air quality, nor contaminate the water supply.

**Issue:** Whether the new dairies will endanger public health, worsen air quality, and contaminate the water supply

Once you have the conclusion identified, it is much easier to determine whether the premises are relevant or irrelevant. Although these premises may be good reasons to support the construction of the dairies, they do not establish that the dairies will not have harmful effects on public health, air quality, and water supplies. The argument, thus, commits the red herring fallacy because it provides premises that distract the reader from the issue in question.

Let's consider one more example.

*Some critics argue that the delayed government response to the flooding in New Orleans following Hurricane Katrina is a result of racism and classism. But this just isn't true. Hurricane Katrina rapidly grew from a Category 3 storm to a Category 5 storm in less than nine hours. At peak strength, winds reached 175 miles per hour and a minimum central pressure of 902 mbar, making it, at that time, the strongest hurricane recorded in the Gulf of Mexico.*

Lower Ninth Ward residents stranded on roofs wait for rescue boats in New Orleans on August 29, 2005.



Marko Georgiev/Getty Images

**EXERCISE 5.16**

**Your Turn!** What conclusion is being opposed by the author of this passage? What, then, is the issue up for debate?



Once you have the issue identified, you can then identify the conclusion of the argument and determine whether or not the premises are relevant to it. The Formal Analysis of the argument is as follows.

- P1:** Hurricane Katrina rapidly grew from a Category 3 storm to a Category 5 storm in less than nine hours.
- P2:** At peak strength, Hurricane Katrina's winds reached 175 miles per hour and a minimum central pressure of 902 mbar.
- P3:** Hurricane Katrina was, at that time, the strongest hurricane recorded in the Gulf of Mexico.
- ∴** The delayed government response to the flooding in New Orleans following Hurricane Katrina is not a result of racism and classism.

**Issue:** Whether the delayed government response to the flooding in New Orleans following Hurricane Katrina is a result of racism and classism

In analyzing the argument, you can see that the premises do not support the conclusion the arguer purports to defend. Instead, the premises distract the reader from the issue that is being debated. The argument, then, commits the red herring fallacy.

**EXERCISE 5.17**

For each of the following, complete a Formal Analysis of the argument. Then, determine whether the argument commits the red herring fallacy.

1. Opponents of increased oil drilling offshore contend that more drilling will be dangerous to the marine environment. This isn't true. Offshore drilling will provide hundreds of local jobs, improve the local economy, and decrease our reliance on energy importation. So, you must agree that increased drilling offshore will not be dangerous to the marine environment.
2. Many have applauded the success of welfare reform in helping people make the transition from welfare to employment. However, Lester Spence, a political science professor at Johns Hopkins University, argues that we must recognize that welfare reform has not helped people transition from welfare to solidly working-class lives. First, the employment found by former welfare recipients does not pay well enough to support a family. Second, parents who are unable to afford child care costs routinely leave their children at home to fend for themselves. And, finally, the jobs obtained by former welfare recipients rarely include healthcare benefits.
3. A recent Highway Patrol report maintained that texting while driving is as dangerous as drinking and driving. I completely disagree. Texting is a great



way to stay in touch with family and friends. You can send someone a message whenever you want. What's more, it's fun! It's plain that this author is completely misguided about texting.

4. The nurses at the local hospital contend that they should get a pay raise. But many people in this world don't even have jobs. They get by on handouts, charity, and what little they can earn through day labor. The hospital administration should say "no" to this raise.
5. Lots of political commentators say that the first piece of business for the new Congress should be to pass income tax reform that helps the very poorest people in this country. I agree for several reasons. First, the people on the bottom of the economic ladder suffer tremendously from sales taxes. Second, these overworked, overtaxed people lose much of their pitifully small income to federal income tax. Also, many are so poorly educated that they can't find legal means to protect their hard-won dollars.
6. A recent study showed that learning to play the piano helps children do better at math. However, this just isn't true. Pianos cost a lot of money, lessons are difficult to arrange, and most people lack sufficient room for such a large instrument.
7. In your editorial, you argued that the graduates of our social work program are not prepared for jobs in the private sector. This is simply false. The private sector is a wonderful place to work, and many jobs are being created in the private sector each year. Small- and medium-sized businesses create more than their share of jobs, and the pay is above average for the field.
8. Some historians contend that the United States did not need to drop the atomic bomb on Japan in order to win World War II. However, developing nuclear energy has been an important advance toward energy independence. Many countries without oil reserves can realize their dream to modernize and restrain energy costs just by building some nuclear power plants.
9. A popular American history text used in college courses argues that nationalism was a volatile force in the mid-nineteenth century. But this can't be supported. Without nations we would be living in tribal groups, fighting with other tribes over hunting territories. It is nationalism that has allowed the human race to make progress in combating disease, malnutrition, superstition, and many other evils people experience in tribal culture.
10. In 1998, the Arizona Supreme Court ruled that declaring English as the state's official language deprives people of their fundamental First Amendment right to access government and deprives government officials of their rights to free speech. These judges are clearly wrong since the majority of the population of Arizona speaks English. To be successful in school and in one's career, speaking English is a must.

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The strawman and red herring fallacies can be difficult to distinguish. Both arguments that commit the strawman fallacy and those that commit the red herring fallacy refer to the opposing view as the motivation for their arguments. Strawman arguments are fallacious because, rather than offering premises that support rejecting the opponent's conclusion, they offer reasons to reject a *distorted* version of the opponent's conclusion. In this way, the argument does not address the issue up for debate. Red herring arguments are fallacious because the arguer distracts the reader from what's at issue by

providing premises that are irrelevant to the conclusion they are intended to support. The templates for these fallacies are described below, using C to symbolize the claim that is offered as the conclusion and the symbol  $\sim$  to represent the rejection of a claim.

<b>Strawman</b>	<b>Red Herring</b>
<b>P:</b> <u>Premises</u> <b><math>\therefore</math></b> $\sim C$ (distorted)	<b>P:</b> <u>Premises (irrelevant)</u> <b><math>\therefore</math></b> C
<b>Issue:</b> Whether C is true	<b>Issue:</b> Whether C is true

### EXERCISE 5.18

For each of the following, complete a Formal Analysis of the argument. Then, determine whether the argument commits the strawman fallacy, the red herring fallacy, or no fallacy is committed.

1. A bunch of fanatics have been clamoring for restrictions on alcohol use by pregnant women to prevent fetal alcohol syndrome. They forget that alcohol is a perfectly normal part of society. It can help people relax in social situations and make people feel happy. Why, virtually every culture on Earth has used alcohol for a relaxant.
2. The governor has argued that the state could save much-needed funds through the early release of nonviolent offenders who have served at least 90% of their sentences. Why does the governor want people who commit crimes to escape all punishment? Letting these dangerous felons loose in the streets will just lead to more crime and endanger more lives.
3. The head of our employees union contends that the new contract should include a raise that keeps employee wages in line with inflation. But using all the company savings just to enrich the employees is a bad idea. Why, we need to pay for additional inventory, need to pay our suppliers, and need to put money away for a rainy day. I urge the board to resist the union's demand for raises.
4. I've heard statistics used to show that wearing seatbelts in a moving vehicle saves lives. But this is ridiculous. Cars are one of the most useful modern conveniences of the twentieth century. They provide us with a relatively cheap and easy way to travel quickly across great distances. If it weren't for cars, we'd be stuck walking or riding horses to work every day.
5. Some people argue that the death penalty is no more of a deterrent to crime than life in prison without parole. But, I disagree. What's to stop convicted murderers from killing prison guards and other prisoners while they're incarcerated?
6. You have probably heard arguments against suspending athletes who use performance enhancers. How can the integrity of sports be maintained if we just let them off with no penalties at all? Competition is unfair if athletes are allowed to cheat without consequences. Therefore, we must penalize athletes who cheat if we want to ensure the quality of sports.
7. You may be aware of the recent proposal to create a pub on campus that would sell beer and wine to adult students. Having the entire campus drunk



day and night is a bad idea and one we all should oppose. It will only lead to violence, destruction of property, and a dramatic decline in academic performance.

8. Recently animal rights supporters charged that horse racing can cause life-threatening injuries to young animals. This doesn't make sense. Horse racing is not only an important source of jobs for thousands of people, it also provides thrilling entertainment for untold numbers of spectators and bettors across the country.
9. Horse racing is a popular sport all across the country. But did you realize that racing a horse before it is fully mature can result in life-threatening leg injuries? This is because the leg bones of young horses are not very strong, and if the leg bones are not strong, then injury can easily result.
10. The attorney general is advocating that the Miranda warnings automatically given to suspects in criminal cases should be withheld when police apprehend terror suspects. This would be a step backward for justice in this country. After all, Miranda rights are so common that every person in the country knows the name. Even television shows constantly have suspects being read their Miranda rights.

### Putting It All Together: A Basic Analysis Plus Fallacy Identification

In Chapter 2, you learned how to recognize arguments and to distinguish them from explanations and passages that are neither arguments nor explanations. In Chapters 3 and 4, you learned how to analyze the parts of an argument and to diagram them. In this chapter, you have learned to identify some common forms of fallacious reasoning. Now, you can put all these skills together in paragraph form.

#### Directions for a Basic Analysis plus Fallacy Identification

In *paragraph form*, use complete sentences and proper English grammar and spelling to do the following.

**Step 1:** Write a Basic Analysis of the passage. (You may want to refer to the Directions for Basic Analysis, Chapter 3, page 49.)

**Step 2:** If the passage contains an argument, determine whether the argument commits a fallacy. If it does, write a separate paragraph identifying the fallacy committed, and explaining how this fallacy is committed.

**Step 3:** If the argument does not commit a fallacy, diagram it and verify that the diagram is consistent with your Basic Analysis.

Let's examine the argument by Veronica referred to at the start of this chapter. Recall that this was her response to Davion's argument for banning smoking in public places. Here are the two posts again.



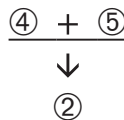
**Davion says** If you want to subject yourself to the health risks of smoking, that's fine. But smoking in public places should be banned. Why? It's simple. Smoking poses a health risk to others, and anything that does that should be outlawed. Period.



**Veronica says** Are we living in a fascist state now??? The only people who would support this are uptight nonsmokers who want to take away my freedom to express myself and enjoy life. I know smoking is bad for me, but it's my choice!

Before analyzing Veronica's post, you need to analyze Davion's because she is responding to him. First, notice that Davion's post contains an argument, even though not every claim in it plays a role in the argument. Therefore, diagram it as follows.

① *If you want to subject yourself to the health risks of smoking, that's fine.*  
 But ② *smoking in public places should be banned. Why?* ③ *It's simple.*  
 ④ *Smoking poses a health risk to others,* and ⑤ *anything that does that should be outlawed. Period.*



Next, write a Basic Analysis of the argument.

**This passage by Davion contains an argument. The issue is whether smoking in public places should be banned. The conclusion is that smoking in public places should be banned. The first premise is that smoking poses a health risk to others. The second premise is that anything that poses a health risk to others should be outlawed.**

Now, let's turn to Veronica's post. Given that she is responding to the previous posts, the issue is the same, namely "whether we should ban smoking in public places." Unfortunately, Veronica attacks supporters of the ban on smoking such as Davion for being "fascists" rather than offering reasons why their argument might be flawed. Therefore, the Basic Analysis should read as follows.

**This passage by Veronica contains an argument. The issue is whether we should ban smoking in public places. The conclusion is that we should not ban smoking in public places. The premise is that the only people who would support the ban on smoking are uptight nonsmokers who want to take away my freedom to express myself and enjoy life.**

**This argument commits the ad hominem fallacy because the arguer attacks the source of the argument rather than addressing the argument itself.**

Notice that Veronica's argument is not diagrammed because it commits a fallacy.

## EXERCISE 5.19

Complete a Basic Analysis plus fallacy identification for each of the following passages.

1. There's nothing wrong with downloading pirated copies of movies because my roommate said that it's not cheating anyone.
2. Richard Nixon has to be one of the worst presidents in the history of this country. Look at his record: lies, corruption, and scandal. Plus, he is the only president forced to resign the office.
3. State-perpetrated or -tolerated physical violence towards an identifiable group could not occur unless it is preceded by symbolic violence.—A. L. Hinton, *Annihilating Difference*
4. Because fraud is an evil peculiar to man, it more displeases God. Therefore the fraudulent are the lower, and so more pain assails them.—Dante, *The Inferno*
5. Angela Smith has given a stirring argument opposing the storage of radioactive waste on Native American lands. But we can dismiss her conclusion, since her grandparents were members of the Iroquois nation.
6. No one has ever demonstrated that Iraq didn't have WMDs. In the absence of such evidence, isn't it reasonable to conclude that they did have them?
7. You don't think that Iran is most likely planning to build a nuclear weapon? Well, you're wrong. They have embarked on plutonium enrichment, and that is not necessary for a nuclear power plant.
8. If a person is over the age of 16, he or she should be considered an adult. This is because if a person is over the age of 16, then he or she can get a driver's license, and if a person can get a driver's license, then he or she should be considered an adult.
9. Some say that only losers who don't know how to have a good time save for retirement. This attitude is just false. The reality is that if you manage your finances efficiently and start working towards your goals sooner, you can spend more in the long run. Besides, who says spending all your money is the only way to have fun?—Eric Tyson, *Personal Finances for Dummies*
10. Beyond the age of 65, widowhood increases geometrically because of the higher death rate of men.—John Weeks, *Population: An Introduction to Concepts and Issues*
11. NRA supporters have argued that responsible citizens should be able to legally own firearms. This is just ridiculous. Letting every American run around armed with surface-to-air missiles and rocket launchers will just lead to chaos and death on a massive scale. We clearly would be ruining our country with such policies.
12. A team of engineers found that Hurricane Katrina damaged the structural integrity of the Lake Pontchartrain bridge. Therefore, the bridge will have to be closed until its safety can be assured.
13. Peter Singer argues that the treatment of chickens in factory farms is inhumane. But Singer is just plain wrong. Chicken is a great source of protein, and is significantly healthier than beef or pork.
14. It would weaken a story like *A Couple of Hamburgers* if the author tried to describe directly the feelings that lie beneath such actions or if he intruded into his story with explanatory comments of his own—Arthur Mizener, *Modern Short Stories*
15. Some people argue that we should increase foreign aid to Pakistan. But this is a terrible idea! Pakistan is currently too unstable and their regime is corrupt.

Furthermore, they may use the money to attack neighboring countries like India.

16. Occupational therapy is a profession that should have more men in it, because it currently has too many women.
17. Occupational therapy is the best profession to go into in the near future, because as the baby boomers age, they will be needing more and more help with the living skills taught by occupational therapists.
18. Critics of NASA's space program contend that the money spent on space exploration could be better spent here on Earth. I heartily disagree. People are natural explorers, and space offers the last frontier for us to explore. Furthermore, the technology that will result from the space program will have many uses in satellite and missile defense systems.
19. Since food allergies can cause serious illness for young people, the government should educate parents about the need to take food allergies seriously and also should provide free allergy screenings for children.
20. The curvature of the earth's surface is very similar to that of a sphere. Because of this curvature, surveys are divided basically into geodetic surveys and plane surveys.—Department of the Army, *Elements of Surveying*

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### Chapter Review Questions

1. Define *fallacy*.
2. What does it mean to say that an argument begs the question?
3. How do you determine who has the burden of proof?
4. How do you know when an argument commits the fallacy of appeal to illegitimate authority?
5. When is an argument that attacks a person not an ad hominem fallacy?
6. What mistake does an arguer make when committing the strawman fallacy?
7. What is the error in reasoning when an arguer commits the red herring fallacy?

## CHAPTER 6

# Preparing to Evaluate Arguments

Imagine that in your political science class you read this argument:

Socialite Nicole Richie leaves court in 2007 after being sentenced to 90 hours in jail, fined \$2,048, and ordered three years probation for driving the wrong way on the freeway while under the influence of drugs.

*If the government of the United States is really built on the notion that all people are fundamentally equal, then every person would be equally treated under the law. But it's clear that not everyone is treated equally, because crimes committed by wealthier individuals result in much lighter sentences than those committed by poor people. So, we must conclude that the government of the United States is not really built on the idea of fundamental equality among persons.*

Many people would find this conclusion—that the United States is not really built on the idea of equality—deeply troubling. But since the goal of an argument is to convince you of something using good reasons, maybe this conclusion really does follow. How can you decide? When you judge whether an argument's conclusion follows or not, you are **evaluating** the argument.

In order to successfully accomplish any task, you must choose the right tools, and that choice depends on the kind of task you face. If, for example, you have a plumbing problem, it is not likely that a hammer will help. This is because hammers are typically useless for plumbing troubles. Similarly, when evaluating arguments, you must choose the proper tools, and this will depend on what kind of argument you are evaluating. In this chapter, you will learn how to identify different argument types so that you can pair them with the appropriate evaluative tools. To do this, you will first learn to distinguish two different styles of reasoning: deductive reasoning and inductive reasoning. Once you understand the differences between these, you will learn to identify two kinds of arguments that utilize deductive reasoning and three kinds of arguments that utilize inductive reasoning. By the end of the chapter, then, you should be able to identify five kinds of arguments. Although this chapter is not comprehensive in its presentation of argument types, it does offer a sampling of some of the most common arguments you will encounter.



ROBYN BECK/AFP/Getty Images

Chapters 7–11 will provide you with the specific tools needed to evaluate each of these five argument types.

## Distinguishing Two Styles of Reasoning

The first step in preparing to evaluate an argument is determining what kind of support the arguer intends the premises to provide for the conclusion. Premises can be used to support a conclusion in one of two ways. They can be used to *guarantee* a conclusion or, instead, they can make a conclusion look very *likely*. These two ways of supporting a conclusion constitute two fundamental styles of reasoning: deductive reasoning and inductive reasoning. These terms, *deductive* and *inductive*, are probably familiar to you, but in critical thinking they have technical meanings that may differ from the way you have previously learned to use them.

The key to understanding these two styles of reasoning lies in their distinct (yet similar-sounding) definitions. You'll need to give these careful thought. A **deductive argument** is one in which the arguer attempts to demonstrate that the truth of the conclusion *necessarily* follows from the premises. When a deductive argument is properly constructed, the premises logically *entail* the conclusion. An **inductive argument**, on the other hand, is one in which the arguer attempts to demonstrate that the truth of the conclusion *probably* follows from the premises. This is because the conclusion of an inductive argument makes a claim *beyond* what is entailed by the premises; it is a *projection* based upon the premises. When you consider these two definitions together, you see that the only difference lies in the relationship between the premises and conclusion. Conclusions of deductive arguments are intended to follow by *necessity*, whereas conclusions of inductive arguments are intended to follow by *probability*.

Distinguishing between deductive and inductive arguments will take some practice. Let's consider some examples.

*All U.S. presidents are over the age of 35. Barack Obama is a U.S. president.  
Therefore, Barack Obama is over the age of 35.*

First, identify the premises, conclusion, and issue.

**P1:** All U.S. presidents are over the age of 35.  
**P2:** Barack Obama is a U.S. president.  
**∴** Barack Obama is over the age of 35.

**Issue:** Whether Barack Obama is over the age of 35

Next, assuming that the premises are true, does the conclusion follow necessarily or only probably? The conclusion follows from the premises *necessarily*. If every U.S. president is over the age of 35 and Barack Obama is a U.S. president, then he must be over the age of 35. The argument, then, utilizes deductive reasoning.

Notice how that argument differs from this one.

*Most U.S. presidents attended college. Barack Obama is a U.S. president.  
Therefore, Barack Obama attended college.*

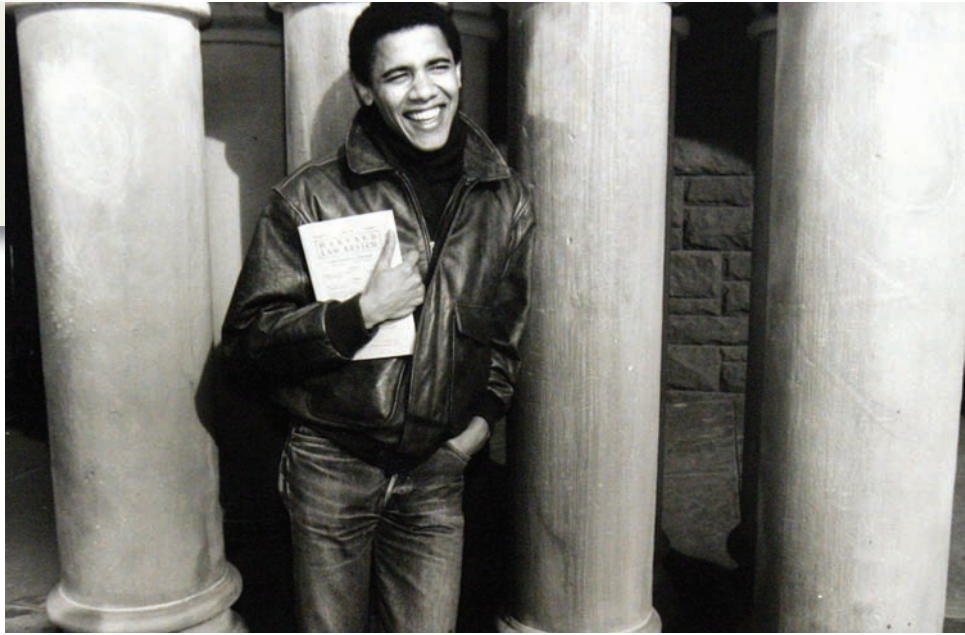
Here, the argument is presented with the premises and conclusion identified formally.

**P1:** Most U.S. presidents attended college.  
**P2:** Barack Obama is a U.S. president.  
**∴** Barack Obama attended college.

**Issue:** Whether Barack Obama attended college



At Harvard Law School, Barack Obama holds a copy of the *Harvard Law Review*. Obama was the first black president of this prestigious law journal.



AP Photo/Obama Presidential Campaign

Assuming that the premises are true, does the conclusion follow necessarily or only probably? In this case, it is only *probable* that the conclusion is true. Even if 42 of the 43 U.S. presidents attended college, Barack Obama may be that one who did not attend college. You cannot be certain that the conclusion is true, given the premises with which you are provided. Thus, the argument utilizes inductive reasoning.

Oftentimes, arguers will include indicator words to signal whether an argument is deductive or inductive. Words such as *certainly*, *absolutely*, and *definitely* often indicate that a conclusion *necessarily* follows from the premises, and therefore the argument is deductive. In contrast, words such as *likely*, *plausibly*, and *possibly* indicate that a conclusion *probably* follows from the premises, and therefore the argument is inductive. However, deductive argument indicators are sometimes used improperly in everyday speech or inserted merely to make an argument appear more powerful than it is. Consider this example.

*Most U.S. presidents attended college. Barack Obama is a U.S. president.  
Therefore, Barack Obama certainly attended college.*

Notice that the inclusion of the word *certainly* might be rhetorically persuasive, but it does not make the conclusion any more likely. The argument is still inductive because the premises offer only probable support for the conclusion, even though it includes a deductive argument indicator.

### EXERCISE 6.1



**Your Turn!** How can you tell whether or not an argument with a deductive argument indicator is really a deductive argument?

When evaluating an argument, it is important to remember that the truth or falsity of the premises has no bearing on whether the argument is deductive or inductive. Instead, you should consider what kind of support the premises provide for the conclusion by assuming that the premises are true. Consider the following example.

- P1:** Either Earth orbits the sun or Copernicus was mistaken.  
**P2:** Earth does not orbit the sun.  
 ∴ Copernicus was mistaken.

**Issue:** Whether Copernicus was mistaken

Assuming that both premises are true, does the conclusion follow necessarily or only probably? The conclusion necessarily follows from the premises, even though one of the premises, namely that “Earth does not orbit the sun,” is false. This is because *if* it were true that either Earth orbits the sun or Copernicus was mistaken, and *if* it were also true that Earth does not orbit the sun, then it would *have to be true* that Copernicus was mistaken. In the argument, the disjunction offers us two options, and the second premise takes one choice away, so only one option for the conclusion remains.

## EXERCISE 6.2

**Your Turn!** Why is the truth or falsity of the premises irrelevant to whether the argument is deductive or inductive?



In Chapters 3 and 4 you learned how to analyze and diagram multiple arguments. When authors present chain arguments, they may not exclusively use one or the other style of reasoning. Instead, they may combine them as in this example.

*The Boilermakers will make it to the Final Four only if they win their next game. But the Boilermakers will not win their next game since their best players are all hospitalized for Swine Flu. So, the Boilermakers will not make it to the Final Four.*

This passage contains two arguments: the main argument and a subargument. Here is the main argument presented formally.

- P1:** The Boilermakers will make it to the Final Four only if they win their next game.  
**P2:** The Boilermakers will not win their next game.  
 ∴ The Boilermakers will not make it to the Final Four.

**Issue:** Whether the Boilermakers will make it to the Final Four

Assuming that the premises are true, does the conclusion follow necessarily or only probably? The conclusion cannot fail to be true if the premises are true. So, the conclusion follows by necessity. Now, what about the subargument?



## EXERCISE 6.3



**Your Turn!** Provide a Formal Analysis of the subargument in the previous passage.

Notice that, although the conclusion of the main argument is necessarily true if its premises are true, the conclusion of the subargument is only probable given the premise. This means that the main argument is deductive and the subargument is inductive. Whenever you are asked to determine whether an argument is deductive or inductive, your answer should always refer to the main argument, even when the subargument utilizes a different style of reasoning.

## EXERCISE 6.4

Write a Formal Analysis of the following arguments. Then, decide whether the argument is deductive or inductive.

1. You are attracted to Matthew and George. Since they are both tall, dark, and handsome, you are likely attracted to Bryant, as well.
2. I flipped a coin and it has come up heads 25 times in a row. Therefore, it will come up heads again this next toss.
3. Mitchell's roommate has seen the *Lord of the Rings* trilogy four times. Rita has never seen the *Lord of the Rings* trilogy. Accordingly, Rita cannot be Mitchell's roommate.
4. If the laws of physics are always correct, then what goes up must come down. And the laws of physics are always correct. So, what goes up must come down.
5. Waterman is older than Jackman. Jackman is older than Bootman. Consequently, Waterman is older than Bootman.
6. A dolphin is smaller than an elephant, and an elephant is smaller than a flea. Thus, a dolphin is smaller than a flea.
7. Jamie fell off the roof. She's sure to have injuries.
8. The airbag in Jose's car failed to deploy when he crashed, and anyone whose airbag fails to deploy in an accident gets hurt. So, Jose's sure to have been hurt.
9. Recent opinion polling done by the *New York Times* showed that 75% of university students under the age of 25 work at least 20 hours per week. Consequently, about three-quarters of my students work at least 20 hours per week.
10. I have studied really well, I got a good night's sleep, and I love this subject. That means I should do well on the exam.

## Distinguishing Two Kinds of Deductive Arguments

Now that you have some experience distinguishing deductive from inductive arguments, we'll make some further distinctions within each style of reasoning, beginning with deduction. Two of the most common types of deductive arguments are categorical arguments and truth-functional arguments. The difference between the two lies in what

kinds of claims are presented in the argument. Although you will learn the details about how to evaluate these two kinds of deductive arguments in later chapters, for now the important skill you need to acquire is how to distinguish between them.

A **categorical argument** is a deductive argument that contains categorical claims. **Categorical claims** are claims that relate two categories of things. Although categorical claims can be expressed in many different ways, all categorical claims can be presented as one of only four formal sentence types. These formal sentences are called universal affirmative, universal negative, particular affirmative, and particular negative.

A **universal affirmative** claim expresses a positive claim about the relation between an *entire* category of things to another category of things. For example,

*All houses are buildings.*

A **universal negative** claim expresses a negative claim about the relation of an *entire* category of things to another category of things. For example,

*No fish are vegetables.*

A **particular affirmative** claim expresses a positive claim about the relation of a *portion* of a category of things to another category of things. For example,

*Some cars are Mustangs.*

Finally, a **particular negative** claim expresses a negative claim about the relation of a *portion* of a category of things to another category of things. For example,

*Some Americans are not truck drivers.*

Notice that each of these examples expresses a claim that relates two categories of things—that *all*, *none*, or *some* members of a particular category of things are or are not members of another category of things. Note that this is true even when the words *all* or *none* are left out, as in the following examples.

*Houses are buildings.*

*Fish are not vegetables.*

The first sentence could be formally restated as “All houses are buildings,” and the second sentence as “No fish are vegetables.” At this point, don’t worry about being able to distinguish between these four types of categorical claims. What’s more important is that you can identify when an argument contains categorical claims.

## EXERCISE 6.5

**Your Turn!** Provide your own example of each kind of categorical claim.



A **truth-functional argument** is a deductive argument that contains truth-functional claims. **Truth-functional claims** are claims that are composed of simple claims and logical operators. A **simple claim** is a claim that does not contain any other claim as a component. For example,

*Craig lives in Madison, Wisconsin.*

When one or more simple claims is combined with a logical operator, the resulting truth-functional claim is called a **compound claim**. Although they can be expressed in many different ways, all compound claims can be presented as one of only four types: negation, conjunction, disjunction, and conditional. In ordinary language these are claims containing the words *not*, *and*, *or*, and *if... then...*, or their equivalents.

A **negation** modifies a claim with the operator *not*. For example,

*Anne is not enrolled in this class.*

In this example, the simple claim “Anne is enrolled in this class” is modified by the operator *not*. A **conjunction** modifies two other claims with the operator *and*. For example,

*I have a job interview tomorrow, and I can’t find a babysitter.*

This sentence combines the simple claims “I have a job interview tomorrow” and “I can’t find a babysitter” with the operator *and*. A **disjunction** modifies two other claims with the operator *or*, as in this example:

*Either we can go see Clash of the Titans or we can see Iron Man 2.*

Here, the two simple claims, “We can go see *Clash of the Titans*” and “We can go see *Iron Man 2*,” are modified with the operator *or*.



**Hint!** Notice that the term *simple claim* refers to the components of a truth-functional claim, not to the number of claims expressed by the sentence. Thus, the claim, “Either we can go see *Clash of the Titans* or we can see *Iron Man 2*,” contains two simple claims, but these two parts are combined with the operator *or* to form one compound claim.

Finally, a **conditional**, sometimes referred to as a material implication, modifies two other claims with the operator *if... then...* For example,

*If you overdraw your account, then the bank will charge you a fee.*

Here, the two simple claims, “You overdraw your account” and “The bank will charge you a fee,” are modified by the operator *if... then...* Remember from Chapter 2 that conditional claims do not always appear in standard *if... then...* format, as in the following examples.

*The bank will charge you a fee if you overdraw your account.*

*I will make it to my job interview tomorrow only if I find a babysitter.*

*We will go see Clash of the Titans unless we go see Iron Man 2.*

## EXERCISE 6.6



**Your Turn!** Provide your own examples of each of the four kinds of truth-functional claims.

Determining whether a deductive argument is a categorical argument or a truth-functional argument is simply a matter of recognizing whether the argument contains categorical claims or truth-functional claims. Claims that relate two categories of things using the words equivalent to *all*, *none*, or *some* signal a categorical argument. Truth-functional claims—those which combine simple claims using logical operators—signal truth-functional arguments. However, since categorical arguments may contain the words *and* or *not*, distinguishing truth-functional arguments from categorical ones requires that you pay particular attention to disjunctions and conditional claims, that is, claims containing the words *or* and *if...then...*, or their equivalents. These operators are not found in categorical arguments.

### EXERCISE 6.7

**Your Turn!** Identify the following as a categorical or a truth-functional claim, and explain your decision.

*If all cats are mammals, then no cats are reptiles.*



Let's examine a couple of arguments before you try to identify some on your own. Consider the following argument.

*All snakes are reptiles. Some snakes are venomous. Therefore, some reptiles are venomous.*

The first thing to notice about this argument is that it is deductive. If the premises are true, then the conclusion must be true. If all snakes are reptiles and some snakes are venomous, then some reptiles *must be* venomous. Next, determine whether the argument is categorical or truth-functional. Notice that both the premises and the conclusion express claims about categories of things. It is, then, a categorical deductive argument. Compare it to the next one.

*If a snake has a rattle on its tail, then it is venomous. Since that snake has a rattle on its tail, it is venomous.*

Again, notice that this is a deductive argument. If the premises are true, then the conclusion must be true. Next, is this argument categorical or truth-functional? This argument doesn't contain claims about categories of things. Instead, it includes truth-functional claims, the most noticeable of which is the *if...then...* claim at the start of the argument. Thus, it is a truth-functional argument.

**Hint!** Sometimes categorical claims can be expressed as truth-functional claims, and vice versa. For example, the categorical claim "All birds are mammals" could be expressed as the truth-functional claim "If it is a bird, then it is a mammal." For now, decide whether the argument is categorical or truth-functional based on the way that it is presented to you.



Of course, there are many deductive arguments that contain neither categorical claims nor truth-functional claims, such as arguments from mathematics and arguments from definition. In these cases, the rules of categorical logic and truth-functional logic will not apply. However, you should still be able to identify the argument as deductive rather than inductive whenever the arguer uses the truth of the premises to guarantee the truth of the conclusion.

### How to Distinguish Kinds of Deductive Arguments

**Step 1:** Determine whether the passage is an argument, explanation, or neither.

- ▲ Does the passage contain at least two claims? If not, the passage is not an argument.
- ▲ Does at least one of the claims provide support to establish the truth of another? If not, the passage is not an argument.

**Step 2:** Determine whether the argument is deductive or inductive.

- ▲ Does the arguer attempt to demonstrate that the truth of the conclusion *necessarily* follows from the premises? If so, then proceed to Step 3.
- ▲ Does the arguer attempt to demonstrate that the truth of the conclusion *probably* follows from the premises? If so, then the argument is inductive, not deductive.

**Step 3:** Determine whether the argument includes categorical claims or truth-functional claims.

- ▲ Does the argument relate *all*, *none*, or *some* members of a category to another category of things? If so, then the argument is categorical.
- ▲ Does the argument include claims using the operator *or* or *if... then...*? If so, then the argument is truth-functional.

### EXERCISE 6.8

Determine whether each of the following deductive arguments is a categorical argument or a truth-functional argument.

1. If the laws of physics are always correct, then nothing can travel faster than light. And the laws of physics are always correct. So, nothing can travel faster than light.
2. Soccer players are baseball players. And baseball players aren't accordion players. Consequently, some soccer players are accordion players.
3. Either Naomi goes bowling or Miguel studies. Miguel does not study and Naomi goes bowling. It follows that if Miguel does not study then Naomi goes bowling.
4. Some ants are insects. Thus, no ants are caterpillars, given that some caterpillars are not insects.
5. Only pirates are parrot owners. This is because no pirates are landlubbers, and the only parrot owners are landlubbers.
6. If you passed geology, then you passed a science class. And if you passed a science class, then you have qualified for honors. Consequently, if you passed geology, then you have qualified for honors.

7. Every student takes critical thinking, and some students are math majors. So, many people who take critical thinking are math majors.
8. Anyone who reads philosophy books will immediately get smarter. Some people who get smarter will become president of the United States. So, anyone who reads philosophy books will become president of the United States.
9. The defendant must be found not guilty. A defendant is guilty of murder only if he intended to kill the victim, and my client, the defendant, had no such intention.
10. The mail carrier is the one who stole my package! I never received my package, and if the mail carrier stole my package, then I wouldn't receive it.

## Distinguishing Three Kinds of Inductive Arguments

Recall that an inductive argument is one in which the arguer attempts to prove that the truth of the conclusion *probably* follows from the premises. Three of the most common kinds of arguments utilizing inductive reasoning are analogical arguments, inductive generalizations, and causal arguments. Although you will learn the details about how to evaluate these three varieties of inductive arguments in later chapters, for now the important lesson is that you can distinguish them from each other.

An **analogical argument** is an inductive argument that uses an analogy to conclude that because one case has some feature, the other case should, too. As you can see by this definition, analogical arguments include analogies among their premises. An **analogy** is a claim that compares two (or more) things. Each of the following claims draws an analogy.

*Learning is like rowing upstream.*

*My love is like a red, red rose.*

*Life is a rollercoaster.*

To identify an analogical argument, look for an analogy among the premises of the argument. Consider the following example.

*Dogs are a lot like cats. Since I am allergic to cats, I am probably also allergic to dogs.*

The first thing to notice about this argument is that it is inductive. The argument's use of the inductive indicator word *probably* is a helpful clue. If the premises are true, the conclusion is at best probably true. Next, notice that among the argument's premises, there is an analogy comparing dogs to cats. So, the passage must be an analogical argument.

An **inductive generalization** concludes that some, most, or all of a particular group has some feature based on evidence that a portion of that group has the feature. The conclusion of an inductive generalization will, then, be a general claim. A **general claim** makes a statement about all, most, or many members of a group or set. Each of the following is a general claim.

*All swans are white.*

*One-third of college students smoke cigarettes.*

*Junk food is high in calories.*

Inductive generalizations differ from analogical arguments in that analogical arguments compare two or more different things, whereas the comparison made in an inductive generalization is of a sample of some group to a larger portion (perhaps all) of that *same* group. Consider the following example.

*I have suffered an allergic reaction to every cat I've ever encountered. I bet I'm allergic to all cats.*

First, you should recognize this as an inductive argument. If the premises are true, the conclusion is only probably true. It is likely that I am allergic to all cats, but there may be some cats that will not trigger an allergic reaction. Next, what kind of inductive argument is this? Like analogical arguments, this argument makes a comparison, this time between those cats I've encountered in the past and all cats. But, notice that the conclusion makes a general claim, one about *all* cats, based on a claim about a portion of that same group, namely the cats I have encountered.



**Hint!** Sometimes you may be unsure whether an argument containing claims about all, some, or none of a group is an inductive generalization or a categorical argument. In these cases, remember that inductive generalizations are inductive arguments and categorical arguments are deductive arguments. If you first determine whether the argument is deductive or inductive, you will avoid this confusion.

A **causal argument** is an inductive argument that provides evidence to conclude that some causal claim is true. A **causal claim** is a claim about the cause of some event. For example, each of the following expresses a causal claim.

*Smoking causes cancer.*  
*Civil unrest results from political repression.*  
*The root of sexual violence is pornography.*

The first sentence expresses the claim that cancer is *caused* by smoking. The second sentence expresses the claim that civil unrest is *caused* by political repression, and the third sentence expresses the claim that sexual violence is *caused* by pornography. Notice that even though the second and third examples do not utilize the word *cause*, nonetheless each makes a causal claim. In causal arguments, the conclusion is always a causal claim. Consider this example.

*Every time my mom has visited me in the past 10 years, she has had classic symptoms of an allergic reaction, including sneezing, itchy eyes, and congestion. But this year when she visited, she did not have any allergy symptoms. Given that my cat died last December, my mom's allergies must have been caused by the cat.*

The first thing to notice about this example is that it is an inductive argument. If the premises are all true, the conclusion is at best probable. Second, notice that the conclusion of the argument is a causal claim. The arguer concludes that his or her mom's allergy symptoms were caused by being near a cat.

### How to Distinguish Kinds of Inductive Arguments

**Step 1:** Determine whether the passage is an argument, explanation, or neither.

- ▲ Does the passage contain at least two claims? If not, the passage is not an argument.
- ▲ Does at least one of the claims provide support to establish the truth of another? If not, the passage is not an argument.

**Step 2:** Determine whether the argument is deductive or inductive.

- ▲ Does the arguer attempt to demonstrate that the truth of the conclusion *necessarily* follows from the premises? If so, then the argument is deductive, not inductive.
- ▲ Does the arguer attempt to demonstrate that the truth of the conclusion *probably* follows from the premises? If so, then proceed to Step 3.

**Step 3:** Determine whether the argument includes an analogy, a general claim, or a causal claim.

- ▲ Do the premises include a claim comparing one thing to one or more others? If so, then the passage is an analogical argument.
- ▲ Does the conclusion make a general claim about all, most, or many of a group or set? If so, then the passage is an inductive generalization.
- ▲ Does the conclusion make a causal claim? If so, then the passage is a causal argument.

### EXERCISE 6.9

Determine whether each of the following inductive arguments is an analogical argument, an inductive generalization, or a causal argument.

1. You like spaghetti, and you like pizza. Since they are both Italian foods and made with vegetables, meat, and tomato sauce, you should also like lasagna.
2. You like spaghetti and pizza, and they are both Italian foods. You probably like all Italian foods.
3. Bill, Juan, and Franklin work in the IT department, and they are really bright. Thus, it's likely that all members of the IT department are really bright.
4. There is substantial evidence that tooth decay is caused by a combination of bacteria and food in the mouth. Under laboratory conditions, subjects with both bacteria and food in their mouths developed an average of four cavities



each. In contrast, those subjects in a bacteria-free environment who ate normal food, and those who had the bacteria but were fed intravenously, did not develop any cavities.

5. The bugs that were eating the spinach in my garden have disappeared. Given that I surrounded my garden with marigolds, the marigolds must have caused the bugs to disappear.
6. Each of my five classes at UNC Chapel Hill has been held in a large lecture hall. I expect that all of my classes here will be in large lecture halls.
7. In a small study in New York, half the members of a university choir were given three cigarettes to smoke. The other half of the choir did not smoke any cigarettes. Afterwards, all were tested on their ability to hit a variety of notes. The “smokers” did not do well on the test, demonstrating that smoking really does hurt the vocal cords.
8. Horses, dogs, and cats all can be taught tricks by using positive reinforcement and lots of food treats. Thus, birds are probably trainable in the same way.
9. Blair, Roscoe, Neil, and Nick are all poets, and they all smoke cigarettes. Therefore, all poets probably smoke cigarettes.
10. Since Indianapolis, Fort Wayne, and Lafayette all have wild animal zoos, Bloomington likely also has a wild animal zoo. After all, Bloomington is a lot like the other three cities.
11. On August 23, 2009, Desiree Jennings, a healthy, vibrant woman, was administered the seasonal flu shot at a local grocery store. Ten days later, she came down with the flu and began having seizures. She now has difficulty speaking, walking, and eating. Doctors have diagnosed Ms. Jennings with a neurological condition called dystonia. Given that Desiree Jennings was perfectly healthy before getting the flu shot, it looks like her dystonia was caused by a severe reaction to the seasonal flu vaccine.
12. The two Democratic senators who supported abortion rights and same-sex marriage were opposed for reelection last year by the Committee for Family Values. Since Senator Brown supports abortion rights and same-sex marriage, and she is up for reelection next year, we can expect the CFV to oppose her, too.
13. There’s been a lot of controversy over whether or not life on other planets is possible. Well, Mars is like Earth. Since Earth can support life, Mars is likely able to support life as well.
14. A recent survey of the residents of Macon, Georgia, found that 45% of the adult population uses tobacco. It’s reasonable to conclude, then, that 45% of the adult population of the entire state uses tobacco.
15. The area along the Mississippi River between New Orleans and Baton Rouge, populated by chemical plants, plastic plants, fertilizer manufacturers, electrical power plants, and oil refineries, was dubbed “Cancer Alley” by activists in the 1980s. The residents of Cancer Alley have unusually high rates of stillbirths, asthma, miscarriages, neurological disease, and cancer. For example, in Gonzales, a small town of 18,000 residents, there have been three documented cases of rhabdomyosarcoma, a rare form of cancer normally found in one in one million children. It seems likely, then, that these health problems are a result of the pollution in the area.

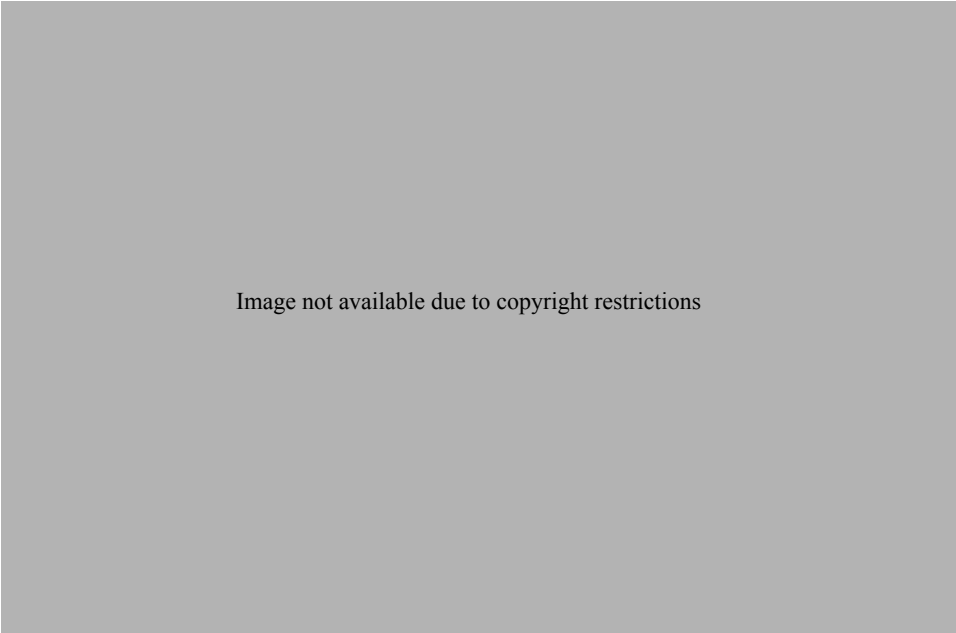


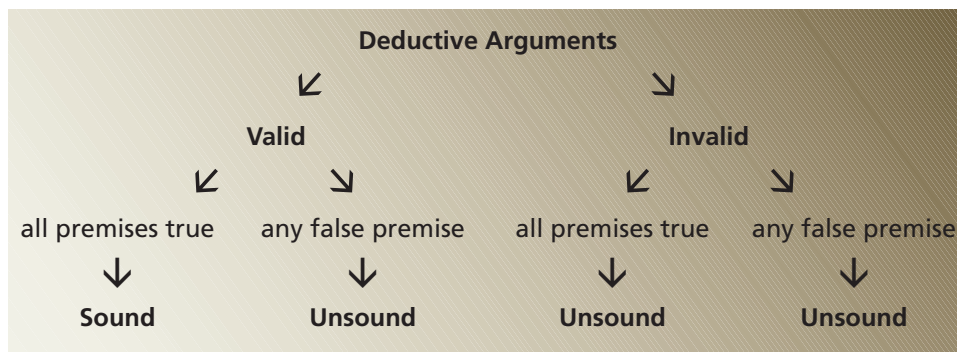
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## Choosing Proper Evaluative Terms

When we evaluate any argument, we consider two questions. First, does the argument have a good structure? Second, are all of the premises true? How we go about answering these questions, however, depends upon what kind of argument we are evaluating. Because the style of reasoning differs, the terms used to evaluate deductive arguments differ from the terms used to evaluate inductive arguments. When evaluating deductive arguments, we use the language of *validity* and *soundness*; when evaluating inductive arguments, we use the language of *strength* and *cogency*. Let's explore what each of these terms means by examining how to evaluate deductive and inductive arguments.

The first step in evaluating an argument is to consider whether the premises support the conclusion as intended. Recall that a deductive argument is one in which the arguer attempts to demonstrate that the truth of the conclusion *necessarily* follows from the premises. When the arguer succeeds in this attempt, the argument is valid. A **valid deductive argument**, thus, is one in which, if the premises are true, then the conclusion must be true. In other words, it is impossible in a valid argument for true premises to produce a false conclusion. Deductive arguments that fail to support the conclusion as intended are called invalid arguments. Notice that whether the premises are in fact true or false is irrelevant to whether the argument is valid or invalid. The judgment of whether a deductive argument is valid or invalid is based entirely on the *structure* of the argument, not the truth-values of the argument's premises.

Once you have determined whether a deductive argument is valid or invalid, you can next judge whether it is sound or unsound. A **sound deductive argument** is a valid argument with all true premises. As you can see from this definition, there are two requirements for soundness: the argument must be valid, and the argument must contain all true premises. If an argument is invalid, then it is unsound, and if a valid argument has any false premises, it, too, is unsound.



This flowchart demonstrates that you can evaluate deductive arguments at two different levels. The first level—concerning an argument’s validity—focuses on the *structure* of the argument. The *truth* of the premises is evaluated at the second level. This means that a deductive argument can have a good structure and yet still be unsuccessful because it contains one or more false premises. Additionally, a deductive argument can have all true premises and yet still be an unsuccessful argument because it does not have good structure.

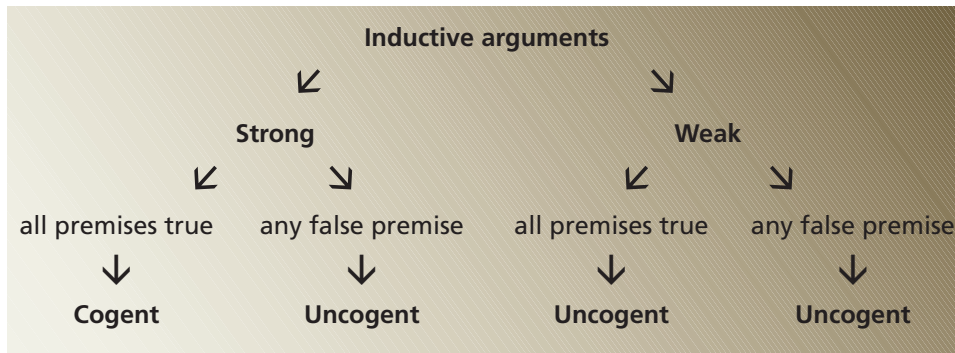
### EXERCISE 6.10



**Your Turn!** Which of the five kinds of arguments that you learned to identify in this chapter are evaluated using the language of validity and soundness?

The first step in evaluating an inductive argument, as in evaluating deductive arguments, is to consider whether the premises support the conclusion as intended. However, although the answer is “yes” or “no” when it comes to determining whether a deductive argument has good structure, for inductive arguments the answer will range on a continuum from better to worse. Recall that an inductive argument is one in which the arguer attempts to demonstrate that the truth of the conclusion *probably* follows from the premises. The likelihood that a conclusion of an inductive argument is true depends upon how well the premises support the conclusion. **Strong inductive arguments** have premises that, if true, make the conclusion probable. Inductive arguments in which the premises, if true, do not make the conclusion probable are weak. Notice that whether the premises are in fact true or false is irrelevant to the strength of the argument. The judgment of whether an inductive argument is strong or weak is based entirely on the structure of the argument, not the truth-values of the argument’s premises.

Once you have assessed the strength of an inductive argument, you can next judge whether it is cogent or uncogent. A **cogent inductive argument** is a strong argument with all true premises. That means that there are two requirements for cogency just as there are two requirements for soundness. The argument must be strong and the argument must contain all true premises. If an argument is weak, then it is uncogent, and if a strong argument has any false premises, then it is uncogent.



Like the previous flowchart for deductive arguments, this flowchart demonstrates that you can evaluate inductive arguments at two different levels. The first level focuses on the *structure* of the argument. The *truth* of the premises is evaluated at the second level. This means that an inductive argument can have a good structure and yet still be an unsuccessful argument because it contains one or more false premises. Additionally, an inductive argument can have all true premises and yet still be an unsuccessful argument because it does not have good structure.

### EXERCISE 6.11

**Your Turn!** Which of the five kinds of arguments that you learned to identify in this chapter are evaluated using the language of strength and cogency?



Using the skills you learned in this chapter, namely distinguishing the kinds of arguments and choosing the corresponding evaluative terms, let's prepare to evaluate the argument that you encountered at the beginning of this chapter.

*If the government of the United States is really built on the notion that all people are fundamentally equal, then every person would be equally treated under the law. But it's clear that not everyone is treated equally, because crimes committed by wealthier individuals result in much lighter sentences than those committed by poor people. So, we must conclude that the government of the United States is not really built on the idea of fundamental equality among persons.*

A Formal Analysis shows that this is a chain argument.

- P:** Crimes committed by wealthier individuals result in much lighter sentences than crimes committed by poor people.  
**∴** Not everyone is treated equally in the United States.

- P1:** If the government of the United States is really built on the notion that all people are fundamentally equal, then every person would be equally treated under the law.
- P2:** Not everyone is treated equally in the United States.
- 
- ∴** The government of the United States is not built on the idea of fundamental equality among persons.

**Issue:** Whether the government of the United States is built on the idea of fundamental equality among persons

First, determine what style of reasoning is used in the main argument. Assuming that the premises are true, does the conclusion of the main argument follow by necessity or probability? After carefully reading the argument, you should be able to see that the conclusion follows by necessity. Thus, this is a deductive argument. Next, you need to determine what kind of deductive argument it is. Does it contain categorical claims or truth-functional claims? Since the argument utilizes a conditional claim in the first premise, the passage is a truth-functional argument. Finally, which terms would be used to evaluate this argument? Since the argument is deductive, the argument is either valid or invalid, and sound or unsound.

### EXERCISE 6.12



**Your Turn!** If this argument contained categorical claims rather than truth-functional claims, which evaluative terms would be used?

Now that you have learned how to distinguish between different kinds of arguments, and you have learned the proper evaluative terms to use, you are ready to learn how to evaluate arguments. The remainder of this textbook will guide you through the evaluation of each of the five kinds of arguments you have learned to identify. Chapters 7 and 8 instruct you on evaluating categorical arguments and truth-functional arguments, respectively, whereas Chapters 9, 10, and 11 instruct you on evaluating analogical arguments, inductive generalizations, and causal arguments.

### EXERCISE 6.13

Determine whether each of the following arguments is a categorical argument, a truth-functional argument, an analogical argument, an inductive generalization, or a causal argument. Then, identify the terms that would be used to evaluate that argument.

1. You can expect to see most states offering drug treatment programs as an alternative to jail or prison sentences for first-time drug offenders. This is because eight states now offer drug treatment. These states report that they have fewer repeat offenders and they save money.
2. Anand is the new chess grand master. This is because he beat Topalov, and if he beat Topalov, then Anand is the new chess grand master.
3. I developed a terrible case of laryngitis over the weekend. Since I don't have any cold symptoms but did an unusual amount of yelling in the second half of the basketball game, my laryngitis must be the result of yelling so much.

4. All trumpet players are pianists. And some trumpet players are not guitar players. Consequently, some pianists are not guitar players.
5. The number of food recalls has increased in each of the last three years, and nothing seems to suggest that this trend will change. Thus, it is likely that the number of recalls will keep rising and rising.
6. Either Miles Davis or Louis Armstrong is the best jazz musician of all time. Since Louis Armstrong can't be the best jazz musician of all time, Miles Davis must be.
7. You clearly have a case of the fungal infection called ringworm. This is because you have a red, elevated, ring-like sore on your arm, and if you have ringworm, then you will have sores like those.
8. The number of students in criminology has increased each of the last three years. During this three-year period, more forensic crime series have been shown on television. The crime rate has been different for each year, the number of new jobs available has been different each year, and the recruiting has diminished each year. Thus, it is clear that the larger number of forensic crime programs on television has resulted in an increase in criminology majors.
9. The LSU football team beat Tulane in 2007; they beat Loyola in 2008; and they beat Northwestern in 2009. Since UNO's football team is a lot like the football teams at Tulane, Loyola, and Northwestern, LSU will certainly beat UNO in 2010.
10. If we don't have a tax increase, Stony Brook tuition will go up again. However, the governor refuses to raise taxes because he promised voters that he wouldn't when he ran for office. For these reasons, we'll be paying more to go to school next year.
11. According to Fay Elahi, a Dallas nutritionist, there may be a link between pesticides and ADHD (Attention Deficit Hyperactivity Disorder). She says that she stopped serving her family any foods produced with pesticides, and afterward her formerly noncompliant daughter became compliant and better able to focus at school.
12. You should buy locally grown produce if you want to support small farmers in your region. Given that you don't buy locally grown produce, you must not care about small farmers.
13. There is no doubt that many pesticides are dangerous to human health. This follows from the fact that many pesticides are dangerous to the environment, and all things that are dangerous to the environment are also dangerous to human health.
14. A nickel is like a quarter. Since whenever I flipped a quarter it came up heads, when I flip a nickel it will also come up heads.
15. Lawyers have advanced degrees, and they make a much higher than average salary. High school teachers also have advanced degrees, and so they, too, make a much higher than average salary.
16. I compared the cost of six different PCs, and each cost 20% more at The Discount Computer Store than at Electronics-R-Us. Since Macs are a lot like PCs, I bet their Mac prices are higher, too.
17. Some Macs are vulnerable to computer viruses, since all Macs are computers, and most computers are vulnerable to viruses.
18. Most people nationwide would be pleased if their son or daughter became a registered nurse. Over 75% of respondents in a poll of 1,000 people nationwide said they would be pleased if their child became a registered nurse.

19. In a university study, 42 students were randomly chosen to be exposed to either sexually violent or sexually nonviolent materials. Afterward, the students' aggression was assessed, and no significant differences were found between the two groups. It is evident, then, that violent pornography does not make its viewers more violent.
20. Several fashion designers at a recent Paris exhibition made a point of using recycled materials in their fall lines of clothing. Therefore, we can expect most fashion designers to bring recycled materials into their collections.

### Putting It All Together: Writing A Complete Analysis

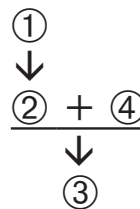
In Chapter 3 you learned how to write a Basic Analysis, in Chapter 4 you learned how to include an argument diagram with your analysis, and in Chapter 5 you learned how to detect fallacious reasoning. Now, you can write a Complete Analysis by combining each of these skills with the identification of the kind of argument.

Suppose, for example, you are discussing world religions with a friend, and he says the following.

*Buddhists do not worship God, so Buddhism isn't theistic. Therefore, Buddhism isn't a religion, since all religions are theistic.*

First, decide whether the passage is an argument, an explanation, or neither. The inference indicators *so*, *therefore*, and *since* signal that there are two conclusions and a premise. This means that there are multiple arguments. Next, determine whether the argument commits a fallacy. Since it does not, diagram it.

- ① *Buddhists do not worship God, so* ② *Buddhism isn't theistic. Therefore,*  
 ③ *Buddhism isn't a religion, since* ④ *all religions are theistic.*



In presenting your analysis of the argument, you should analyze the main argument in the first paragraph and the subargument in the second paragraph. Finally, you should identify the kind of argument in the last paragraph. Notice that the conclusion of the main argument necessarily follows if its premises are true. That means that the argument is deductive. Next, notice that there is a categorical claim in the argument. This means that it is a categorical argument, so your Complete Analysis should read as follows.

**This passage contains an argument. The issue is whether Buddhism is a religion. The conclusion is that Buddhism is not a religion. The first premise is that Buddhism isn't theistic. The second premise is that all religions are theistic.**



**This passage contains a subargument. The intermediate conclusion is that Buddhism isn't theistic. The premise is that Buddhists do not worship God. The argument is a deductive categorical argument.**

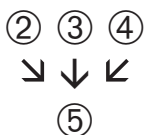
Remember to ensure that the Basic Analysis matches the diagram. The main argument has only two premises, claims ② and ④, so these should appear as the only premises in the first paragraph. The subargument is analyzed in a separate paragraph.

Now, let's work through one more example before you try some on your own.

*ShopperTrak provides shopper-traffic counting technology and data analysis for retail businesses. According to ShopperTrak's Retail Traffic Index (SRTI), shopping traffic rose by 1.1% in Manhattan, by 1.6% in Chicago, and by 0.9% in Beverly Hills. It's likely that shopping traffic rose by approximately 1% across the United States.*

First, determine whether the passage is an argument, explanation, or neither. Given that the passage contains at least two claims and that one of these claims is supported by another, the passage is an argument. The claim that is being supported is expressed in the last sentence, and the premises for it are expressed in the second sentence. Notice that the first sentence, although it is a claim, is neither a premise nor a conclusion of the argument. Next, determine whether the argument commits a fallacy. Since it does not, you should diagram it. Are the premises linked or convergent? Notice that the premises are independent of each other; if one were false, the others could still support the conclusion.

① *ShopperTrak provides shopper-traffic counting technology and data analysis for retail businesses.* According to ShopperTrak's Retail Traffic Index (SRTI), ② *shopping traffic rose by 1.1% in Manhattan,* ③ *by 1.6% in Chicago,* and ④ *by 0.9% in Beverly Hills.* It's likely that ⑤ *shopping traffic rose by approximately 1% across the United States.*



To complete the analysis, you must determine the kind of argument. Notice the inference indicator, *it's likely*, in front of the conclusion. This signals that the argument is inductive. Is the conclusion a causal claim? It is not. Is the conclusion a general claim? Yes, it is. This argument generalizes from a sample of three U.S. cities to the United States as a whole. Your Complete Analysis should, then, read as follows.

**This passage contains an argument. The issue is whether shopping traffic rose approximately 1% across the United States. The conclusion is that shopping traffic rose approximately 1% across the United States. The premises are that shopping traffic rose by 1.1% in Manhattan, it rose by 1.6% in Chicago, and it rose by 0.9% in Beverly Hills.**

**The argument is an inductive generalization.**



**Directions for a Complete Analysis**

In *paragraph form*, use complete sentences and proper English grammar and spelling to do the following:

**Step 1:** Write a Basic Analysis of the passage. (You may want to refer to the Directions for Basic Analysis, Chapter 3, page 49.)

**Step 2:** If the passage contains an argument, determine whether the argument commits a fallacy. If it does, write a separate paragraph identifying the fallacy committed, and explaining how this fallacy is committed.

**Step 3:** If the argument does not commit a fallacy, diagram it and verify that the diagram is consistent with your Basic Analysis.

**Step 4:** In a separate paragraph, identify the kind of argument.

- ▲ If the argument is deductive, identify it as a categorical argument or a truth-functional argument.
- ▲ If the argument is inductive, identify it as an analogical argument, an inductive generalization, or a causal argument.

**EXERCISE 6.14**

For each of the following, provide a Complete Analysis of the passage.

1. I have owned this computer since 2006.
2. I'm sure that most computers cost over \$500, since I paid well over that price for the last two I bought.
3. People who have computer addictions will likely benefit from psychological counseling services. This is because computer addictions are like drug addictions, and people with drug addictions often benefit from psychological counseling.
4. A just society is not possible unless philosophers rule.
5. Either a society must be ruled by philosophers or it will be unjust. It follows that there is no just society since no societies are ruled by philosophers.
6. Any society ruled by philosophers is a just one. No society is ruled by philosophers. Therefore, no societies are just.
7. In his book, *Republic*, Plato argues that philosophers are the only persons fit to rule a society. But, we can dismiss what Plato says since he is a philosopher himself.
8. The defendant murdered the victim because she was angry with him for having an affair.
9. An "online affair" is just like an affair in person because they both devalue their primary partners. Since divorce is the appropriate response to an affair in person, it is also an appropriate response to an online affair.
10. According to licensed therapist Holly Hein, nearly 70% of married men and 60% of married women have had affairs. She reports that, among her clients, 8 out of 10 who have committed adultery regret having done so. It's reasonable to conclude, then, that about 80% of all adulterers regret having cheated.

11. Does poverty cause crime? Most definitely. Last year, unemployment rates rose from 15% to 25%, and crime rates rose in a similar fashion.
12. Does poverty cause crime? Not at all. Many crimes, such as domestic violence and sexual assault, are notoriously underreported. We'll never know just how prevalent crime is unless the stigma attached to being victimized is overcome.
13. It seems that either the federal government needs to figure out a consistent policy regarding illegal immigrants or individual states will each have to create a plan to protect themselves. Since the federal government seems to be unable to figure out a consistent policy, it's clear what option remains.
14. Either developed countries can continue to send billions of dollars to poor countries without much to show for their efforts or they can begin to do serious research to find a way to actually help people in these countries. Since the developed countries will not continue to send money to poor countries given that developed countries are themselves in economic trouble, they will finally begin to do some serious research to develop plans that will help.
15. In 2010, an oil drilling rig leased by British Petroleum (BP) was damaged from an explosion, and oil began gushing out of a broken pipe into the Gulf of Mexico. Less than one month after the accident, 156 sea turtles have been found dead or debilitated along the Gulf Coast. Since this is a much higher amount than what is typical for the season, it is reasonable to conclude that the sea turtle deaths are a result of the oil spill.



A dead turtle lies in the surf following the massive oil spill in the Gulf of Mexico in 2010.

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### Chapter Review Questions

1. What is the difference between inductive reasoning and deductive reasoning?
2. What is a categorical argument?
3. What is a truth-functional argument?
4. How can you distinguish between categorical arguments and truth-functional arguments?
5. What is an analogical argument?
6. What is an inductive generalization?
7. What is a causal argument?
8. How can you distinguish between analogical arguments, inductive generalizations, and causal arguments?
9. What are the two questions that you ask when evaluating arguments?
10. What terms are used in evaluating deductive arguments?
11. What terms are used in evaluating inductive arguments?

# Evaluating Categorical Arguments

## CHAPTER

# 7

Imagine you are visiting your family during winter break. Your dad mentions that he's been concerned about your younger brother, Tony. He presents the following argument.

*We're certain that Tony's friend, Jason, is taking drugs. His eyes are always red, and we all know that people on drugs have red eyes.*

How convincing is your father's reasoning in this case? Suppose the premises really are true: Yes, Tony's friend, Jason, has reddened eyes, and yes, people on drugs do sometimes have reddened eyes. But does this conclusion follow from these premises? You may have already recognized this as a categorical argument since you learned how to distinguish between different kinds of arguments in Chapter 6. In this chapter, you'll learn to recognize, analyze, and evaluate categorical arguments such as this one.

The formal system of categorical arguments has been an important part of logic since Aristotle systematized it in Ancient Greece over 2,000 years ago. A categorical argument is a kind of deductive argument often presented in the form of a syllogism. A **syllogism** is a formal argument containing two premises and a conclusion. In categorical syllogisms all three claims (the two premises and conclusion) are categorical claims. So, in order to recognize categorical arguments, the first thing you need to learn is the language of categorical claims.

## Recognizing Categorical Claims

Chapter 6 explained that **categorical arguments** are deductive arguments containing categorical claims, and that **categorical claims** relate two categories of things. The following are some examples of categorical claims:

*All pies are desserts.*

*Horned toads are not amphibians.*

*Some western raptors are endangered birds.*

*A few Hollywood movies aren't available for home viewing.*

You may readily recognize the first and third sentences as categorical claims; the second and fourth sentences are also categorical claims because they relate two categories, or classes. Although you can express the content of a categorical claim in a great number of different ways, all claims in categorical logic are expressed by using one of four types of formal sentences. When claims follow the formal rules of expression in one of those four types, they are in **standard form**.

Here are examples of the four kinds of standard form claims.

- |                       |  |
|-----------------------|--|
| (1) All S are P.      | <i>All cats are mammals.</i>                   |
| (2) No S are P.       | <i>No turnips are apples.</i>                  |
| (3) Some S are P.     | <i>Some violins are musical instruments.</i>   |
| (4) Some S are not P. | <i>Some root beer floats are not desserts.</i> |

Each part of sentences (1)–(4) has a name and a function. In each sentence, S (or, in the examples, *cats*, *turnips*, *violins*, and *root beer floats*) is called the **subject term**. Since the subject term identifies a class, group, or set, in formal language it is always expressed as a plural noun. The letter P (or *mammals*, *apples*, *musical instruments*, and *desserts*) in each sentence must also be stated as a plural noun and is called the **predicate term**. The verbs that link the subject and predicate terms together, *are* and *are not*, are known as the **copula**. In standard form, the subject term precedes the copula and the predicate term comes after it.

### EXERCISE 7.1



**Your Turn!** Identify the subject term, the predicate term, and the copula for the following claim.

*No dogs are fish.*

The term that begins each of the four previous sentences is the most difficult to understand. This term is called the **quantifier**, and it has two different functions. It identifies both the *quantity* and the *quality* of the claim. First, the *quantity* is either universal or particular. A claim has a universal quantity if it refers to every member of the subject group. A claim whose quantity is particular refers to less than every member of the subject group. So, since the first example (1) has a quantifier of *all*, it refers to each and every member of the group *cats*. The quantity of claim (1) is, thus, universal. The third sentence (3) is particular, because the word *some* means *at least one*, but not necessarily all.

The *quality* of the claim is determined by whether the quantifier includes or excludes the members of the subject class as members of the predicate class. When the members of the subject term are *included* in the predicate class—as in examples (1) and (3)—then the quality is affirmative. When they are *excluded*—as they are in (2) and (4)—the quality is negative.

Each categorical claim is distinguished and identified by its quantifier and copula; that is to say, by its quantity and quality. Thus, claim (1) is known as a **universal affirmative**, or an A claim. Claim (2) is an E claim—a **universal negative**. Claim (3) is

a **particular affirmative**, an I claim, and claim (4) is a **particular negative**, an O claim. It's thought that the letters—introduced in the Middle Ages—come from the first two vowels in *affirmo* (I affirm) and *nego* (I deny). These four claims are often represented using single letters, S and P (for subject term and predicate term, respectively), to stand in as variables for the plural nouns.

	Kind of claim	Quantity	Quality	Standard form
A		Universal	Affirmative	All S are P.
E		Universal	Negative	No S are P.
I		Particular	Affirmative	Some S are P.
O		Particular	Negative	Some S are not P.

## EXERCISE 7.2

To get practice using the new terminology, try applying it in these ways.

**Example:** Take a standard form A claim. Change the *quality* but not the *quantity*.

**Procedure:** The standard form A claim is “All S are P.” The quantity is universal and the quality is affirmative. So, keeping the quantity universal, change the quality from affirmative to negative. Thus, you now have an E claim.

**Answer:** No S are P.

1. Take a standard form E claim. Change the quality but not the quantity.
2. Take a standard form I claim. Change the quality but not the quantity.
3. Take a standard form O claim. Change the quality but not the quantity.
4. Take a standard form A claim. Change the quantity but not the quality.
5. Take a standard form I claim. Change the quantity but not the quality.
6. Take a standard form O claim. Change the quantity but not the quality.
7. Take a standard form O claim. Change the quantity *and* the quality.
8. Take a standard form E claim. Change the quantity *and* the quality.
9. Take a standard form A claim. Change the quantity *and* the quality.
10. Take a standard form I claim. Change the quantity *and* the quality.
11. “No dogs are terriers.” Change the quality but not the quantity.
12. “Some fleas are insects.” Change the quality but not the quantity.
13. “All violins are musical instruments.” Change the quality but not the quantity.
14. “Some oranges are not vegetables.” Change the quantity but not the quality.
15. “No oranges are vegetables.” Change the quantity but not the quality.
16. “All vegetables are oranges.” Change the quantity but not the quality.
17. “No desks are office furniture.” Change both the quality and the quantity.
18. “All rhinos are pterodactyls.” Change both the quality and the quantity.
19. “Some glasses are dishes.” Change both the quality and the quantity.
20. “Some books are not logic texts.” Change both the quality and the quantity.



Poor translations can be misleading (and amusing).



David donohue/Alamy

### Translating Categorical Claims

Now that you've learned the basics of standard form, you can turn your attention to arguments in ordinary English. Many arguments expressed in everyday English are actually categorical syllogisms even though they do not appear in standard form. In order to analyze and evaluate these arguments, each claim must first be translated into standard form. Translating these claims from English into standard form is just like translating from one language into another. In either case, the translator must take care to use the proper grammar so the translated sentence makes sense. The translated claim must also retain the identical meaning of the original. In this chapter, you will find a number of tools to assist you in translating categorical claims, but first we must clarify the requirements of the standard form.

All standard form claims must have plural nouns as subject and predicate terms. Sometimes claims already use plural nouns, so when translating these into standard form you may just retain what has been given. However, you will also encounter categorical claims that don't have subject and predicate terms given as plural nouns. For these kinds of claims, you will have to determine how you can retain the original meaning while providing plural nouns for both the subject and predicate terms. Fortunately, some common examples will provide basic rules for you to follow.

Universal claims sometimes use the pronouns *whoever*, *whatever*, *wherever*, and *whenever*. These pronouns can be readily translated into standard form by replacing them with the general terms, respectively, *people*, *things*, *places*, and *times*. Let's translate an example of each of these. Notice that the pronouns indicate that the claim is universal, and the subject term will be the term immediately following the pronoun.

*Whoever studies seriously will do well on the test.*

Translation: All people who study seriously are people who will do well on the test.

*Whatever can be done should be done.*

Translation: All things that can be done are things that should be done.

*She goes wherever the wind blows her.*

Translation: All places the wind blows her are places she goes.

*Whenever the alarm rings, James wakes up.*

Translation: All times the alarm rings are times James wakes up.

### EXERCISE 7.3

**Your Turn!** Translate the claim, “Wherever extreme poverty exists, life expectancy is low,” into standard form following the previous rules.



Since subject and predicate terms in standard form are translated as plural nouns, adjectives, prepositional phrases, and other modifying terms must be accompanied by a suitable plural noun which may be missing in the original. For example, in English someone might make this kind of claim.

*All apples are red.*

Initially, this claim looks to be already in standard form. It has a proper quantifier and copula. Also, *apples* is already a plural noun, so that doesn’t need changing. However, *red* is an adjective, not a noun. In order for this claim to be a proper categorical claim—that is, to have the proper *grammatical* form—you must make the predicate term a plural noun modified by the adjective *red*. One way to do that is to again employ the appropriate general noun.

Translation: All apples are *red things*.

The predicate term is now *red things*.

Here’s another kind of claim in ordinary English.

*No Americans are in combat.*

Again, the quantifier is fine, as is the copula. The subject term is already a plural noun, so you need not change it. However, since *in combat* is a prepositional phrase and not a plural noun, you must add a plural noun for *in combat* to modify. The noun must make sense not only with the modifying phrase but also with *Americans*, since the sentence is relating the subject and predicate terms. The best translation again uses the general noun that fits the prepositional phrase.

Translation: No Americans are *people* in combat.

By using a general noun, you avoid a problem that can occur in this kind of sentence. Since the quantity is *all*, if you translate the predicate as *Americans in combat* you



have turned the predicate group into a mere subset of the subject group. For example, if you translated the claim as “No Americans are Americans in combat,” then the members of the predicate group are all members of the subject group. You can avoid that potential problem by using a noun that is more general, or broader, than the subject term. In this case, *people* is more general than *Americans*.

### EXERCISE 7.4



**Your Turn!** For the claim, “All zebras are living on the African continent,” provide two different plural nouns that are *more general than* the subject term.

### Guidelines for Translating Categorical Claims

- ▲ *Whoever* introduces the subject of an A claim. The subject and predicate terms should be expressed in terms of *people*.
- ▲ *Whatever* introduces the subject of an A claim. The subject and predicate terms should be expressed in terms of *things*.
- ▲ *Wherever* introduces the subject of an A claim. The subject and predicate terms should be expressed in terms of *places*.
- ▲ *Whenever* introduces the subject of an A claim. The subject and predicate terms should be expressed in terms of *times*.
- ▲ Subject and predicate terms must be plural nouns.
- ▲ The predicate category cannot be a subset of the subject category.

### EXERCISE 7.5

Determine whether the subject and predicate terms are in standard form. For those that are not, translate them into standard form.

1. No fish are reptilian.
2. Wherever there's smoke there is fire.
3. Some violins are expensive.
4. Whoever makes the mess should clean it up.
5. Some contemporary music is terrible.
6. All physicians are in the military.
7. Whatever goes up must go down.
8. Some people who want a second chance are out of luck.
9. No jockeys are horse lovers.
10. I feel a pain in my heart whenever I hear her voice.
11. All peanut butter candies are wrapped individually.
12. All of the stagehands are in the cast.
13. Some birds on the wire are not available for photos.
14. All students study in the library.
15. Some tunes are songs.

Another problem that will arise in translating ordinary language claims into standard form occurs in sentences referring to individuals or using proper names. This is because they refer to an individual, but categorical subjects and predicates must be classes or groups. The solution is to treat individuals as the lone member of a group of one. So, as odd as it may sound, translate individuals by using the words *identical to* as shown in the following examples.

*James is a fine student.*

Translation: All people identical to James are fine students.

*King Kong is a classic monster movie.*

Translation: All movies identical to *King Kong* are classic monster movies.

*My ticket was not expensive.*

Translation: No tickets identical to my ticket were expensive purchases.

### EXERCISE 7.6

**Your Turn!** Using the previous translation rules, translate the claim, “General Motors is in economic trouble,” into standard form.



The terms *only* and *the only* merit special attention. The reason is each has a logical meaning that is not readily apparent but rather easily forgotten or ignored during translation. To get the correct meaning, you must remember that *only* introduces the *predicate* term of an A claim. *The only* introduces the *subject* term of an A claim. These rules hold wherever those terms are located in the sentence. You must learn how to translate these two terms accurately, for they are very important and their meaning is not always intuitively clear.

*Only apples are fruit.*

Translation: All fruit are apples.

The word *only* introduces the predicate term. That means *apples* is the predicate, so *fruit* must be the subject term.

*The only vegetables are carrots.*

Translation: All vegetables are carrots.

*The only* introduces the subject term. Thus, *vegetables* is the subject term of an A claim and *carrots* must be the predicate term.

*Dogs are the only pets.*

Translation: All pets are dogs.

Even though *the only* appears mid-sentence, what follows—*pets*—is the subject term of the A claim.

Additionally, conditional claims can be expressed as categorical claims. The antecedent of the conditional (following the *if*) is the subject term of an A claim. The consequent (following *then*) is the predicate term. Consider the following example.

*If this animal is a cat, then it is a mammal.*

Translation: All cats are mammals.

The antecedent is *this animal is a cat*, and *it is a mammal* is the consequent.

Conditionals are sometimes negative. These can be translated as categorical claims, except the subject and predicate terms need to be made affirmative, not negative. You do this by making the positive version of the consequent the subject term, and making the positive version of the antecedent the predicate term. Consider the following example.

*If this is not a mammal, then it is not a cat.*

Translation: All cats are mammals.

Take the consequent *it is not a cat*, get rid of the negative, and translate it as the subject term of an A claim, like this: *All cats* . . . Then take the antecedent, *this is not a mammal*, get rid of the negative, and translate it as the predicate term of the claim.

Finally, claims that use the phrase *not all* and *not every* can be particularly tricky to translate. Take this example.

*Not all vehicles are cars.*

Translation: Some vehicles are not cars.

*Not all* signals that the quantity is particular, so we use *some*. However, *not* signals that the quality is negative. Therefore, it should be translated as an O claim.

### Additional Guidelines for Translating Categorical Claims

- ▲ Claims about individuals should be translated using the phrase *identical to*.
- ▲ *Only* or *none but* introduces the predicate of an A claim.
- ▲ *The only* introduces the subject of an A claim.
- ▲ *If . . . , then . . .* translates as an A claim where the antecedent is the subject term.
- ▲ *If not X, then not Y* translates as an A claim. However, negate both the antecedent and consequent and then switch them.
- ▲ *Unless* is translated as *if not*.
- ▲ *Not all* and *not every* should be translated as *Some . . . are not* . . .

### EXERCISE 7.7

Translate the following claims into standard form.

1. Only the studios are successful.
2. Firs are the only evergreen trees.

3. Theodore Roosevelt fought in the Spanish-American War.
  4. Not all sailors are home from the sea.
  5. If you are over five feet tall, then you can ride on the Ferris wheel.
  6. Only the good die young.
  7. Ducks are the only birds in the pond.
  8. Not all pigeons are dirty.
  9. My biology professor is my cousin.
  10. If this is a cow, then it is a mammal.
  11. Only cows are mammals.
  12. The only mammals are cows.
  13. If this is a campaign contribution, then it is tax deductible.
  14. Aristotle systematized the rules of categorical logic.
  15. You can't enter the movie theater unless you are over the age of 17.
- 

### EXERCISE 7.8

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Translate the following claims into standard form.

1. Some lizards are brown.
  2. Some lizards are in the woodpile.
  3. A few bears are not mammals.
  4. Bears are dangerous.
  5. Whoever gets the job gets a paycheck.
  6. Whatever is made of wood is flammable.
  7. All basketballs are round.
  8. A couple of students are history majors.
  9. None of the children are in class.
  10. Nobody on campus favors an increase in parking fees.
  11. Every cow is a mammal.
  12. There's a cow wherever there's a bull.
  13. Not all bread slices are crusts.
  14. Few toys are playthings.
  15. Duct tape is the only universal tool.
  16. Only tomatoes are vegetables.
  17. The only renewable energy source is garbage.
  18. None of the navigators are in the clouds.
  19. Not one person listened to my explanation.
  20. Peonies are flowers.
  21. Some shirts are clothes.
  22. All soups are served in bowls.
  23. Every peony is a flower.
  24. Not every calf is a Holstein.
  25. Only the foolish cut class.
-

## Recognizing Categorical Arguments

A common form of argument that uses categorical claims is called a **categorical syllogism**. A syllogism contains two premises and a conclusion, and in a categorical syllogism all three claims are categorical claims. These claims will relate two categories, each of which is shared with one of the other two claims. Thus, all valid syllogisms will contain exactly three categories altogether, with each of the three appearing exactly twice in the argument. For example,

*All cats are mammals.*  
*All mammals are animals.*  
*All cats are animals.*

Categorical syllogisms are typically represented like this, with two premises above the line and the conclusion below it. The syllogism contains three plural nouns, or categories: *cats*, *mammals*, and *animals*. Each of those three occurs exactly twice: *cats* is the subject term in the first premise and in the conclusion; *mammals* is the predicate term in premise one and the subject term in premise two; *animals* is the predicate term in premise two and in the conclusion.

The three terms in a categorical syllogism are identified by a name that indicates their role in the argument. The **major term** is the predicate term of the conclusion, which will also appear in one of the premises. The **minor term** is the subject term of the conclusion, and it will always appear in the other premise. The **middle term** of the argument is the category that occurs in both premises but is absent from the conclusion. Thus, the three terms for the preceding example are:

Major term:        animals  
 Minor term:       cats  
 Middle term:     mammals

### EXERCISE 7.9



**Your Turn!** Using *dogs* as the major term, *mammals* as the minor term, and *animals* as the middle term, properly insert the terms for the following categorical syllogism:

All \_\_\_\_\_ are \_\_\_\_\_.  
 All \_\_\_\_\_ are \_\_\_\_\_.  
 All \_\_\_\_\_ are \_\_\_\_\_.

### EXERCISE 7.10

Identify the major, the minor, and the middle terms in the following syllogisms.

1. All S are M.  
     All P are M.  
     All S are P.

2. All tomatoes are fruits.  
Some tomatoes are red foods.  
 Some red foods are fruits.
3. No barn owls are pets.  
All pets are animals.  
 No animals are barn owls.
4. No emeralds are gems.  
Some rubies are gems.  
 Some rubies are not emeralds.
5. Some pumpkins are legumes.  
Some legumes are squash.  
 Some pumpkins are squash.
6. All executives are workaholics.  
No workaholics can relax.  
 No executives can relax.
7. All hot dogs are nutritious snacks.  
No fast food is a hot dog.  
 No fast food is a nutritious snack.
8. All quintuplets are hungry mouths to feed.  
All hungry mouths to feed are things to be avoided.  
 All quintuplets are things to be avoided.
9. Not all bread slices are heels, and not all crusts are heels. Thus, some crusts are not bread slices.
10. All majors are officers. Since no majors are lieutenants, no lieutenants are officers.

## Analyzing Categorical Arguments

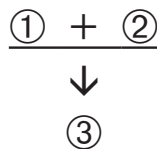
Categorical syllogisms all have two linked premises. Consider the following example.

*No animal products are allowed in a vegetarian diet, and eggs are animal products.  
 Thus, eggs are not allowed in a vegetarian diet.*

To diagram the argument, first underline and number the claims.

① No animal products are allowed in a vegetarian diet, and ② eggs are animal products. Thus, ③ eggs are not allowed in a vegetarian diet.

Then, identify the premises and conclusion. In this case, *thus* indicates that the conclusion is the final claim and that the two prior claims are premises.



Placed in standard form, the argument would appear like this:

No animal products are foods allowed in a vegetarian diet.  
All eggs are animal products.  
 No eggs are foods allowed in a vegetarian diet.

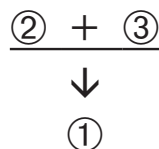
Of course, the conclusion and premises may be presented in any order. Consider the following example.

*Registered nurses need state licenses, because registered nurses are medical professionals, and all medical professionals need state licenses.*

First, underline and number the claims.

① Registered nurses need state licenses, because ② registered nurses are medical professionals, and ③ all medical professionals need state licenses.

Then, identify the premises and conclusion. *Because* signals that the conclusion is the claim prior to that premise indicator and the premises are the two claims following. Notice that, again, the premises are linked.



In standard form, the argument would appear like this.

All registered nurses are medical professionals.  
All medical professionals are workers who need state licenses.  
 All registered nurses are workers who need state licenses.

### EXERCISE 7.11



**Your Turn!** Why are the premises in a categorical syllogism always linked?

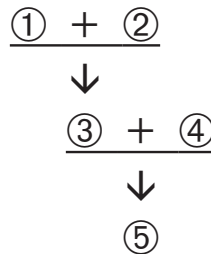
Categorical syllogisms may also be part of a chain argument. For example,

*Preschool teachers need patience, and everyone who needs patience would benefit from studying yoga. Thus, preschool teachers would benefit from studying yoga.*

*Since people who would benefit from yoga are people who would benefit from massage therapy, preschool teachers would benefit from massage therapy.*

Again, underline and number the claims.

① Preschool teachers need patience, and ② everyone who needs patience would benefit from studying yoga. Thus, ③ preschool teachers would benefit from studying yoga. Since ④ people who would benefit from yoga are people who would benefit from massage therapy, ⑤ preschool teachers would benefit from massage therapy.



In standard form, the categorical syllogisms would be expressed in the following two arguments. Notice that, as always, the subargument is presented first.

All preschool teachers are people who need patience.  
All people who need patience are people who would benefit from studying yoga.  
 All preschool teachers are people who would benefit from studying yoga.

All preschool teachers are people who would benefit from studying yoga.  
All people who would benefit from studying yoga are people who would benefit from massage therapy.  
 All preschool teachers are people who would benefit from massage therapy.

## EXERCISE 7.12

Diagram each argument. Then, rewrite the argument as a standard form categorical syllogism.

1. All S are P. This is because no S are M, and all M are P.
2. Since all bread slices are heels, and not all crusts are heels, some crusts are bread slices.
3. Jack-o-lanterns are pumpkins, for jack-o-lanterns are Halloween objects, and some Halloween objects are pumpkins.
4. Given that pirates are sailors, and sailors are at home on the sea, pirates are at home on the sea.
5. If this is a campaign contribution, then it is tax deductible, and if it is tax deductible, then it's an economic investment. So, if this is a campaign contribution, then it's an economic investment.
6. Not every calf is a Holstein. Since every Holstein lives in a barnyard, some calves do not live in barnyards.



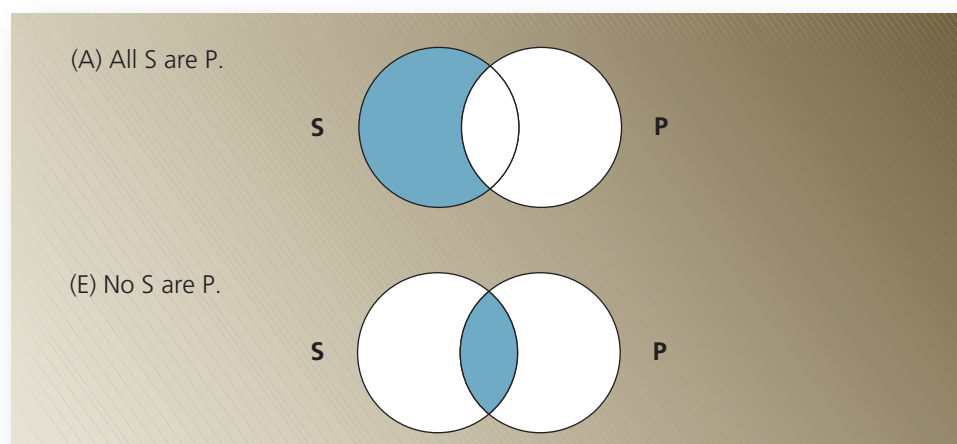
7. Since all soccer players are baseball players, and no baseball players are accordion players, some soccer players are accordion players.
8. Brick layers are skilled workers, because they have an apprenticeship. And every trade that has an apprenticeship consists of skilled workers.
9. All languages that are not spoken regularly are dead languages, and Latin is not spoken regularly. Consequently, Latin is a dead language. Given that Greek is also a dead language, Greek is Latin.
10. All majors are officers because all officers are enlisted, and majors are enlisted. Since no majors are lieutenants, no lieutenants are officers.

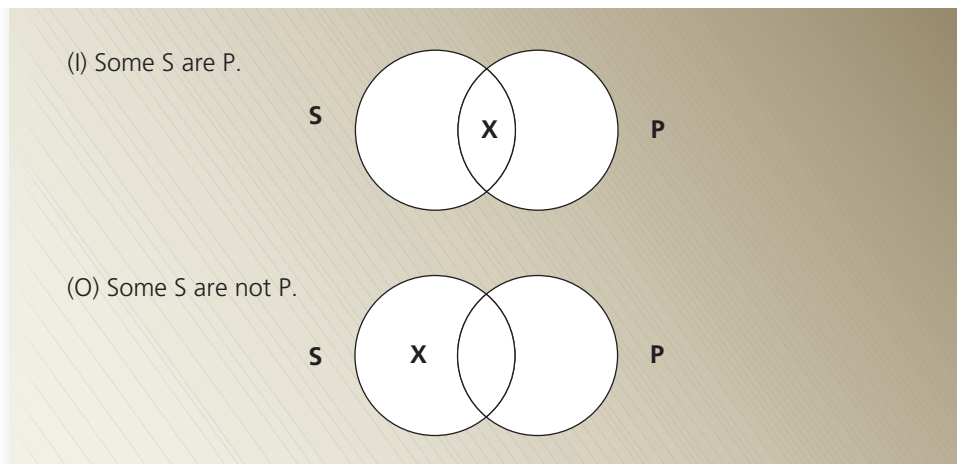
## Evaluating Categorical Syllogisms

As you recall from Chapter 6, the structure of a deductive argument can be evaluated according to whether the premises support the conclusion. In a valid deductive argument, the premises support the conclusion in such a way that if the premises are true, the conclusion must be true. Invalid arguments, by contrast, are deductive arguments in which it is possible to have a false conclusion with all premises true. When evaluating categorical syllogisms in this chapter, we will be solely concerned with the structure of the argument, not with the actual truth or falsity of the premises. Our evaluation will determine whether the argument is valid or invalid, not whether it is sound or unsound. Here you will learn to determine the validity of categorical syllogisms using two different methods: with Venn diagrams and with rules. We begin with Venn diagrams.

## Using Venn Diagrams to Determine Validity

Both categorical claims and categorical syllogisms can be expressed in words, but their content can also be represented by overlapping circles known as **Venn diagrams**. Each of the four standard form claims—A, E, I, and O—can be represented in a unique Venn diagram as shown below:

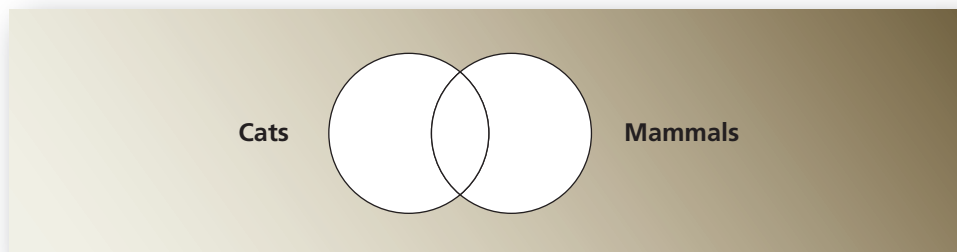




Let's consider examples of each of these four types of Venn diagrams, beginning with an A claim.

(A) *All cats are mammals.*

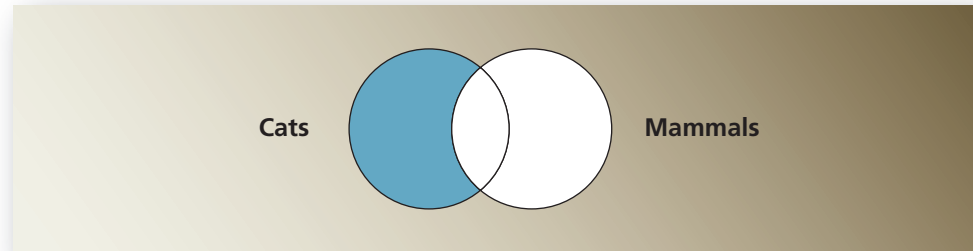
The circle on the left represents the entire class of cats. Whatever is a cat is inside that circle. The circle on the right represents the predicate term—in this case, it is the class of mammals. Every mammal is inside that circle.



You'll notice that the circles intersect. Their intersection creates three areas with different members assigned to each. The section of the circle on the far left consists of cats that are outside of the circle of mammals—that is, cats that are not mammals. The section of the diagram on the farthest right consists of mammals that are outside of the circle of cats—that is, mammals that are not cats. So dogs, deer, rabbits, elephants, and mice (and many, many other mammals) are out here. The area where the two circles intersect contains those that are members of both groups. Everything in the overlapping area is both a cat and a mammal.

Now the unique diagram for an A claim is created by *shading* the area that has no members. For those of you trained on Venn diagrams in math classes, this is probably just the opposite of how you were trained there. (Sorry!) Try thinking of the shading

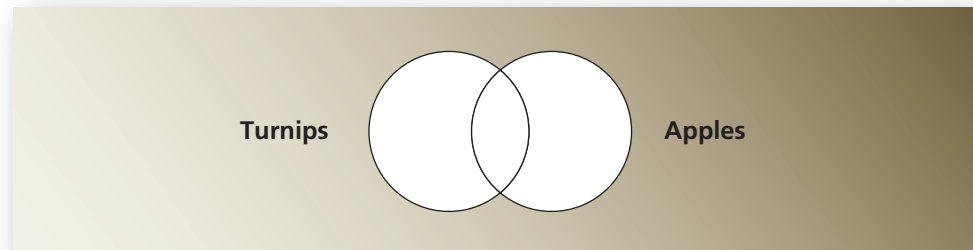
as eliminating any possible members in the shaded part of a circle. In our example, the A claim diagram shades out the portion of the circle representing cats that are not mammals. According to the claim there are no cats that aren't mammals.



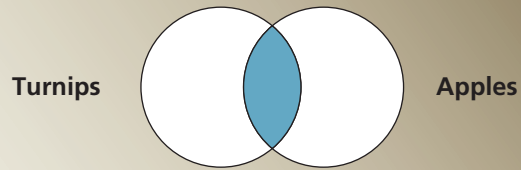
Notice that nothing at all is shaded in the mammals circle. Quantifiers (in this case, *all*) only indicate whether (and, if so, how many of) the members of the *subject* class are included or excluded from the predicate class. So, according to both the Venn diagram and the claim, it is possible that there are other mammals besides cats, but we don't know if they are more than merely logically possible. When you read this sentence back from the diagram, the shaded circle indicates the subject term. The claim is about all cats, not about all mammals. Thus, an A claim can only be read back in one direction.

Now, let's look at an example of an E claim.

(E) *No turnips are apples.*



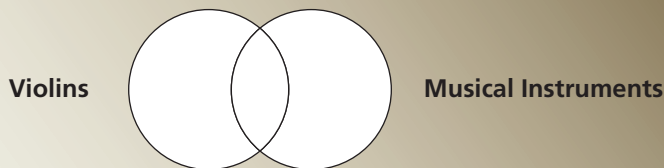
These two circles represent the subject term (on the left) and the predicate term (on the right) in the same way as the previous example. Thus, the section of the circle farthest to the left represents turnips that are not apples. In the middle are turnips that are also apples (since whatever is in here is inside both circles and, thus, a member of both sets). The section on the far right represents apples that are not turnips. According to the claim, nothing is both turnip and apple, so shade (eliminate) that part of the diagram where the two circles overlap—right there in the middle. Two open areas remain—on the left, where turnips are not apples, and on the right, where apples are not turnips.



Notice that you can read this sentence back from the Venn diagram in *either* direction. You can correctly read either “No turnips are apples” or “No apples are turnips.” As you saw in the first example, A claims don’t work that way. They can only be read in one direction, because the shaded circle has to be the subject term. E claims such as this one can be read from either direction. This distinction will be important later.

Here is the third example.

(I) *Some violins are musical instruments.*



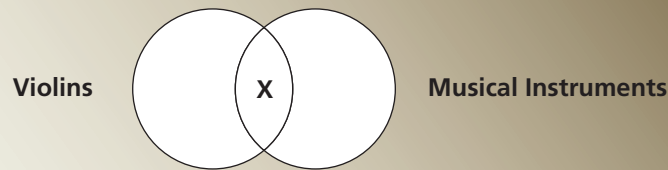
In logic, the word *some* means “at least one.” Venn diagrams use an X to represent “at least one” for both particular claims—the I claim and the O claim.

### EXERCISE 7.13

**Your Turn!** What does the far left section of the circles represent? The middle section? The section on the far right?



Now, the I claim states that at least one member of the violin set is also a member of the musical instrument set. Therefore, place an X in the overlapped section.



In this Venn diagram, the sections to the left and to the right have no shading and no X in them. This means that the sentence does not indicate whether there are or are not violins that exist that are not musical instruments. Nor does it tell us whether there are or are not other kinds of musical instruments. Once you have determined that a categorical claim is an I claim, its Venn diagram will always look exactly the same as this one. Notice that, just as with the E claim, you can read I claims back in either direction. In this case, from the diagram you can read that “Some violins are musical instruments” or that “Some musical instruments are violins.” Again, this information will be important later.

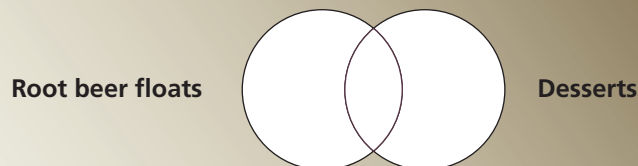
### EXERCISE 7.14



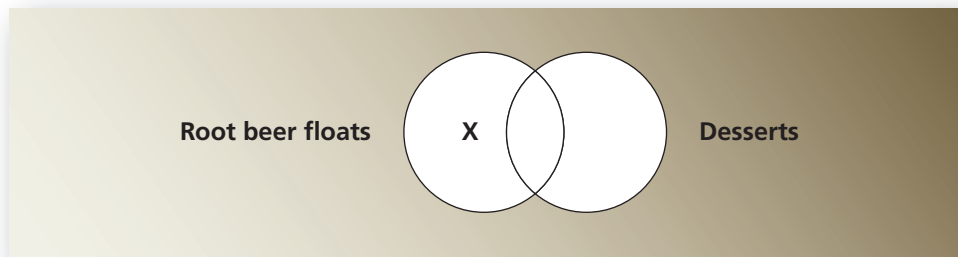
**Your Turn!** Why can the Venn diagram for “Some violins are musical instruments” also be read as “Some musical instruments are violins”?

Finally, here’s an example of an O claim.

(O) *Some root beer floats are not desserts.*



Root beer floats that are not desserts are represented in the section to the left. In the middle are root beer floats that are desserts. The section to the far right represents desserts other than root beer floats (pies, cakes, puddings, etc.). According to the claim, at least one member of the root beer float category exists which is *not* a dessert. Thus, you must place an X in the section to the far left.



The diagram shows that at least one member of the class of root beer floats is not a member of the class of desserts. It does *not* show that there is a member of the root beer floats class that is a member of the desserts class. Thus, you have to be a bit careful with particular claims (I and O) to avoid inadvertently misrepresenting them in the Venn diagram. Since you are working with a formal language with specific meanings for each claim, your diagram must represent exactly what the claim asserts, not what you think it might imply. So, here the O claim only asserts that some root beer floats are *not* desserts. It *does not imply* that some root beer floats *are* desserts. This rule applies also to I claims.

### EXERCISE 7.15

**Your Turn!** Explain why the Venn diagram for an O claim can be read back in only one direction.



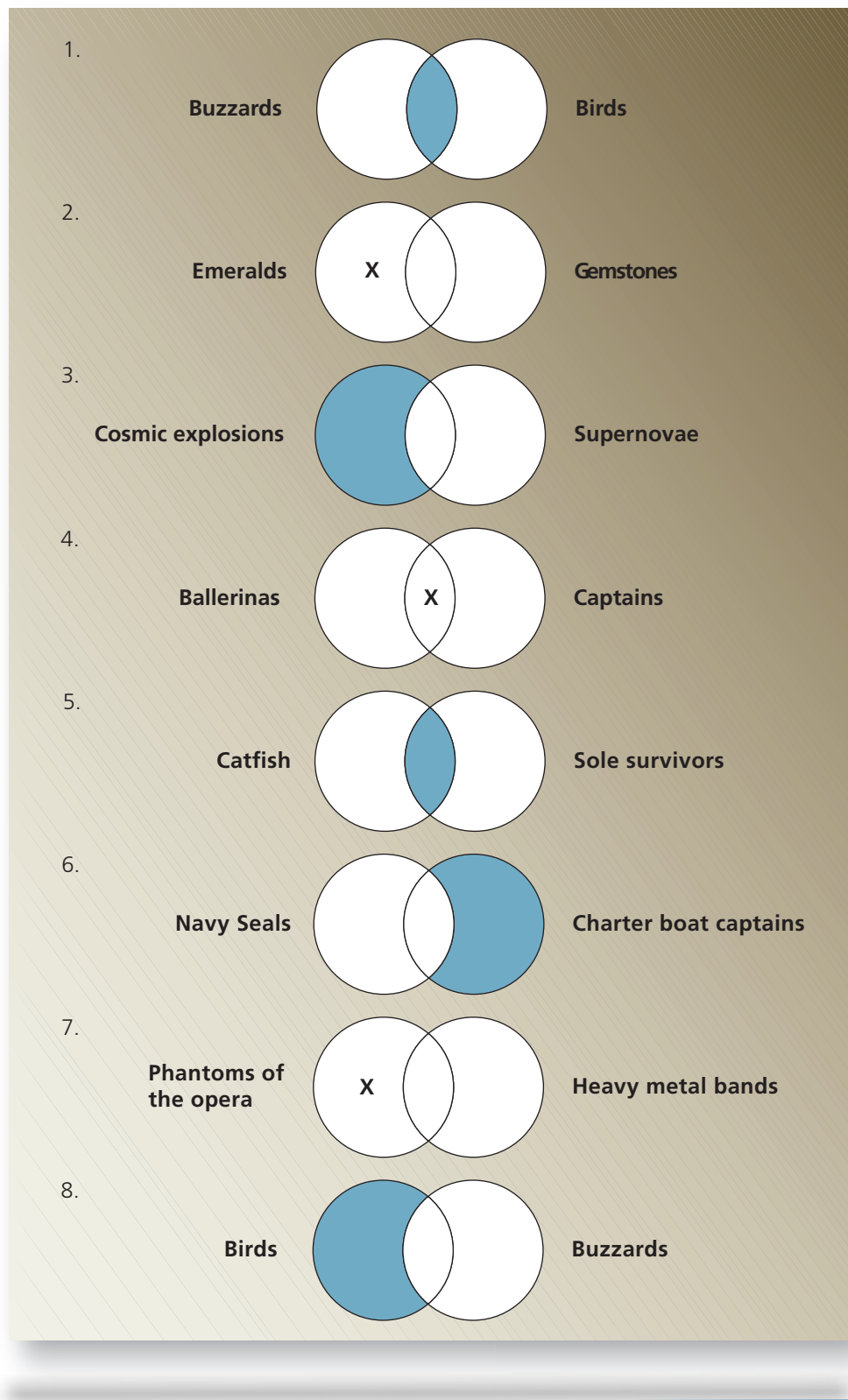
### EXERCISE 7.16

Draw Venn diagrams for the following claims. Be sure to label the circles as plural nouns.

1. Some captains are not ballerinas.
2. No figs are vegetables.
3. Some vegetables are not tomatoes.
4. No cell phones are GPS devices.
5. All phantoms are ghosts.
6. Some supernovae are cosmic explosions.
7. Some plantations are not farmhouses.
8. No lilac bushes are presidential historians.
9. All long-haired male cats are troublesome house pets.
10. Some phantoms of the opera are heavy metal bands.

### EXERCISE 7.17

Write the proper standard form claims from these Venn diagrams. If the diagram can be read in two directions, give both formulations of the claim.

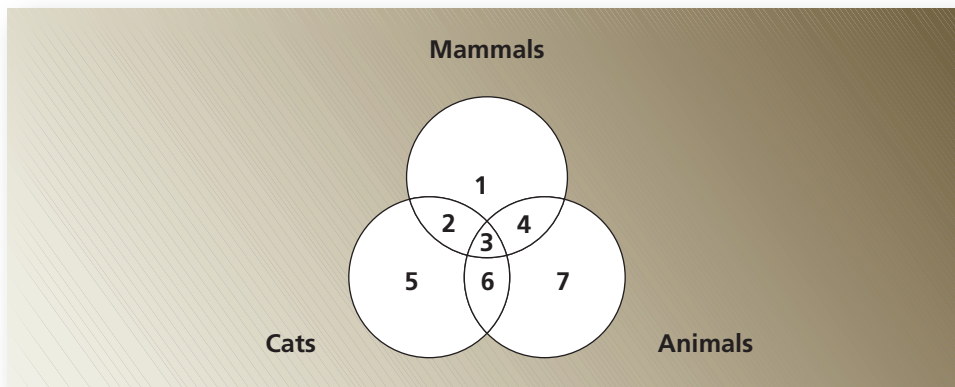


Now that you have had some practice with Venn diagrams of claims, you are ready to learn how they can be used to determine the validity of a categorical syllogism. A Venn diagram for a categorical syllogism is derived from the Venn diagrams for categorical claims. However, because the argument has three categories, or classes, altogether, the Venn diagram will have three overlapping circles, one for each category.

Draw all of your Venn diagrams using the following format: The circle at the top represents the middle term of the argument; the bottom left circle represents the minor term; the bottom right circle represents the major term. To help explain what the diagram represents, we have inserted numbers into each section; however, Venn diagrams themselves do not use numbers. Let's look again at the earlier example.

*All cats are mammals.*  
*All mammals are animals.*  
*All cats are animals.*

Image not available due to copyright restrictions



First, what does each section represent? Section 1 represents mammals that are not cats and not animals; section 2 represents cats that are mammals but not animals.

### EXERCISE 7.18

**Your turn!** Determine what is represented in each of the remaining sections.

Section 3: \_\_\_\_\_ that are \_\_\_\_\_ and \_\_\_\_\_.

Section 4: \_\_\_\_\_ that are \_\_\_\_\_ but not \_\_\_\_\_.

Section 5: \_\_\_\_\_ that are not \_\_\_\_\_ and not \_\_\_\_\_.

Section 6: \_\_\_\_\_ that are \_\_\_\_\_ but not \_\_\_\_\_.

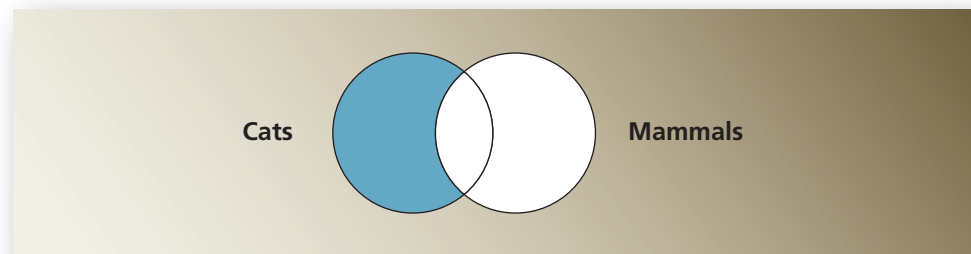
Section 7: \_\_\_\_\_ that are not \_\_\_\_\_ and not \_\_\_\_\_.



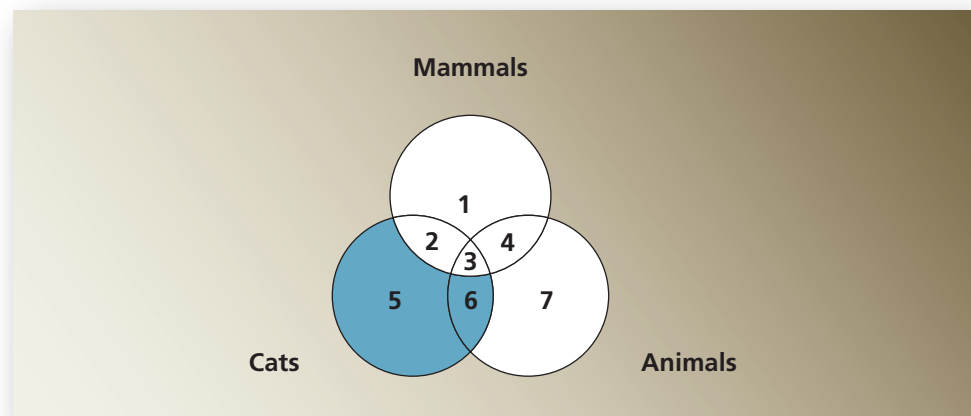


To test a categorical syllogism for validity, first draw the Venn diagram for each of the two premises, one at a time. If the argument is valid, the conclusion will already be shown in the Venn diagrams for the premises. You don't need to shade or place an X for the conclusion; just shade or show X's for premises. Since the shading may influence where X's are located, always begin with a premise that is universal, when one exists.

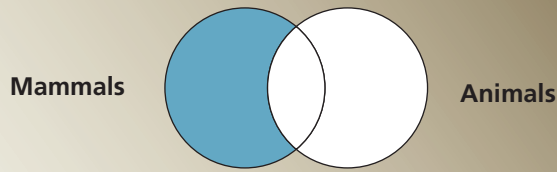
In our example, both premises are A claims (as is the conclusion), so you will only be shading. In that case, begin with the first premise. At first, you should focus solely on the two circles representing the two categories from this premise. In the first premise, because *cats* is the subject term, you will shade that circle just exactly as you would for any standard A claim.



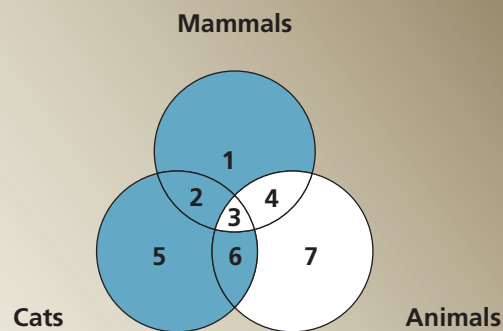
The shaded sections above correspond to sections 5 and 6 in the Venn diagram of the argument. Please note that since *three* circles are intersecting, you will always shade *two* sections. The result will look identical to the standard A claim Venn diagram.



Next, draw the second premise: All mammals are animals. Since this, too, is an A claim, the subject term circle is again shaded.



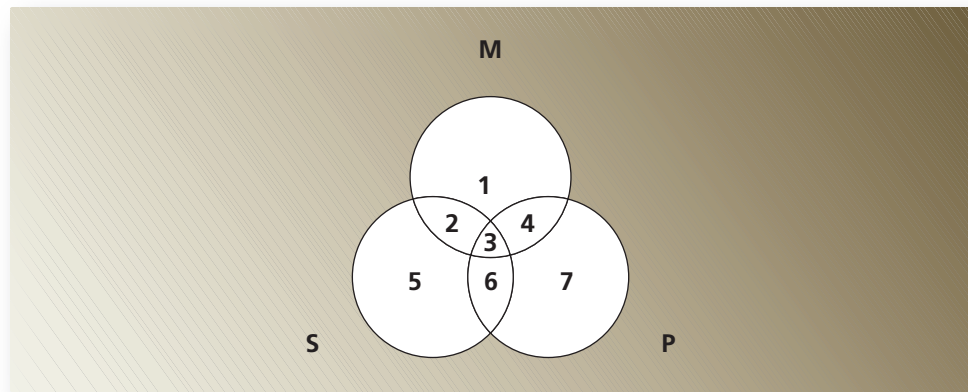
Now, however, the two circles involved are the top one (showing *mammals*) and the bottom right (showing *animals*). So, since the circle for *mammals* is the subject term of this A claim, shade sections 1 and 2. Compare that drawing with the standard form A claim of those two terms. Here is the second premise combined with the first.



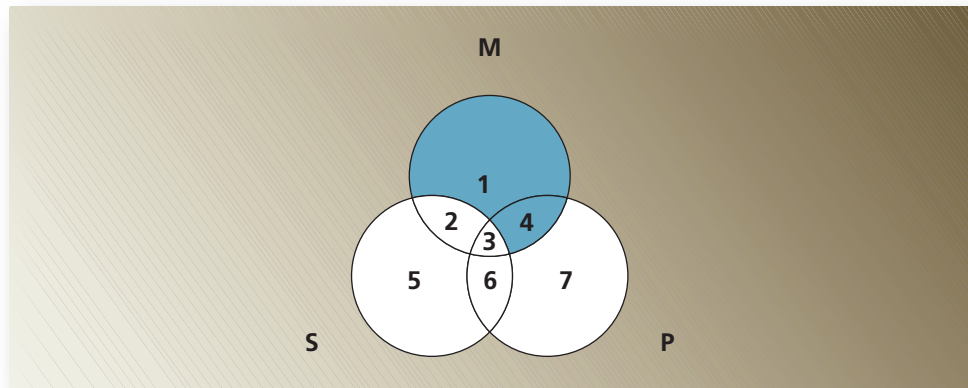
That's all the drawing you do. If the argument is valid, the conclusion will already be represented in the diagram. So, in this case, are all cats within the circle of animals? The answer is yes, since the only area of the cats circle not shaded is section 3, which is also part of the animal circle. Thus, the conclusion was necessitated by the premises, and that means the argument is *valid*. So long as the argument retains this formal structure, it will be impossible for both premises to be true and the conclusion to be false—no matter what specific terms occupy the major, minor, and middle term positions.

Let's try another example, this time, involving a particular claim among the premises.

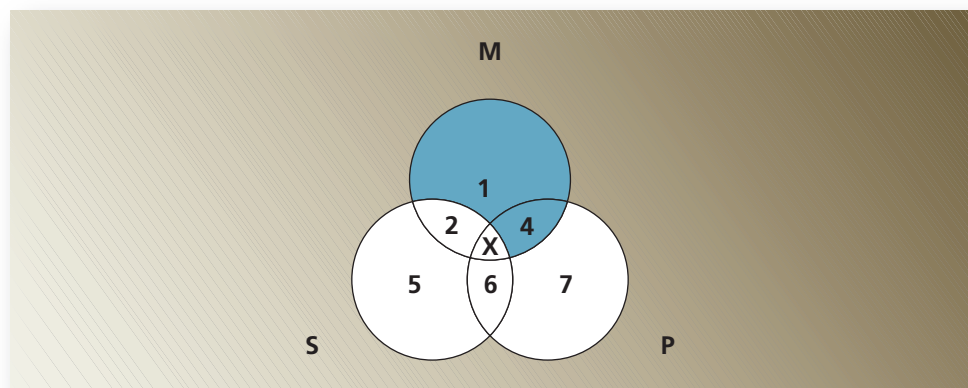
Some *P* are *M*.  
 All *M* are *S*.  
 Some *S* are *P*.



Since the first premise is particular, not universal, begin diagramming the second premise. *Shading always goes first*. When you apply the shading for the second premise, you shade all of the M circle outside of S. That would be sections 1 and 4.



Look next at the first premise. Since this is a particular affirmative claim, you will be applying an X to the area where P and M overlap. Originally, before you shaded the M circle in sections 1 and 4, two areas were overlapping P and M—sections 3 and 4. But now that 4 is shaded, that section is eliminated. Nothing can occupy that section. The only overlapping area remaining is section 3. Place an X inside that section and check the argument for validity.



Is the conclusion already shown? Yes, because the conclusion claims that at least one S is also in P. And the X in section 3 is both in S and in P. Therefore, this argument is valid.

### EXERCISE 7.19

**Your Turn!** Look back at the argument presented at the start of this chapter. Use a Venn diagram to determine whether the argument is valid or invalid.

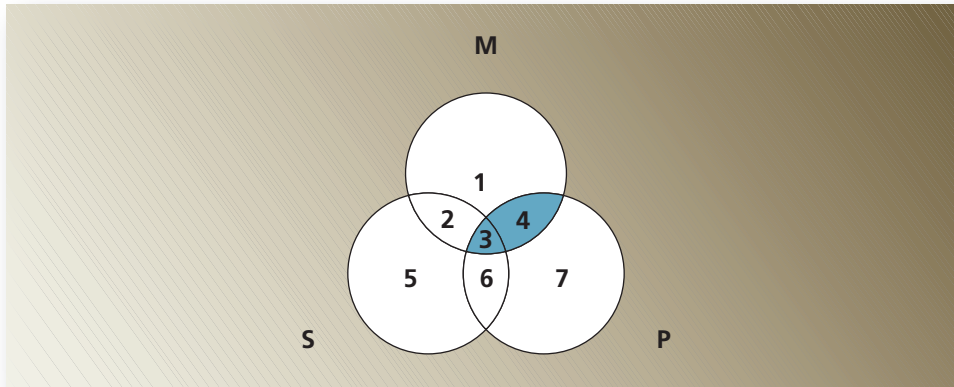


Determining where to place an X in your diagram can often be challenging. Let's consider another example.

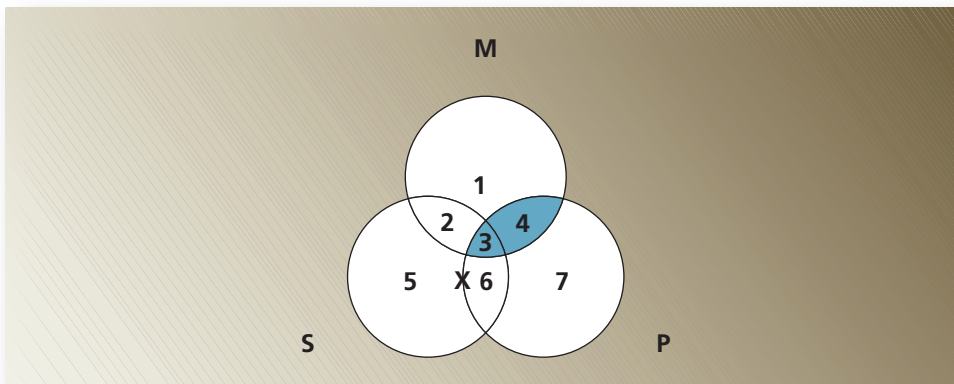
*No P are M.*  
*Some S are not M.*  


---

*Some S are not P.*



Do the shading first—sections 3 and 4 are shaded from the first premise. The shading must match the Venn diagram for the universal negative, an E claim. Next, diagram the second premise, a particular negative, by placing an X *inside* the S circle but *outside* of the M circle. Two sections are available—5 and 6. Since the claim doesn't indicate whether the X belongs in 5 exclusively or in 6 exclusively, you must show it *between* the two sections. That is, draw the X *on the line* that separates sections 5 and 6.



With the diagramming complete, check whether the conclusion is already represented in the drawing. In this case an X is inside S (there *is* an S), but with the X on the line, it's unclear whether it is outside of P or not. According to this diagram, some S might be P, or might not be P; you cannot tell. To be valid, the X would have to be *in* section 2 or 5. Since it isn't in either of those sections, the conclusion is *not* demonstrated in the drawing, and thus the argument is invalid.

### How to Draw Venn Diagrams

**Step 1:** State the argument as a standard form categorical syllogism.

**Step 2:** Draw and label three intersecting circles.

**Step 3:** Shade the sections to represent the universal premises.

**Step 4:** Place an X in the section or on the line to represent any particular premises.

**Step 5:** Determine validity by checking whether the conclusion is represented in the diagram.

### EXERCISE 7.20

Draw Venn diagrams and determine the validity of the following arguments.

1. All S are M.  
    All P are M.  
                          
    All S are P.
2. No S are M.  
    All P are M.  
                          
    No S are P.
3. All S are M.  
    All M are P.  
                          
    All S are P.
4. Some P are M.  
    All M are S.  
                          
    Some S are P.
5. No P are M.  
    Some M are not S.  
                          
    Some S are not P.
6. No emeralds are gems.  
    Some rubies are gems.  
                          
    Some rubies are not emeralds.
7. Some pumpkins are legumes.  
    Some legumes are squash.  
                          
    Some pumpkins are squash.

8. All executives are workaholics.  
No workaholics can relax.  
No executives can relax.
9. All hot dogs are nutritious snacks.  
No fast food is a hot dog.  
No fast food is a nutritious snack.
10. All quintuplets are hungry mouths to feed.  
All hungry mouths to feed are things to be avoided.  
All quintuplets are things to be avoided.
11. Some lizards are poisonous.  
Anything that is poisonous should be avoided.  
Some lizards should be avoided.
12. All vine-ripened tomatoes require extra care at the store.  
Some things that require extra care at the store need to be expensive.  
Some vine-ripened tomatoes need to be expensive.
13. All squirrels are animals.  
No penguins are animals.  
No squirrels are penguins.
14. All squirrels are animals.  
No penguins are animals.  
No penguins are squirrels.
15. All kangaroos are Australian.  
Some turtles are not Australian.  
Some turtles are not kangaroos.
16. All kangaroos are Australian.  
Some turtles are not kangaroos.  
Some turtles are not Australian.
17. No Danes speak English.  
All Northern Europeans speak English.  
All Northern Europeans are Danes.
18. No principals are teachers.  
No teachers are fifth-graders.  
No principals are fifth-graders.
19. All joules are units of work.  
No units of work are measurements.  
No joules are measurements.
20. All computer hackers who cause damage deserve to be prosecuted.  
Some who deserve to be prosecuted must be punished.  
Some computer hackers who cause damage must be punished.

## EXERCISE 7.21

Draw Venn diagrams and determine the validity of the following arguments.

1. All presidents are farmers, and no farmers are senators. Thus, some presidents are not senators.
2. Since all bread slices are crusts, and not all crusts are heels, some heels are bread slices.
3. All soccer players are athletes, since all athletes are baseball players, and no baseball players are soccer players.
4. Some ants are insects. Thus, no ants are caterpillars, given that some caterpillars are not insects.
5. Only vegetarians are farmers because no vegetarians are animal breeders, and the only farmers are animal breeders.
6. If you passed geology, then you passed a science class. And if you passed a science class, then you have qualified for honors. Consequently, if you passed geology, then you qualified for honors.
7. Wherever there are turtles there are toads. Accordingly, since toads exist wherever there are snails, wherever there are snails, there are turtles.
8. Because Socrates is not a man, and only mortals are men, Socrates is not mortal.
9. Any senator is corruptible. So, no senators are liars, as some liars are corruptible.
10. Some students take critical thinking, and some students are math majors. So, some people who take critical thinking are math majors.
11. Anyone who reads philosophy books will immediately get smarter. Some people who get smarter will become president of the United States. So, anyone who reads philosophy books will become president of the United States.
12. Mascots are the only animals allowed in the gym. Thus, only mascots are nuisances, since the only animals allowed in the gym are nuisances.

### Using Rules to Determine Validity

Venn diagrams are not the only way to determine whether a categorical syllogism is valid. You can also evaluate a categorical argument by the rules of validity. Five rules must be satisfied in order for a categorical syllogism to be valid. If an argument breaks any of the rules, it is invalid. All valid arguments satisfy each of the rules.

When you know the rules and you know how to properly draw Venn diagrams, you can use the two methods to check your work. When your diagram shows the argument is invalid, you can run through the list of rules just to make sure you were correct. When applied properly, the Venn diagram and rule procedures will always concur.

The rules are not difficult to learn, but since two of the rules involve the concept of distribution, that must first be explained. A subject or predicate term is **distributed** if the claim refers to every member of the group. Each of the four standard form claims has a unique distribution pattern. In the following examples, the distributed terms are *underlined*.

A claim: All S are P.

In an A claim, the claim is that *all* S are something, so the claim is about every member of the S group. Thus, subject terms of A claims are distributed. The predicate term is not distributed in an A claim, because the claim does not concern every member of that set. You can see this readily in the Venn diagram for an A claim on page 154. The S circle is shaded except where it overlaps with the P circle. All of the S's are in the P circle because there is nowhere else for them to be. The P circle, however, is not shaded at all. So P's could be in S or P's could be outside of S. No mention is made in this claim about the P category except where S's fit with it.

**Hint!** Distribution of terms depends solely on the kind of claim and position within the claim (subject or predicate position). Therefore, the subject term in an A claim is distributed whether the claim is a premise or a conclusion.

E claim: No S are P.

Every E claim distributes both the S and P terms. Since the claim is universal, it should be clear that it's talking about *all* of something. But the distribution pattern is clearest in the Venn diagram on page 154. When the middle part is shaded, the two sets, S and P, have no common members. That is, *all* of the S are outside of *all* of the P. This explains why E claims can be read in either direction—"No S are P" or "No P are S." Since both terms are distributed, either version is correct.

I claim: Some S are P.

It should be apparent that a particular claim does not include every member of the S group. Nor is it making any claim about each and every member of the P group. All it is claiming is that at least one S is also a P. Nothing is said about what happens with the other members of S or P. Therefore, neither term is distributed.

## EXERCISE 7.22

**Your Turn!** I claims can also be read in either direction. Explain why.

O claim: Some S are not P.

Again, the S term cannot be distributed. But what about the P term? The answer can be most effectively seen in the Venn diagram on page 155. Notice that the X is placed *in* S



but *outside of the entire circle* of P. The claim is about all of P—the X must be outside of the entire set. Therefore, particular negatives distribute the predicate term but not the subject.

The result is four unique distribution patterns:

Type of Claim	Distribution Pattern
A claim	subject term only
E claim	both terms
I claim	neither term
O claim	predicate term only



### EXERCISE 7.23

**Your Turn!** Find the patterns for term distribution.

Both *universal* claims distribute \_\_\_\_\_ terms.

Neither *particular* claim distributes \_\_\_\_\_ terms.

Both *negative* claims distribute \_\_\_\_\_ terms.

Neither *affirmative* claim distributes \_\_\_\_\_ terms.

### EXERCISE 7.24

Translate all claims into standard form and underline all distributed claims.

1. All M are P.
2. Some P are M.
3. Some M are not S.
4. No S are M.
5. All economics majors are intelligent students.
6. Some kangaroo rats are members of an endangered species.
7. No felons are voters.
8. Only voters are participants.
9. The only good ice cream is chocolate ice cream.
10. Not every lizard is a reptile.

Now that you understand the concept of distribution and can determine which claims in a categorical syllogism are distributed and which are not, we can introduce the five rules a valid categorical syllogism must satisfy. The first two rules relate to *distribution*, the second two rules relate to the *quality* of the claims, and the final rule involves the *quantity* of the claims.

### Rules for Valid Syllogisms

- ▲ The middle term must be distributed at least once.
- ▲ Any term that is distributed in the conclusion must be distributed in a premise.
- ▲ If a premise is negative, the conclusion must be negative, and vice versa.
- ▲ A valid argument cannot have two negative premises.
- ▲ A valid argument cannot have two universal premises when the conclusion is particular.

The first rule concerning the distribution of terms in the argument is that *the middle term must be distributed at least once*. The middle term, you remember, is the term in each of the premises that is not in the conclusion. If the middle term is not distributed in at least one premise, then the argument is invalid.

The second rule concerning the distribution of terms in the argument is that *any term that is distributed in the conclusion must be distributed in a premise*. Look first to see if any terms are distributed in the conclusion. If a subject or predicate term is distributed in the conclusion, that term must also be distributed in a premise. A valid argument cannot draw a conclusion about every member of some group unless it asserts something about every member of that group in a premise. Take care not to get this rule backwards. An argument can be valid if the premise is about all members of a class and the conclusion is about fewer members. Put another way, it is not a problem to distribute a term in the premise and not distribute that same term in the conclusion.

The first rule relating to the quality of the claims is that *if a premise is negative, the conclusion must be negative, and vice versa*. Two claims are negative—E claims and O claims. If one of the premises is an E or an O, the conclusion must be an E or an O. This rule works both ways—if the conclusion is negative, then a premise must be negative.

The second rule relating to the quality of the claims is that *a valid argument cannot have two negative premises*. Regardless of whether the conclusion is negative or affirmative, a valid argument cannot contain two negative premises.

The final rule, concerning the quantity of the claims, is that *a valid argument cannot have two universal premises when the conclusion is particular*. The problem with this combination of claims is fairly technical—at least more technical than our chapter will allow. Looking at the Venn diagram will allow you to see how the rule is broken. If the premises are both universal, they will only contribute shading to the Venn diagram. If the conclusion is particular, it will need an X to satisfy it. Since neither premise contributed an X, then the conclusion is not already pictured in the Venn diagram. Therefore, the argument is invalid.

## EXERCISE 7.25

Determine whether the following arguments are valid or invalid using the rules for valid syllogisms. For all invalid arguments, state the rule(s) that are violated.

1. All S are M.  
All M are P.  
All S are P.
2. All M are S.  
No P are M.  
No S are P.
3. Some P are M.  
Some M are S.  
Some S are P.
4. No M are S.  
Some P are not M.  
Some S are not P.
5. No M are P.  
All S are M.  
No S are P.
6. No caterpillars are ants.  
All ants are insects.  
Some caterpillars are insects.
7. Some jaywalkers are not felons.  
All jaywalkers are circus performers.  
Some felons are circus performers.
8. All executives are workaholics.  
No workaholics can relax.  
No executives can relax.
9. All hot dogs are nutritious snacks.  
No fast food is a hot dog.  
No fast food is a nutritious snack.
10. All quintuplets are hungry mouths to feed.  
All hungry mouths to feed are things to be avoided.  
All quintuplets are things to be avoided.

11. Some lizards are poisonous.  
Anything that is poisonous should be avoided.  
Some lizards should be avoided.
  12. All vine-ripened tomatoes require extra care at the store.  
Some things that require extra care at the store need to be expensive.  
Some vine-ripened tomatoes need to be expensive.
  13. All squirrels are animals.  
No penguins are animals.  
No squirrels are penguins.
  14. All squirrels are animals.  
No penguins are animals.  
No penguins are squirrels.
  15. All kangaroos are Australian.  
Some turtles are not Australian.  
Some turtles are not kangaroos.
  16. All kangaroos are Australian.  
Some turtles are not kangaroos.  
Some turtles are not Australian.
  17. No Danes speak English.  
All Northern Europeans speak English.  
All Northern Europeans are Danes.
  18. No principals are teachers.  
No teachers are fifth-graders.  
No principals are fifth-graders.
  19. Some students take critical thinking, and some students are math majors.  
So, some people who take critical thinking are math majors.
  20. Anyone who reads philosophy books will immediately get smarter. Some people who get smarter will become president of the United States. So, anyone who reads philosophy books will become president of the United States.
  21. Some pumpkins are not squash, and some pumpkins are legumes. Accordingly, no squash are legumes.
  22. All soccer players are baseball players. And no baseball players are accordion players. Consequently, some soccer players are accordion players.
  23. All kites are flying toys since all flying toys are model airplanes and some model airplanes are not kites.
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## EXERCISE 7.26

Draw Venn diagrams for the following syllogisms. Check for validity by using both the Venn diagram and the rules. For all invalid arguments, state the rule(s) that are violated.

1. All M are P.  
All S are M.  
 All S are P.
2. All P are M.  
All S are M.  
 All S are P.
3. All M are P.  
No S are M.  
 No S are P.
4. All P are M.  
All M are S.  
 Some S are P.
5. No P are M.  
No S are M.  
 No S are P.
6. All M are P.  
Some S are M.  
 Some S are P.
7. Some M are P.  
Some M are S.  
 Some S are P.
8. All P are M.  
Some S are not M.  
 No S are P.
9. All great scientists are college graduates. Some professional athletes are college graduates. Therefore, some professional athletes are great scientists.
10. Only rectangles are octagons, since not all rectangles are pumpkins, and the only octagons are pumpkins.
11. All chipmunks are dinosaurs. Some dinosaurs are extinct species. Therefore, some extinct species are chipmunks.
12. Some maple trees are not tropical plants. Therefore, some tropical plants are not fruit trees, since no fruit trees are maple trees.
13. Because all minds are in our heads, it follows that nothing in our heads are brains, since no brains are minds.

14. Accountants aren't creative artists. Creative artists use laptop computers; and few, if any, accountants use laptop computers.
  15. Some athletes are not college students, and some college students are not handball players. Therefore, some athletes are not handball players.
- 

### EXERCISE 7.27

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Draw Venn diagrams for the following syllogisms. Check for validity by using both the Venn diagram and the rules. For all invalid arguments, state the rule(s) that are violated.

1. People who live in Minnesota endure severely cold winters, and thus should be treated with respect, because people who endure severely cold winters should all be treated with respect.
2. This is not the best omelet ever cooked, because the best omelet ever cooked would not contain anchovies, and this omelet contains anchovies.
3. No dog trainers are small business owners. This is because no small business owners are graduates of engineering programs at MIT and no dog trainers are graduates of engineering programs at MIT.
4. All paperback novels are available in an audio version, and all hardback novels are also available in an audio version. So, at least some paperback novels are hardback novels.
5. Every war crime is beyond any kind of moral justification. It demeans innocent humans, and anything that demeans innocent humans is beyond any kind of moral justification.
6. None of the summer camps on campus are accepting new students, and some of the summer camps at the high schools are not accepting new students, either. So, some of the summer camps at the high schools are also summer camps on campus.
7. The halberds were all ancient battle axes, and no halberds exist anymore. So there aren't any more ancient battle axes.
8. Everybody on stage is a tap dancer, and all understudies are tap dancers. Therefore, everybody on stage is an understudy.
9. Farmers using genetically modified seed should not be allowed to label their crops as organic, since anyone who uses unnatural products should be allowed to label their crops as organic, and people using unnatural products are not farmers using genetically modified seed.
10. Mansard roofs are no longer standard features of tract homes. This is because mansard roofs cost a lot of money, and nothing that costs a lot of money is a standard feature of tract homes.
11. It is no longer important to learn Dutch, since it isn't spoken in many countries, and there isn't much point in learning a language that isn't spoken in many countries.
12. Every bike racer is a competitor, and no competitor takes steroids. Therefore, no bike racers take steroids.

13. Since all sociologists are social scientists, it follows that no theologian is a social scientist, since no sociologists are theologians.
14. Avatars are sacred figures, and shamans are, too. So, avatars are shamans.
15. Each stoic is a skeptic, and no stoic is a professor. Therefore, no skeptic is a professor.

## Using Rules to Complete Categorical Arguments

Sometimes categorical arguments are presented with an unstated premise or conclusion. Such an argument is called an **enthymeme**. Finding the missing premise or conclusion of an enthymeme is a great way to master the rules of valid syllogisms. To show how this works, let's begin with a sample argument.

*Some dogs are celebrities, for some dogs are movie stars.*

The task with this example, and with any enthymeme, is to supply the missing piece that makes the argument *valid*. That means that the completed syllogism must not break any of the rules for a valid syllogism. If it is impossible for all the rules to be followed, then the enthymeme cannot be completed. For our purposes, every enthymeme in this chapter can be made valid.

The first task is to determine whether the missing part is a premise or a conclusion. In this example, the word *for* indicates that the first claim is the conclusion and the second claim is the premise. Set it out in standard form like this:

Some dogs are movie stars.  
Some dogs are celebrities.

Next, we must identify which two terms will be in that missing premise. We know that all three terms must be used exactly twice. So, since *dogs* is already included twice in the argument (in a premise and in the conclusion), the missing premise must contain the terms *celebrities* and *movie stars*.

### EXERCISE 7.28



**Your Turn!** Which term is the middle term of this enthymeme?

The next step is to determine whether the premise will be affirmative or negative. Since the conclusion is affirmative, the missing premise must be affirmative, too. That means that the missing premise must be either an A claim or an I claim.

**EXERCISE 7.29**

**Your Turn!** What rule would be broken if we made the premise negative?



Now distribution must be considered. The middle term must be distributed, so you must determine whether the middle term is already distributed or not. Since *dogs* and *celebrities* are in the conclusion, *movie stars* has to be the middle term, and it is not distributed already. That means that the middle term must be distributed in the missing premise.

**EXERCISE 7.30**

**Your Turn!** How do you know the middle term isn't already distributed?



If the middle term needs to be distributed, then the premise must be an A claim, since an I claim will not distribute any terms. Furthermore, since the subject term is the only term distributed in an A claim, *movie stars* must be the subject term.

Distribution also might occur in the conclusion. Are any terms distributed in the conclusion? If so, they would need to be distributed in a premise. But since the conclusion is an I claim, and I claims do not distribute either term, no term is distributed in the conclusion. Thus, we can determine that the missing premise is an A claim with *movie stars* as the subject term.

The completed valid argument should look like this.

All movie stars are celebrities.  
Some dogs are movie stars.  
 Some dogs are celebrities.

As you can see, the missing premise is discovered by a process of elimination using the rules for valid syllogisms. You go through the rules until the answer satisfies each of the rules. Once you have the completed syllogism, the final step is to check the completed argument against the rules to verify that it's valid. It's also a good idea to draw a Venn diagram just to make sure you've done everything right.

**How to Complete Enthymemes**

**Step 1:** Determine whether the missing claim is a premise or a conclusion.

**Step 2:** Identify which two terms are in the missing claim.

**Step 3:** Determine whether the claim will be affirmative or negative.

**Step 4:** Make sure that terms are properly distributed.

**Step 5:** Verify that all rules for valid syllogisms are followed.



**EXERCISE 7.31**

Turn the following enthymemes into valid categorical syllogisms. All syllogisms need to be presented in standard form.

1. No S are M.  
No S are P.
2. No P are M.  
Some S are M.
3. All X are Y.  
All X are Z.
4. Some J are T because all R are J.
5. Some P are not M. Thus, some S are not M.
6. No mature lobsters are good things to eat, since all good things to eat are low in calories.
7. Off-shore oil fields are environmentally-sensitive areas, so they should be protected.
8. Because every metaphor is a peanut, all cupcakes are peanuts.
9. All elephants are calliopes, so some calliopes are not tangerines.
10. Some lamps are not chickens, and every bookshelf is a chicken.
11. Australian shepherds make good guard dogs, given that they are alert for danger.
12. Only pirates are true sailors, so a few tank commanders are pirates.
13. Enthymemes are not syllogisms, and valid arguments are enthymemes.
14. Not all snakes are poisonous reptiles; thus, not every animal is a poisonous reptile.
15. Since plants won't grow in the shade, some places the sun shines aren't places plants will grow.

**Putting It All Together: A Complete Analysis  
Plus Evaluation**

In Chapters 2, 3, and 4, you learned how to recognize and analyze arguments, and to present a Basic Analysis with an argument diagram. In Chapters 5 and 6, you also learned how to identify fallacious reasoning and distinguish between different kinds of arguments in a Complete Analysis. Now that you can analyze and evaluate categorical syllogisms, you can put all of these skills together by adding categorical argument evaluation to the Complete Analysis assignments.

**Directions for a Complete Analysis Plus Evaluation**

In *paragraph form*, use complete sentences and proper English grammar and spelling to do the following:

**Step 1:** Write a Basic Analysis of the passage. (You may want to refer to the Directions for Basic Analysis, Chapter 3, page 49.)

**Step 2:** If the passage contains an argument, determine whether the argument commits a fallacy. If it does, write a separate paragraph identifying the fallacy committed, and explaining how this fallacy is committed.

**Step 3:** If the argument does not commit a fallacy, diagram it and verify that the diagram is consistent with your Basic Analysis.

**Step 4:** In a separate paragraph, identify the kind of argument.

- ▲ If the argument is deductive, identify it as a categorical argument or a truth-functional argument.
- ▲ If the argument is inductive, identify it as an analogical argument, an inductive generalization, or a causal argument.

**Step 5:** Evaluate the argument.

- ▲ If the argument is categorical, state the syllogism in standard form, and *demonstrate* whether the argument is valid or invalid using either a Venn diagram or the rules for valid syllogisms.

Let's work through a couple of examples to demonstrate a proper Complete Analysis plus Evaluation. Consider the following passage.

*Some winged animals are dinosaurs because all dinosaurs are giant reptiles, and all giant reptiles are winged animals.*

The first step is to determine whether the passage is an argument, an explanation, or neither argument nor explanation. Even when the content is rather silly, as in this case, a syllogism shows a pattern of inferential reasoning, with a conclusion clearly being drawn from premises. Thus, you should consider all categorical syllogisms, including this one, as arguments. Given the indicator word *because*, the premises and conclusion are readily identifiable. The conclusion is prior to *because*, and two premises follow.

Next, does the argument commit a fallacy? Since it does not, you should diagram the argument. Are the premises linked or convergent? Since the conclusion requires two terms, *winged animals* and *dinosaurs*, the premises must be linked. Each premise delivers only one of the two required terms to the conclusion. Now you can draw the argument diagram and write the Basic Analysis.

① *Some winged animals are dinosaurs because* ② *all dinosaurs are giant reptiles,*  
and ③ *all giant reptiles are winged animals.*

$$\begin{array}{c} \textcircled{2} + \textcircled{3} \\ \hline \downarrow \\ \textcircled{1} \end{array}$$

**This passage contains an argument. The issue is whether some winged animals are dinosaurs. The conclusion is that some winged animals are dinosaurs. The two premises are that all dinosaurs are giant reptiles, and that all giant reptiles are winged animals.**

All that remains is the second paragraph of evaluation. Since all of the claims are categorical claims, and the argument is deductive, you should be able to recognize the argument as a categorical syllogism. That means that in the second paragraph you will need to identify the type of argument and prove it valid or invalid. Since the validity of a categorical syllogism can be demonstrated with either a Venn diagram or by considering the rules of validity, you can use either procedure. Remember, however you decide to prove the argument valid or invalid, you must set the argument up in standard form.

**This argument is a categorical syllogism and, thus, is deductive.  
Its standard form is:**

**All dinosaurs are giant reptiles.  
All giant reptiles are winged animals.  
Some winged animals are dinosaurs.**

**The argument is invalid because a valid syllogism cannot have two  
universal premises and a particular conclusion.**

Note that in this first example, the argument is proven invalid by identifying the rule for valid categorical syllogisms that this example breaks.

In the next example, the argument is proven valid by drawing a Venn diagram. Either option will be sufficient. Here's the argument with the Complete Analysis plus Evaluation presented immediately afterward.

*Only that which science studies is real. Science cannot study consciousness.  
So consciousness is not real.*—Mary Midgley, *Science and Poetry*

① *Only that which science studies is real.* ② *Science cannot study consciousness.* So ③ *consciousness is not real.*

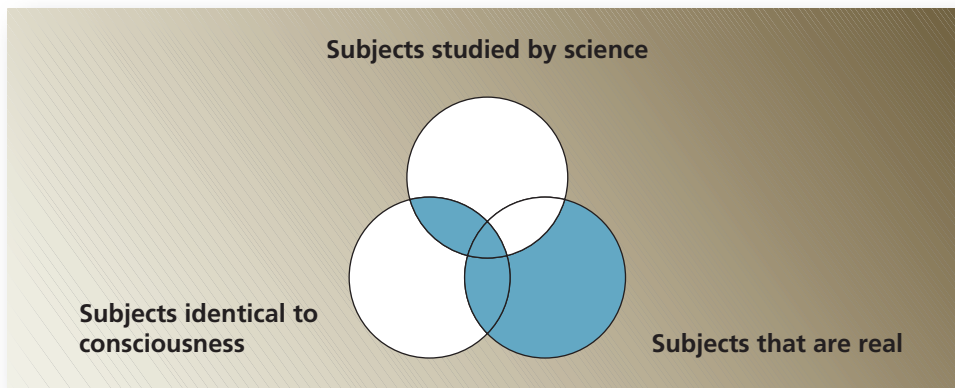
$$\begin{array}{c} \textcircled{1} + \textcircled{2} \\ \hline \downarrow \\ \textcircled{3} \end{array}$$

This passage from Mary Midgley's book, *Science and Poetry*, contains an argument. The issue is whether consciousness is real. The conclusion is that consciousness is not real. The two premises are that only that which science studies is real, and that science cannot study consciousness.

This is a deductive argument and a categorical syllogism. The standard form of the argument is as follows:

All subjects that are real are subjects studied by science.  
 No subjects identical to consciousness are subjects studied by science.  
 No subjects identical to consciousness are subjects that are real.

The following Venn diagram proves that the argument is valid:



### EXERCISE 7.32

Write a Complete Analysis plus Evaluation for the following passages.

1. United States senators make good presidents because senators know how to pass legislation, and anyone who knows how to pass legislation makes a good president.
2. If an engaged couple knows or suspects that there may be diseases, such as hemophilia, cystic fibrosis, sickle-cell anemia, Down syndrome, fragile X syndrome, or Tay-Sachs disease in their family genetic makeup, they can seek genetic counseling before marriage.—Rosalind Charlesworth, *Understanding Child Development*
3. Nobody who received a performance bonus will be prosecuted, and nobody who is prosecuted can run for federal office. Hence, nobody who received a performance bonus can run for federal office.
4. Because one of its ultimate aims is thorough understanding of living organisms, including man, biology is the most useful science. Accordingly, since more efforts should be made to encourage high school students to major in biology if biology is the most useful science, more efforts should be made to encourage high school students to major in biology.

5. CDs are like vinyl records. Both have data stored on a surface, and both can be easily damaged by mishandling. Vinyl records became obsolete. So, it is likely that CDs will also become obsolete.
6. A platypus is really a mammal. This is because a platypus gives birth to live young, and only mammals give birth to live young.
7. Madeline was out of town when the bank was robbed, and nobody who was out of town when the bank was robbed could have been the bank robber. So, Madeline is not the person who robbed the bank.
8. Critics accuse owners of racehorses of abusing their animals in the name of profits. This just isn't true, because the owners wouldn't harm their animals.
9. Late at night, much of what is on television is "infomercials," so-called because they purport to give information but are really just long commercials.
10. Some lizards are endangered animals, so some lizards are buzzards, given that some buzzards are endangered animals.
11. We all know that wars are violent and that violence is immoral. The conclusion that follows is obvious.
12. I think of good writing being done in a very deliberate way. That's why I use a dip pen. It's to slow myself down and to keep myself from rushing the writing.—novelist and historian Shelby Foote in *Conversations with Shelby Foote*, edited by William C. Carter
13. Given that the weather was warm last December, and it's the only thing that is different between this last December and the December the previous year, the warm weather must have caused a decline in Christmas tree sales. Trees arrived the last week of November as usual, prices were exactly the same, and the same number of people live in town
14. Air is an extremely poor conductor of heat, which is why most insulating materials have a large number of air spaces trapped within them.—C. Donald Ahrens, *Essentials of Meteorology*
15. When a 1989 Gallup Poll asked 1,249 adults to compare contemporary youth to those of 20 years ago, topping the list were the words "Selfish" (81 percent), "Materialistic" (79 percent), and "Reckless" (73 percent). These descriptors and the other data cited in the study are diametrically opposed to how teens actually view themselves. A survey of 1,015 high school students cited in the study found that the values teens hold dear are "being honest" (8.6 on a 10-point scale), "working hard" (8.4), "being a good student" (7.9), and "giving time to help others" (7.6). —Kent Baxter, "(Re)inventing Adolescence," *The Hedgehog Review*, Spring 2009

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### Chapter Review Questions

1. Define *syllogism*.
2. How many premises are contained in a categorical syllogism?
3. In the claim, "All turtles are mollusks," what is the word *turtles* called?
4. What is the copula for the claim in question 3?
5. What is the quantifier for the claim in question 3?
6. How do you determine a claim's quality?
7. What is the formal name for an E claim?

8. Turn the claim “All pine trees are green” into a proper standard form claim.
9. When must you use *identical to* to translate a claim into standard form?
10. How do you translate a claim that begins with *only*?
11. How can we identify the major term of a syllogism?
12. When putting a syllogism into a Venn diagram, do we shade or draw X’s first?
13. In a Venn diagram in standard form, which term is represented by the middle circle?
14. What does it mean to say a term is *distributed*?
15. Which terms are distributed in an E claim?
16. Which terms are distributed in an I claim?
17. Which term is always distributed in a negative claim?
18. How many rules must a valid syllogism satisfy?
19. How many rules of negation exist?
20. Define *enthymeme*.

## CHAPTER 8

# Evaluating Truth-Functional Arguments

Suppose that you are studying for your astronomy class when you encounter the following argument.



UPI/NASA/Landov

NASA's Hubble Space Telescope shows the dwarf planet Pluto (left) with its three moons (to the right).

*If Pluto is a planet, then it must have "cleared the neighborhood" around its orbit. Since Pluto has not "cleared the neighborhood" around its orbit, Pluto is not a planet. Besides, if Pluto is not a planet, then it would be reclassified as a "dwarf planet," and Pluto was reclassified as a "dwarf planet" in 2006.*

You may have already recognized this as a truth-functional argument since you learned how to distinguish between different kinds of arguments in Chapter 6. But, is it a *good* argument? In this chapter, you'll learn to recognize, analyze, and evaluate the structure of truth-functional arguments such as this one. Just as with categorical arguments, you must translate truth-functional arguments into symbolic form in order to determine whether they are valid or invalid. First, though, let's review how to recognize truth-functional claims.

### Recognizing Truth-Functional Claims

In Chapter 2, you learned how to recognize and count claims. A claim, you should remember, is a statement that has truth-value; that is, it may be true or false. In truth-functional logic, the smallest unit having truth-value is called a **simple claim**. The following two sentences express the same simple claim.

*The Mona Lisa was painted by Rembrandt.*  
*Rembrandt painted the Mona Lisa.*

When counting claims, you learned that sometimes claims are combined in a sentence in a way that transforms them into a single claim. This kind of sentence is called a **compound claim**, a claim containing one or more simple claims modified

by one or more operators. An **operator** is a word or phrase that modifies one or more simple claims to create a new, compound claim. There are four operators used in truth-functional arguments, and therefore four kinds of compound claims: negations, conjunctions, disjunctions, and conditionals.

A **negation** is a compound claim made by modifying another claim with the word *not* or its equivalent. For example, the following negations express the same compound claim.

*The light bulb was not invented by Henry Ford.*

*It is not the case that the light bulb was invented by Henry Ford.*

In both cases, the simple claim is “The light bulb was invented by Henry Ford.”

A **conjunction** joins together two claims with the word *and* (or its logical equivalents such as *but* or *yet*) to form a compound claim. Thus, the following conjunctions express the same compound claim.

*The strawberries are organic, and the blueberries are overpriced.*

*The strawberries are organic, but the blueberries are overpriced.*

*The strawberries are organic, yet the blueberries are overpriced.*

In these sentences, the two simple claims are “The strawberries are organic” and “The blueberries are overpriced.”

### EXERCISE 8.1

**Your Turn!** Does the following sentence express the same meaning as the compound claim previously listed?

*The blueberries are overpriced, and the strawberries are organic.*



A **disjunction** is a compound claim that joins together two claims with the word *or* or its equivalent. The following disjunctions express the same compound claim.

*Baton Rouge is located in Louisiana or Arkansas.*

*Either Baton Rouge is located in Louisiana or Baton Rouge is located in Arkansas.*

*Baton Rouge is located in Arkansas or Baton Rouge is located in Louisiana.*

Notice that the meaning of the disjunction is not changed when the order of the simple claims is reversed.

### EXERCISE 8.2

**Your Turn!** What are the two simple claims in the previous disjunctions?





A **conditional** joins together two claims with the phrase *if... then...* or its equivalent. The following three conditionals express the same compound claim.

*If you are a nurse, then you passed an anatomy course.*

*You are a nurse only if you passed an anatomy course.*

*You passed an anatomy course if you are a nurse.*

In these conditionals, the two simple claims are “You are a nurse” and “You passed an anatomy course.” These simple claims play distinct roles in a conditional such that when the order of the claims is reversed, the meaning of the conditional changes. The structure of conditional claims will be discussed further in the following section.

## Translating Truth-Functional Claims

As an aid in identifying the underlying structure of truth-functional arguments, you can translate truth-functional claims into symbolic form. Each simple claim and operator should be given a symbol. Although you can use any symbol you wish, it is general practice to translate simple claims by using a letter of the alphabet related to the content of the claim. For example, “Berkeley is located in California” might be translated as B, and “California is located in the United States” might be translated as C. Most importantly, make sure that whatever symbol you assign to a simple claim is used consistently to represent that claim, and that no single symbol is used to represent more than one simple claim.

Logical operators, on the other hand, need agreed-upon symbols. Although there are several in common usage, the following are used in this book.

	Compound claim	Common translation	Symbol
	Negation	not	$\sim$
	Conjunction	and	$\bullet$
	Disjunction	or	$\vee$
	Conditional	if... then...	$\supset$

Let’s consider an example of each kind of compound claim. The negation “The light bulb was not invented by Henry Ford” could be translated as follows, using I to represent the simple claim “The light bulb was invented by Henry Ford.”

$\sim I$



**Hint!** Whenever you encounter a claim that denies a negation, as in “It is not the case that the light bulb was not invented by Henry Ford,” you may translate the claim as either I or  $\sim(\sim I)$ . The two translations are equivalent.

The conjunction “The strawberries are organic, and the blueberries are overpriced” could be translated as follows, using  $S$  to represent “The strawberries are organic” and  $B$  to represent “The blueberries are overpriced.”

$$S \bullet B$$

The disjunction “Baton Rouge is located in Arkansas or Baton Rouge is located in Louisiana” could be translated as follows, using  $A$  to represent “Baton Rouge is located in Arkansas” and  $L$  to represent “Baton Rouge is located in Louisiana.”

$$A \vee L$$

### EXERCISE 8.3

**Your Turn!** Why shouldn't you translate the compound claim “Baton Rouge is located in Arkansas or Baton Rouge is located in Louisiana” as  $B \vee B$ ?



The conditional “If you are a nurse, then you passed an anatomy course” could be translated as follows, using  $N$  to represent “You are a nurse” and  $P$  to represent “You passed an anatomy course.”

$$N \supset P$$

Among the four compound claims, conditional claims deserve special attention for three reasons. First, the simple claims in a conditional play different roles such that changing their order changes the meaning of the compound claim. Second, conditional claims can be expressed in many different ways, and it takes practice to identify when these different ways of expressing conditionals express the same meaning. Third, understanding the structure of conditional claims can help you evaluate whether certain deductive arguments are valid or invalid.

Recall that a conditional is a compound claim that joins together two claims with the phrase *if...then...* or its equivalent. We will refer to the *if...then...* form as the standard form for conditional claims. In any conditional, the two claims that compose it fulfill different roles. The claim following the word *if* is called the **antecedent**, and the claim following the word *then* is called the **consequent**.

### EXERCISE 8.4

**Your Turn!** Underline each simple claim in the following conditional. Then properly label the simple claims as antecedent and consequent.

*If it is raining, then there are clouds in the sky.*



When the order of the claims in a conditional is reversed, the meaning of the conditional changes. Consider the following two conditionals.

*If it is raining, then there are clouds in the sky.*

*If there are clouds in the sky, then it is raining.*

The first of these conditionals is true, but the other is false. The first one tells us that whenever it rains there are clouds in the sky. This claim is true because clouds are required for rain. The second conditional tells us that whenever there are clouds in the sky there is rain. However, this is false because clouds do not guarantee rain; in other words, not every cloudy day produces rain.



**Hint!** Do not confuse conditional claims with causal claims. Although causal claims may be expressed as conditional claims, not all conditional claims express a causal connection between two events. Instead, conditional claims express a *logical relationship* between the antecedent and consequent.

What we see from this is that a conditional claim expresses a certain kind of relationship between the antecedent and the consequent. Every conditional claim states two things: the truth of the antecedent is **sufficient** for the truth of the consequent, and the truth of the consequent is **necessary** for the truth of the antecedent. Returning to the previous true conditional, “If it is raining, then there are clouds in the sky,” this compound claim states that the antecedent and consequent are related to each other in the following ways.

Rain is a *sufficient* condition for clouds in the sky.

Clouds in the sky are a *necessary* condition for rain.

### EXERCISE 8.5



**Your Turn!** What does it mean to say that rain is a sufficient condition for clouds in the sky? What does it mean to say that clouds in the sky are a necessary condition for rain?

Although the standard form for conditionals is the *if...then...* form, conditional claims can be expressed in other ways, most commonly using the phrases *only if* and *if*. But notice that these two phrases express different meanings when the simple claims are presented in the same order.

*It is raining only if there are clouds in the sky.*

*It is raining if there are clouds in the sky.*

The first of these conditionals tells us that rain occurs only when clouds are in the sky. The second conditional says that rain occurs anytime there are clouds in the sky. The first of these is true, and the second is false. As you previously saw, clouds in the sky are a necessary condition for rain; they are not a sufficient condition for rain. This means that the *if...then...* conditional expresses the same meaning as the *only if* conditional when the claims are presented in the same order.

*If it is raining, then there are clouds in the sky.*  
*It is raining only if there are clouds in the sky.*

Both of these conditional claims tell us that rain is a sufficient condition for clouds in the sky, and that clouds in the sky are a necessary condition for rain. The antecedent and consequent of both claims are identical.

### EXERCISE 8.6

**Your Turn!** Underline each simple claim in the following conditional. Then properly label the simple claims as antecedent and consequent.

*It is raining only if there are clouds in the sky.*



When we compared the conditional claim using the phrase *only if* with the one using *if*, we found that the former is true and the latter is false when the simple claims are presented in the same order. This is because the order of the antecedent and consequent is reversed in an *if* conditional. Notice that when we switch the order of the simple claims, the conditional is true.

*There are clouds in the sky if it is raining.*

This conditional tells us that there are clouds in the sky whenever it is raining. In other words, rain is a sufficient condition for clouds in the sky, and clouds in the sky are a necessary condition for rain.

### EXERCISE 8.7

**Your Turn!** Underline each simple claim in the following conditional. Then properly label the simple claims as antecedent and consequent.

*There are clouds in the sky if it is raining.*



All this means that the following three conditional forms are interchangeable. That is, each expresses the same meaning. You will need to commit these structures to memory.

**If** (antecedent), **then** (consequent).  
 (antecedent) **only if** (consequent).  
 (consequent) **if** (antecedent).

When translating conditional claims into symbolic form, the placement of the antecedent always occurs before the horseshoe ( $\supset$ ), and the consequent always occurs

after it. Thus, if we use  $R$  to symbolize the simple claim “It is raining” and  $C$  to symbolize the simple claim “There are clouds in the sky,” the conditional “If it is raining, then there are clouds in the sky” would be translated as follows.

$$R \supset C$$

Similarly, the conditionals “It is raining only if there are clouds in the sky” and “There are clouds in the sky if it is raining” would be translated the same way.

$$R \supset C$$

Notice that, although the consequent appears before the antecedent in the *if* conditional, the symbol for the antecedent still comes before the horseshoe in the translation.

### EXERCISE 8.8



**Your Turn!** Why are the conditionals “It is raining only if there are clouds in the sky” and “There are clouds in the sky if it is raining” both translated as  $R \supset C$ ?

Some conditional claims do not, at first, appear to be conditional claims. For example, the word *unless* is often used to express a conditional. Although we use the term regularly in our everyday speech, analyzing a conditional claim containing the phrase *unless* can be challenging. One trick for remembering how to do so is to substitute the phrase *if it is not the case that* (or *if...not...for short*) for *unless*, and then rewrite the claim in standard *if...then...form*.

Consider the following conditional claim.

*It is not raining unless there are clouds in the sky.*

First, replace *unless* with *if...not...*, making sure to write the sentence in grammatically correct English. Either of the following would be an acceptable substitution.

*It is not raining if it is not the case that there are clouds in the sky.*

*It is not raining if there are not clouds in the sky.*

Next, rewrite the sentence in *if...then...* form. Since the sentence expresses a conditional using *if*, the consequent comes before the *if* and the antecedent comes after it. The rewritten claim would read as follows.

*If there are not clouds in the sky, then it is not raining.*

Now, we can translate the claim into symbolic form.

$$\sim C \supset \sim R$$

**EXERCISE 8.9**

Translate each of the following truth-functional claims into symbolic form.

1. People often think that all claims are either facts or they are opinions.
2. If John continues to look haggard, then someone must arrange to take him to the University Health Center to find out what's wrong.
3. The player on the field appears to be injured, and the team doctor has been called to the scene.
4. Kestrels are not common in this part of the country.
5. In an automobile accident, the insurance companies are interested in discovering who is liable or who has the money to pay.
6. Loose clothing is more comfortable in hot weather, but I have trouble finding loose clothing that is attractive.
7. All students on campus have access to either a desktop computer or a laptop.
8. If the movie has a lot of violence, then it will be too gruesome to watch.
9. If a bear is in the house, then a crocodile is in the yard.
10. Either the car decelerates or the motor is getting enough gasoline.
11. The car does not decelerate.
12. You definitely do not have a bronchial infection.
13. Llamas are South American ruminants, and bison are North American bovine mammals.
14. If Congress declares these prairies a national park, then it will be clear they are committed to preserving the habitat of the creatures that live here.
15. Primroses are hearty in our climate only if they are protected from the gophers.
16. Craig should be considered an opportunist if he takes advantage of the injury to improve his position in relation to the other players.
17. You can graduate from this university only if you pass the logical reasoning class.
18. If the regiment is split into two battalions, it will be more flexible.
19. An appraisal is required for tax purposes if a single donated item is valued at \$500.
20. Only if airport security is lax will a terrorist board an aircraft.

**Using Proper Punctuation**

When more than one operator is present in a compound claim, your translation must specify which operations apply to which claims in order to retain the original claim's meaning. Parentheses signal that an operator located inside them combines only those claims which accompany it. Other punctuation symbols such as brackets and braces work similarly, indicating that the operator combines only the claims located inside them. An operator outside of any punctuation symbols is the **main operator**. The key to using proper punctuation is identifying the main operator of the compound claim; it applies to the entire claim, not just to some of the parts of the claim.

Consider the following example.

*If the defendant is an "enemy combatant," then he is either an enemy soldier or a member of a terrorist organization.*

To translate this claim, first choose a symbol for each simple claim. Let's make D represent "The defendant is an 'enemy combatant,'" S represent "The defendant is an enemy soldier," and T represent "The defendant is a member of a terrorist organization." Next, translate the sentence.

$$D \supset S \vee T$$

Since we have multiple operators, we must insert parentheses to indicate whether the main operator is the conditional or the disjunction. Look back at the original sentence. Notice that the disjunction is contained in the consequent because it appears following the word *then*. The proper translation of the sentence must be as follows.

$$D \supset (S \vee T)$$

This translation shows that the disjunction applies only to the claims inside the parentheses, and that the main operator of the compound claim is the horseshoe ( $\supset$ ).

Let's look at another example of a sentence with multiple operators. Consider this one.

*If you don't go to the party with me, then I will find someone who will.*

To translate this claim, let's use G to symbolize the simple claim "You go to the party with me" and F to symbolize the simple claim "I will find someone who will." Which of the following two translations accurately reflects the meaning of this compound claim?

$$\begin{aligned} &\sim G \supset F \\ &\sim (G \supset F) \end{aligned}$$

First, notice that the two translations are not equivalent; they do not express the same meaning. In the first translation, the main operator is the conditional; in the second translation, the main operator is the negation. Only the first accurately translates the original compound claim. The second translation would represent the following sentence.

*It's not the case that if you go to the party with me, then I will find someone who will.*

Notice in this sentence that the negation applies to the entire conditional, not just the antecedent.

### EXERCISE 8.10



**Your Turn!** Translate the following compound claim into symbolic form.

*It is not the case that we live in Canada and we live in South America.*

Some of the trickiest claims to translate are *neither...nor...* claims. For example,

*Your new pet is neither a llama nor a bison.*

Part of what is tricky about claims like these is that they can be translated as conjunctions and as negations. To see how, let's first think about what this claim is expressing. It tells us that your new pet is not a llama and that your new pet is not a bison. In other words, the claim can be translated as follows.

$$\sim L \bullet \sim B$$

This claim could also, however, be translated with a negation as the main operator. What, then, is being denied? It denies that your new pet is either a llama or a bison. In other words, the claim could also be translated as follows.

$$\sim (L \vee B)$$

You might wonder which of the two translations above is the right one. The answer is that both are correct. What makes this possible is a rule called DeMorgan's Law.

$$\sim (X \vee Y) = \sim X \bullet \sim Y$$

Notice that when the negation is assigned to each simple claim, the claim must be translated as a conjunction. This is because when you say that "It is false that X or Y," you mean that both are false. Similarly, when a conjunction is denied, as in "It is false that X and Y," what is meant is that at least one of them is false. In other words, DeMorgan's Law also tells us that,

$$\sim (X \bullet Y) = \sim X \vee \sim Y$$

### EXERCISE 8.11

**Your Turn!** Apply DeMorgan's Law to the claim in the previous Your Turn! exercise.



### EXERCISE 8.12

Identify the main operator of each of the following compound claims.

1.  $A \vee \sim B$
2.  $\sim (C \bullet D)$
3.  $E \vee (F \bullet G)$
4.  $\sim (H \supset I) \vee J$
5.  $(\sim K \bullet L) \supset M$
6.  $N \supset \sim (O \vee P)$
7.  $(Q \bullet R) \vee \sim S$
8.  $T \bullet (U \supset V)$
9.  $(W \vee \sim X) \bullet (Y \vee Z)$
10.  $\sim [A \bullet (B \supset C)]$

Hulton Archive/Getty Images



English mathematician  
Augustus De Morgan  
(1806–1871).



## EXERCISE 8.13

Translate each of the following compound claims into symbolic form using proper punctuation. Then, identify the main operator of the compound claim.

1. A crocodile is neither in the yard nor in the house.
2. It is not the case that if Earth is the center of the universe, then all professional astronomers are totally mistaken.
3. If the pet owner is not extremely consistent, housebreaking a new kitten can be difficult.
4. It is not the case that my car will start after a rainstorm only if I dry off the battery connections.
5. Toyota's new hybrid car gets excellent gas mileage and is available with either an automatic or a manual transmission.
6. You can't register your car if you don't pass the smog inspection.
7. It is not the case that you can have a successful business and you can hire dishonest employees.
8. You won't have a successful business unless you hire hard-working employees.
9. We can either go out to dinner or go to the movies if you want to go out tonight.
10. Unless you are afraid of the dark, your mission is to go into that cave.

### Analyzing Truth-Functional Arguments

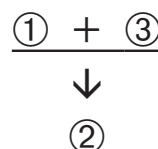
When analyzing and diagramming truth-functional arguments, you must use the skills that you learned in Chapters 3 and 4. For example, remember that the conclusion of the argument may not appear as the last claim in the passage. Inference indicators can help you identify the conclusion and premises so that when you translate the claims in an argument you put the premises and conclusion in their proper places.

Consider the following example.

*If the water main breaks, a plumber should be called. That means that we need to call a plumber since the water main is broken.*

The inference indicators, *that means that* and *since*, signal that the second claim is the conclusion and that the first and third claims are the premises. Since both premises are needed to support the conclusion, they are dependent on each other, and the diagram for the argument should appear as follows.

① *If the water main breaks, a plumber should be called.* That means that ② *we need to call a plumber* since ③ *the water main is broken.*



When translating the argument into symbolic form, you must put the premises and conclusion in their proper places, regardless of the order that they appear in the passage. The previous argument should, then, be translated as follows, using W to symbolize the claim “The water main is broken” and P to symbolize the claim “We need to call a plumber.”

**P1:**     $W \supset P$   
**P2:**     $W$   
 $\therefore$      $P$

Notice that the premises are the translation of claims ① and ③, and the conclusion is the translation of claim ②.

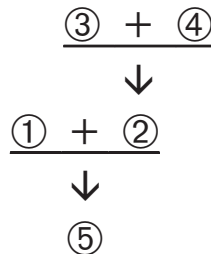
You also learned in Chapters 3 and 4 that extra claims, that is, claims that are neither premises nor conclusions, should be left out of your analysis and diagram, and that implied claims, that is, claims that are implied by non-claims, should be included in your analysis and diagram. When you translate arguments like these, you should do the same. Also, remember that premises in subarguments are not part of the main argument, so they should not be included with your translation of the main argument.

Consider this example.

*The Mona Lisa was painted using either acrylic or oil. But, there's no way that it could have been painted using acrylic since acrylic paints were available only after the 1940s, and the Mona Lisa was painted in the sixteenth century. So, the material used is obvious.*

When you diagram the passage, you can see that there is a subargument and an implied claim.

① *The Mona Lisa was painted using either acrylic or oil. But, ② there's no way that it could have been painted using acrylic since ③ acrylic paints were available only after the 1940s, and ④ the Mona Lisa was painted in the sixteenth century. So, ⑤ the material used is obvious.*  
 ⑤ The Mona Lisa was painted using oil.



In translating the argument, the premises of the subargument should not be included with the main argument, just as they are not included in your Formal Analysis of the main argument. In the following translation, A represents “The *Mona Lisa* was painted using acrylic” and O represents “The *Mona Lisa* was painted using oil.”

**P1:**     $A \vee O$   
**P2:**     $\sim A$   
 $\therefore$      $O$

This detail from Leonardo da Vinci's famous *Mona Lisa* (Ca. 1502–06) shows her gaze fixed on the observer.



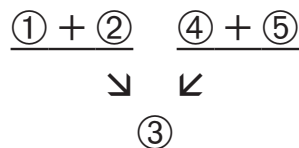
SuperStock

Let's analyze and diagram one more truth-functional argument by considering the one you encountered at the start of this chapter.

*If Pluto is a planet, then it must have "cleared the neighborhood" around its orbit. Since Pluto has not "cleared the neighborhood" around its orbit, Pluto is not a planet. Besides, if Pluto is not a planet, then it would be reclassified as a "dwarf planet," and Pluto was reclassified as a "dwarf planet" in 2006.*

The indicator *since* signals that the second claim is a premise for the third claim, and the indicator *besides* signals premises that are independent of the previous ones. The diagram of the argument should look like this.

① If Pluto is a planet, then it must have "cleared the neighborhood" around its orbit. Since ② Pluto has not "cleared the neighborhood" around its orbit, ③ Pluto is not a planet. Besides, ④ if Pluto is not a planet, then it would be reclassified as a "dwarf planet," and ⑤ Pluto was reclassified as a "dwarf planet" in 2006.



The diagram of the argument helps you see that the passage offers two pairs of premises for the conclusion. When translating the argument into symbolic form, each of the pairs of premises should be treated as constituting a distinct argument. Using *P* to symbolize

“Pluto is a planet,” C to symbolize “Pluto has ‘cleared the neighborhood’ around its orbit,” and D to symbolize “Pluto is reclassified as a ‘dwarf planet,’” the two arguments can be translated as follows.

**P1:**  $P \supset C$   
**P2:**  $\sim C$   
 $\therefore \quad \sim P$

**P1:**  $\sim P \supset D$   
**P2:**  $D$   
 $\therefore \quad \sim P$

You should translate the passage as constituting two separate arguments so that you can evaluate whether each pair of premises provides the intended support for the conclusion. The following sections present three methods for determining whether a truth-functional argument is valid or invalid, beginning first with identifying argument forms.

## Identifying Argument Forms to Determine Validity

Understanding the structure of conditionals provides you with the tools to identify some common argument forms. In this section, you will learn to identify two valid argument forms and two invalid argument forms. Recall that any conditional claim tells us two things:

The antecedent is *sufficient* for the consequent.  
 The consequent is *necessary* for the antecedent.

Now, take the following argument.

*If it is raining, then there are clouds in the sky. It is raining; therefore, there must be clouds in the sky.*

This argument can be symbolized as follows using R to represent “It is raining” and C to represent “There are clouds in the sky.”

**P1:**  $R \supset C$   
**P2:**  $R$   
 $\therefore \quad C$

This form of argument is called **modus ponens** and is a valid argument form. To understand why, think about the relationship between the premises. The first premise tells us that rain is a sufficient condition for clouds. Combined with the second premise, namely that it is raining, we must conclude that there are clouds in the sky. The argument is valid because when the premises are both true, the conclusion cannot fail to be true.

Here is an example of the second valid argument form.

*If it is raining, then there are clouds in the sky. There are no clouds in the sky; therefore, it is not raining.*

This argument can be symbolized like this.

$$\begin{array}{ll} \text{P1:} & R \supset C \\ \text{P2:} & \sim C \\ \hline \therefore & \sim R \end{array}$$

This form of argument is called **modus tollens** and is also a valid argument form. The first premise tells us that clouds are a necessary condition for rain. Combined with the second premise, namely that there are no clouds in the sky, we must conclude that it cannot be raining. This argument is valid because when the premises are both true, the conclusion cannot fail to be true.

There are two argument forms easily confused with modus ponens and modus tollens that are invalid argument forms. Here's an example of the first.

*If it is raining, then there are clouds in the sky. It is not raining; therefore, there are no clouds in the sky.*

This argument can be symbolized like this.

$$\begin{array}{ll} \text{P1:} & R \supset C \\ \text{P2:} & \sim R \\ \hline \therefore & \sim C \end{array}$$

This form of argument is called **denying the antecedent**, and it is invalid. To understand why, think back to what a conditional claim says. The antecedent is sufficient for the consequent, not necessary. Rain guarantees clouds, but it is not necessary for clouds. There are plenty of cloudy days without rain. This argument is invalid because when the premises are all true, the conclusion may or may not be true. The mistake in this argument is that it treats a sufficient condition as if it were necessary.

Finally, here's an example of the second invalid argument form.

*If it is raining, then there are clouds in the sky. There are clouds in the sky; therefore, it is raining.*

This argument can be symbolized like this.

$$\begin{array}{ll} \text{P1:} & R \supset C \\ \text{P2:} & C \\ \hline \therefore & R \end{array}$$

This form of argument is called **affirming the consequent**, and it is also invalid. According to the conditional claim, clouds are a necessary condition for rain. However, again, just because there are clouds doesn't mean there will be rain. This argument is invalid because when the premises are all true, the conclusion may or may not be true. The mistake is that the argument treats a necessary condition as if it were sufficient.

**Valid Argument Forms**Modus Ponens

$$\begin{array}{l} X \supset Y \\ \underline{X} \\ \therefore Y \end{array}$$

Modus Tollens

$$\begin{array}{l} X \supset Y \\ \underline{\sim Y} \\ \therefore \sim X \end{array}$$

**Invalid Argument Forms**Denying the Antecedent

$$\begin{array}{l} X \supset Y \\ \underline{\sim X} \\ \therefore \sim Y \end{array}$$

Affirming the Consequent

$$\begin{array}{l} X \supset Y \\ \underline{Y} \\ \therefore X \end{array}$$

**EXERCISE 8.14**

**Your Turn!** Recall the two Pluto arguments that were translated at the end of the previous section. Are these valid or invalid arguments? Identify the argument form for each.

$$\begin{array}{ll} \text{P1:} & P \supset C \\ \text{P2:} & \underline{\sim C} \\ \therefore & \sim P \end{array}$$

$$\begin{array}{ll} \text{P1:} & \sim P \supset D \\ \text{P2:} & \underline{D} \\ \therefore & \sim P \end{array}$$

**EXERCISE 8.15**

Identify the argument forms of the following symbolized arguments.

$$\begin{array}{l} 1. \ M \supset K \\ \underline{M} \\ \therefore K \end{array}$$

$$\begin{array}{l} 2. \ P \supset Q \\ \underline{Q} \\ \therefore P \end{array}$$

$$\begin{array}{l} 3. \ S \supset C \\ \underline{\sim S} \\ \therefore \sim C \end{array}$$

$$\begin{array}{l} 4. \ L \supset T \\ \underline{\sim T} \\ \therefore \sim L \end{array}$$

$$\begin{array}{l} 5. \ \sim S \supset \sim C \\ \underline{S} \\ \therefore C \end{array}$$

$$\begin{array}{l} 6. \ \sim A \supset B \\ \underline{\sim A} \\ \therefore B \end{array}$$

$$\begin{array}{l} 7. \ \sim C \supset \sim D \\ \underline{D} \\ \therefore C \end{array}$$

$$\begin{array}{l} 8. \ \sim E \supset \sim F \\ \underline{\sim F} \\ \therefore \sim E \end{array}$$

$$\begin{array}{l} 9. \ Q \\ \underline{P \supset Q} \\ \therefore P \end{array}$$

$$\begin{array}{l} 10. \ \sim C \\ \underline{S \supset C} \\ \therefore \sim S \end{array}$$



**EXERCISE 8.16**

Identify the argument forms of the following symbolized arguments.

$$\begin{array}{l} 1. X \supset (J \bullet F) \\ \quad \sim (J \bullet F) \\ \hline \therefore \sim X \end{array}$$

$$\begin{array}{l} 2. \sim (A \vee B) \\ \quad \sim (A \vee B) \supset \sim C \\ \hline \therefore \sim C \end{array}$$

$$\begin{array}{l} 3. (B \supset C) \supset (D \supset F) \\ \quad D \supset F \\ \hline \therefore (B \supset C) \end{array}$$

$$\begin{array}{l} 4. \sim L \bullet \sim M \\ \quad \sim (L \vee M) \supset \sim (A \vee \sim B) \\ \hline \therefore \sim A \bullet B \end{array}$$

$$\begin{array}{l} 5. (L \bullet M) \supset (C \vee D) \\ \quad \sim L \vee \sim M \\ \hline \therefore \sim C \bullet \sim D \end{array}$$

**EXERCISE 8.17**

Diagram each argument. Then, translate the main argument into symbolic form and determine whether it is valid or invalid by identifying the argument form.

1. If Christina went to the market, then she bought frozen peas. She went to the market, so she bought frozen peas.
2. If the car is new, then we must keep it in good condition. The car is not new; thus, we do not need to keep it in good condition.
3. The movie will be too gruesome to watch if it has a lot of violence. It does have a lot of violence; therefore, it will be too gruesome to watch.
4. If my bird eats moldy grain, then it is liable to get sick. My bird does not eat moldy grain, so she is not liable to get sick.
5. Anand is the new chess grand master. This is because he beat Topalov, and if he beat Topalov, then Anand is the new chess grand master.
6. The story you wrote is not a fairy tale. Accordingly, it is not for children, because if a story is for children, then it is a fairy tale.
7. That must be the fairway. This is because that must be the fairway if my ball is lying in it, and my ball is lying in it.
8. Tomas will get left behind if he forgets to make reservations. Therefore, since Tomas got left behind, he must have forgotten to make reservations.
9. The mail carrier is the one who stole my package! I never received my package, and if the mail carrier stole my package, then I wouldn't have received it.
10. Sean's mother said that he will go to Disneyland only if he finishes all his homework. I guess he's going to Disneyland, then, because he finished all his homework.
11. If the defendant's fingerprints were on the murder weapon, then the defendant is guilty of murder. Therefore, the defendant is guilty of murder since the forensics expert testified that the defendant's fingerprints were found on the murder weapon.

12. You are going to end up on academic probation. Why? Because you are going to the party tonight, and if you go to the party tonight, you will end up on academic probation because you won't have time to finish your term paper.
13. There has been a lot of controversy over whether BP (British Petroleum) is to blame for the Deepwater Horizon oil spill. According to a recent news report, they are responsible. This is because they are responsible for the accident if they deliberately took "shortcuts," and there is evidence that they did take shortcuts, in that workers replaced heavy drilling fluid with saltwater.
14. We won't have good government unless qualified people are elected. This means that we won't have good government. Haven't you seen who got elected?
15. Gay marriage? Why not? If we allow infertile heterosexual couples to marry, then we should allow same-sex couples to marry, and, of course, we should allow infertile heterosexual couples to marry.
16. If you spray pre-emergent on your lawn in the spring, then you don't water your lawn enough if it has weeds. Given that you did not spray your lawn with pre-emergent this spring, it is not the case that you don't water your lawn enough if it has weeds.
17. Without a tax increase, social services will be cut. But the governor refuses to raise taxes since he promised voters that he wouldn't when he ran for election. Thus, we can expect more social service cuts.
18. If Paula is a grandmother, then either her son or her daughter has a child. Paula is not a grandmother, since neither her son nor her daughter has a child.
19. Your car should run just fine. This is because you change your oil regularly, and if you don't change your oil regularly, then your car won't run well. Besides, a car should run just fine if it is new, and your car is new—you just bought it last year.
20. Recently, the U.S. Consumer Product Safety Commission recalled a number of cribs due to strangulation and suffocation hazards. You might worry whether the crib you bought last year poses this kind of danger. But, keep in mind that if a child's crib is either a strangulation hazard or a suffocation hazard, then the U.S. Consumer Product Safety Commission will issue a recall of the item. Thus, you can trust that your child's crib is neither a strangulation hazard nor a suffocation hazard, because it has not been recalled.

## Applying Truth-Functional Definitions

The argument forms examined in the previous section are merely four of an infinite number of possible truth-functional argument forms. Don't worry, you won't be expected to learn all of them, or even all of the most common of them. Instead, in the remaining sections of this chapter you will learn to use two related methods for determining whether any truth-functional argument is valid or invalid: the truth table method and the shortcut method. To use these methods, you must commit to memory the **truth-functional definitions** for negation, conjunction, disjunction, and conditional. These definitions specify when a particular compound claim is true and when it is false.



Recall that a claim is a statement that has truth-value. That is, it can be true or false. This can be represented by listing the two possible truth-values (T for true, and F for false) for any simple claim, here symbolized as X. These possible values are placed in a column directly underneath the X.

$$\begin{array}{c} X \\ T \\ F \end{array}$$

Taking up each kind of compound claim individually, let's start with a negation. Under what conditions will a negation be true? Under what conditions will a negation be false? The following is the truth-functional definition for negation. X refers to any simple claim, and  $\sim$  refers to the operation of negation. Notice that X retains the same two possible truth-values as above.

$$\begin{array}{c} \sim X \\ F T \\ T F \end{array}$$

Since a negation contains one simple claim, there are two possible truth-value combinations for negation: either X is true or it is false. These possible values are placed in a column directly underneath the X. When that simple claim, X, is negated, its truth-value changes. When X is true,  $\sim X$  is false, and when X is false,  $\sim X$  is true. These truth-values are placed underneath the  $\sim$  to indicate the truth-value once the operation has been performed.

What about a conjunction? Under what conditions is a conjunction true? Under what conditions is a conjunction false? The following is the truth-functional definition for a conjunction.

$$\begin{array}{c} X \bullet Y \\ T T T \\ T F F \\ F F T \\ F F F \end{array}$$

First off, notice that there are twice as many possible truth-value combinations in a conjunction as in a negation. This is because negation involves only one simple claim, whereas a conjunction involves two simple claims. Although X and Y only have two possible truth-values each, together there are four possible truth-value combinations. When X is true, Y could be true or it could be false, and when X is false, Y could be true or it could be false. These possibilities are placed underneath the X and the Y in the table. When the conjunctive operation is performed, the truth-value of the conjunction is placed underneath the  $\bullet$ . Notice that the only instance in which the conjunction is true is when both of the simple claims are true; otherwise, the claim is false.

### EXERCISE 8.18



**Your Turn!** Why is a conjunction true only when both simple claims are true?

Next, let's look at the truth-functional definition for disjunction.

$X \vee Y$
T T T
T T F
F T T
F F F

Like a conjunction, a disjunction involves two simple claims; hence, there are four possible truth-value combinations, and these possibilities are placed underneath the X and the Y in the table. When the disjunctive operation is performed, the truth-value of the disjunction is placed underneath the  $\vee$ . Notice that, unlike the conjunction, there are three possible instances in which a disjunction is true, and only one in which it is false.

This kind of disjunction is sometimes referred to as an inclusive disjunction in order to distinguish it from what is called an exclusive disjunction. The difference between these two kinds of disjunction lies in how the term *or* is understood. For an **inclusive disjunction** to be true, *at least* one of the simple claims is true, whereas for an **exclusive disjunction** to be true, *exactly* one of the simple claims is true. Unfortunately, our ordinary usage of the term *or* sometimes treats the disjunction as exclusive and other times treats it as inclusive. For the purposes of this text, you should treat all disjunctions in the inclusive sense, as meaning *at least* one of the simple claims is true.

### EXERCISE 8.19

**Your Turn!** What possibilities would be eliminated if you treated the following disjunction as exclusive rather than inclusive?

*The Opportunity Award is a scholarship intended for those students who either face financial hardships or are first-generation college students.*



Finally, we can examine the truth-functional definition for the conditional operator.

$X \supset Y$
T T T
T F F
F T T
F T F

Our starting place is the same as a conjunction or disjunction; because there are two simple claims involved in conditional, there will be four possible truth-value combinations to consider. The next step, however, can be challenging. When is an *if...then...* statement true? When is it false? Think back to what we learned about conditional claims earlier in this chapter. Recall that all conditional claims express the following two statements: The antecedent is sufficient for the consequent, and the consequent is necessary for the antecedent. That means that a conditional claim will be false when the antecedent is true but the consequent is false; otherwise, the claim will be true. Take a few minutes to carefully reflect on this definition.

## EXERCISE 8.20



**Your Turn!** Using the claim “If it is raining, then there are clouds in the sky” explain the truth-functional definition for conditional.



**Hint!** It may seem quite strange to say that every conditional claim is true whenever the antecedent is false. Consider the following example.

*If California is a planet, then Marilyn Monroe will be the next president.*

According to the truth-functional definition for conditionals, this claim is true because the antecedent is, in fact, false. However, it seems difficult to accept this since the antecedent and consequent have nothing at all to do with each other! In our everyday language, the antecedents and consequents in conditional claims typically have some kind of causal relationship with each other. But, truth-functional logic is not restricted to these everyday uses of conditional claims. The important thing to remember here is that the truth-functional definition of conditional is capturing the *logical structure* of the conditional claim. If the antecedent of a conditional claim is false, then the truth or falsity of the consequent simply doesn't matter.

## EXERCISE 8.21

Translate each compound claim into symbolic form. Then, determine the truth-value of each compound claim using your knowledge of the truth-value for each simple claim.

1. Soccer is not played on ice.
2. Either cowboys wear ballet slippers or they wear boots.
3. Africa is a country and ketchup is a vegetable.
4. If golf is a sport, then soccer is played on ice.
5. Bananas are yellow, and either apples are purple or carrots are green.
6. It is not the case that either apples are purple or carrots are green.
7. Either bananas are yellow or apples are purple only if carrots are green.
8. The sun rises in the east, but it does not set in the east.
9. Either Africa is a country, or Lima is not the capital of Peru.
10. If Africa is not a country, then the sun sets in the east.
11. Either horses neigh and pigs squeal, or puppies meow.
12. It is not the case that both horses have hooves and puppies can fly.
13. Giraffes have long necks and elephants are fish unless pelicans are not birds.

14. Ballerinas wear roller skates, and if soccer is played on grass then golf is not a sport.
15. Either golf is a sport if cowboys wear ballet slippers, or Christmas is in July.
16. If golf is not a sport, then cowboys wear boots.
17. If ketchup is a vegetable, then Marilyn Monroe liked lima beans.
18. If Queen Latifah has visited the Grand Canyon then Africa is not a country.
19. Ballerinas wear ballet slippers or Elvis liked to sing zydeco music.
20. Ketchup is a vegetable and James Dean enjoyed painting landscapes.

## Using the Truth Table Method to Determine Validity

Now that you have learned some basic truth-functional definitions, you can apply them to determine whether a deductive argument is valid or invalid, utilizing what is called the truth table method. A truth table provides a listing of all possible truth-value combinations for an argument. That is, it identifies the conditions under which each of the claims in the argument is true or false. With this information you can identify whether the argument in question is valid or invalid.

The first step in utilizing the truth table method is translating the argument into symbolic form. Consider this one.

*Either there are clouds in the sky or it is not raining. Since there are clouds in the sky, it must be raining.*

Using C for “There are clouds in the sky,” R for “It is raining,” and the proper symbols for each operation, the argument would be translated as follows.

$$\begin{array}{l} C \vee \sim R \\ C \\ \hline \therefore R \end{array}$$

Next, create the table. To do so, write out the argument utilizing / to signal the start of a new premise and // to signal the conclusion.

$$C \vee \sim R / C // R$$

Then, determine the possible truth-value combinations for the argument. First, count the number of simple claims in the argument. Remembering that each simple claim has two possible truth-values, determine the number of combinations for the argument with the following formula:  $L = 2^n$ .  $L$  represents the number of lines of the truth table (i.e., the number of possible combinations); 2 represents the number of truth-values for any given claim (i.e., true and false); and  $n$  represents the number of simple claims in the argument. Thus, an argument containing two simple claims will have four lines, one with three simple claims will have eight lines, one with four simple claims will have 16 lines, and so on.

## EXERCISE 8.22



**Your Turn!** How many simple claims are in the argument? How many lines will your truth table have then?

Although randomly assigning truth-value combinations to the simple claims would be okay so long as all combinations were represented, having a consistent format for assigning those values makes your truth table more readable, gives you confidence that you haven't overlooked something, and assures that your truth tables will look like those of your classmates and instructor. The plan we use is to take the first simple claim, divide the number of lines in half, and assign *true* to the first half and *false* to the bottom half. Then, move to the second claim. Divide the number of lines in the truth table in quarters, assigning *true* to the first quarter, *false* to the second, *true* to the third, and *false* to the fourth. This procedure is repeated for each additional simple claim. Your last assignment of truth-values should alternate *true* and *false* for all lines. Observe this pattern below.

<u>C</u> <u>R</u>	<u>C</u> <u>∨</u> <u>~R</u> / <u>C</u> // <u>R</u>
T T	
T F	
F T	
F F	

The next step is to assign the possible truth-values to each of the simple claims in the argument using the values assigned in the left-hand columns.

<u>C</u> <u>R</u>	<u>C</u> <u>∨</u> <u>~R</u> / <u>C</u> // <u>R</u>
T T	T T T T
T F	T F T F
F T	F T F T
F F	F F F F

Now that you have the truth-values assigned to each simple claim, you can apply the operators in the argument. Let's start with the negation in the first claim. Whenever R is true, ~R will be false, and whenever R is false, ~R will be true.

<u>C</u> <u>R</u>	<u>C</u> <u>∨</u> <u>~R</u> / <u>C</u> // <u>R</u>
T T	T <b>F</b> T T
T F	T <b>T</b> F T F
F T	F <b>F</b> T F T
F F	F <b>T</b> F F F

Next, apply the main operator in the first claim: the disjunction. Notice that the disjuncts are C and ~R, not C and R. Whenever one of the disjuncts is true, the disjunction is true; otherwise, it is false.

$C$	$R$	$C \vee \sim R / C // R$			
T	T	<b>T</b>	<b>T</b>	F	T
T	F	<b>T</b>	<b>T</b>	F	F
F	T	F	<b>F</b>	F	T
F	F	F	<b>T</b>	F	F

Since there are no operators to apply in the second premise or the conclusion, your truth table is now complete. The final step is to interpret the table. Does it show that the argument is valid or invalid? Recall from Chapter 2 what it means for an argument to be valid: the truth of the premises *guarantees* the truth of the conclusion. That means that, in order for a deductive argument to be valid, whenever all the premises are true, the conclusion must also be true. Is the argument valid or invalid? As you can see in the second line, it is possible to have all true premises and a false conclusion. Thus, the argument is invalid. The truth table should be completed as follows, with the final truth-value assigned for each premise and conclusion indicated by the bold font.

$C$	$R$	$C \vee \sim R / C // R$			
T	T	T	T	F	<b>T</b>
T	F	<b>T</b>	<b>T</b>	F	<b>F</b>
F	T	F	<b>F</b>	F	<b>T</b>
F	F	F	<b>T</b>	F	<b>F</b>

**Hint!** Notice that the previous argument is invalid even though the first line of the truth table shows that all premises are true and the conclusion is true (when  $C$  is true and  $R$  is true). This is because an argument is valid only when the truth of the premises *guarantees* the truth of the conclusion. Since the second line shows that the premises are true and the conclusion is false (when  $C$  is true and  $R$  is false), the argument does not guarantee that the conclusion is true whenever all premises are true. This means that it only takes *one* line of true premises with a false conclusion to show that the argument is invalid.



### How to Determine Validity Using the Truth Table Method

**Step 1:** Translate the argument into symbolic form.

**Step 2:** Write the argument horizontally, using  $/$  to separate premises and  $//$  in front of the conclusion.

**Step 3:** Calculate the number of lines in the truth table using the formula,  $L = 2^n$ .

**Step 4:** Assign truth-values to each simple claim in the argument.

**Step 5:** Determine the truth-values of each premise and conclusion using the appropriate truth-functional definitions. You may find it helpful to highlight or draw a box around these final values.

**Step 6:** Evaluate whether the argument is valid or invalid by looking for any row with all true premises and a false conclusion. If you find such a row, then the argument is invalid. If you do not, the argument is valid.

## EXERCISE 8.23

Determine whether each of the following arguments is valid or invalid by using the truth table method.

$$\begin{array}{l} 1. A \vee B \\ \quad \sim B \\ \hline \therefore A \end{array}$$

$$\begin{array}{l} 2. C \vee D \\ \quad C \\ \hline \therefore \sim D \end{array}$$

$$\begin{array}{l} 3. E \supset F \\ \quad F \supset G \\ \hline \therefore E \supset G \end{array}$$

$$\begin{array}{l} 4. H \supset I \\ \quad J \supset I \\ \hline \therefore H \supset J \end{array}$$

$$\begin{array}{l} 5. K \vee L \\ \quad K \supset M \\ \quad L \supset M \\ \hline \therefore M \end{array}$$

$$\begin{array}{l} 6. \frac{N \bullet \sim O}{\therefore N} \end{array}$$

$$\begin{array}{l} 7. P \supset Q \\ \quad R \bullet Q \\ \hline \therefore R \supset P \end{array}$$

$$\begin{array}{l} 8. S \supset (T \bullet R) \\ \quad \sim S \\ \hline \therefore \sim (T \bullet R) \end{array}$$

$$\begin{array}{l} 9. Z \vee W \\ \quad W \bullet \sim X \\ \hline \therefore Z \supset (W \bullet X) \end{array}$$

$$\begin{array}{l} 10. \sim A \\ \quad B \bullet C \\ \quad A \supset (C \vee \sim C) \\ \hline \therefore \sim B \end{array}$$

## EXERCISE 8.24

Translate each argument into symbolic form and then determine whether the argument is valid or invalid using the truth table method.

- Those strawberries are labeled “certified organic” only if they are grown without the use of pesticides. Since the strawberries are either labeled “certified organic” or they are grown with the use of pesticides, that means that if they are grown without the use of pesticides, then they will be labeled “certified organic.”
- Either federal prosecutors don’t believe that they can win a criminal case against AIG (American International Group, Inc.) or they have been bribed to not prosecute. Accordingly, they must not have been bribed, as federal prosecutors don’t believe they can win the case.
- Federal prosecutors must not be convinced they can win. This is because if federal prosecutors don’t believe that they can win a criminal case against AIG (American International Group, Inc.), then they will drop the case, and it is not true both that federal prosecutors believe they can win the case and that they will drop the case.
- There’s a great deal of controversy on the issue of global warming. However, either global warming is a reality or leading climatologists are delusional. Thus, global warming is a reality because leading climatologists are not delusional.

5. There will be more traffic accidents unless people stop using their cell phones while driving. But people won't stop using their cell phones while driving because they do not realize how dangerous it is. As a result, traffic accidents will increase.
6. Should the judge remove herself from the case? I don't think so. This is because if she should remove herself, she must either have a conflict of interest or be ill, and this judge has both a conflict of interest and is ill.
7. If the Eyjafjallajökull volcano erupts, then the Katla volcano will also erupt. And, if the Katla volcano erupts, Iceland will be devastated. Consequently, Iceland will be devastated, given that the Eyjafjallajökull volcano erupted.
8. Cinderella can go to the royal ball if she finishes all of her chores and finds something suitable to wear. Given that her stepsisters will sabotage her efforts, Cinderella will neither finish all of her chores nor will she have something suitable to wear. Therefore, Cinderella won't go to the ball.
9. If the criminal justice major prepares graduates to work as CSIs and prison guards, then the number of criminal justice majors must exceed the number of job openings. Yet, oddly, the number of graduates does not exceed the number of job openings. So, either criminal justice majors are not prepared to work as CSIs or they are not prepared to work as prison guards. I find this just amazing.
10. If the first set of experiments conducted with the Large Hadron Collider (LHC) were not successful, then physicists would not be able to explain the prevalence of dark matter in the universe and they would not be able to explain why gravity is so much stronger than other forces. Since physicists can explain neither the prevalence of dark matter nor why gravity is so strong, it's clear that the LHC experiments did not work.

## Using the Shortcut Method to Determine Validity

The number of lines in a truth table doubles with the addition of each new simple claim given the formula for creating truth tables ( $L = 2^n$ ). This can get overwhelming very quickly. Luckily, there is a shortcut method that can be used to determine whether many truth-functional arguments are valid or invalid. To understand this shortcut, think about how much information we ignore when completing the last step of the truth table method. Once all the possible truth-value assignments are determined, we look only for cases in which all the premises are true and yet the conclusion is false. If there is even one line with all true premises and a false conclusion, the argument is invalid. And, if there are no such lines, then the argument is valid.

The shortcut method, also sometimes called the indirect truth table method, looks only for the conditions under which the argument would be invalid, without determining all possibilities; if those conditions are impossible, the argument must be valid. How does this work? Recall the four truth-functional definitions you learned.

$\sim X$	$X \bullet Y$	$X \vee Y$	$X \supset Y$
<b>F</b> T	<b>T</b> T T	T T T	T T T
<b>T</b> F	T <b>F</b> F	T T F	<b>T</b> F F
	<b>F</b> F T	F T T	F T T
	<b>F</b> F F	<b>F</b> F F	F T F



Notice that for each of these definitions, there is one line that is unique. For negation, there is only one instance in which the compound claim is true, and only one instance in which the compound claim is false. For conjunction, there is only one instance in which the compound claim is true, namely when both conjuncts are true; otherwise, the claim is false. For disjunction, there is only one instance in which the compound claim is false, namely when both disjuncts are false; otherwise, the claim is true. And, for conditional, there is only one instance in which the compound claim is false, namely when the antecedent is true and the consequent is false; otherwise, the claim is true. It is these unique values that are most important when using the shortcut truth table method.

Consider the argument from the previous section. Like in the truth table method, we begin by translating the argument into symbolic form and writing out the argument utilizing / to signal the start of a new premise and // to signal the conclusion.

$$C \vee \sim R / C // R$$

Now, remember the aim of the shortcut method: to show that the argument is invalid. We must try, therefore, to make all our premises true and our conclusion false. To remind yourself of this goal, write it below the main operator of each premise and conclusion.

$$\begin{array}{c} C \vee \sim R / C // R \\ \hline T \quad T \quad F \end{array}$$

In order to prove that each premise can be true while the conclusion is false, we must assign particular truth-values to each simple claim. When doing so, it is important to assign truth-values to the simple claims only when there is exactly one possible truth-value assignment to achieve our goal. In this argument, although the first premise has three possible assignments that would result in the disjunction being true, the second premise and the conclusion have exactly one possible truth-value assignment that would make all premises true and the conclusion false. In order to have a true second premise, C must be true, and in order to have a false conclusion, R must be false. We should insert these truth-values into the table each time that a simple claim occurs in the argument.

$$\begin{array}{c} C \vee \sim R / C // R \\ \hline T \quad F \quad T \quad F \\ T \quad T \quad F \end{array}$$

Now that we have all the values of the simple claims assigned throughout the argument, we can apply the remaining operators; in this case, the operators in the first premise. Since false is assigned to R,  $\sim R$  will be true. Now, we can determine the truth-value of the first premise, the disjunction  $C \vee \sim R$ .

$$\begin{array}{c} C \vee \sim R / C // R \\ \hline T \quad T \quad F \quad T \quad F \\ T \quad T \quad F \end{array}$$

As you can see, it is possible for all the premises to be true while the conclusion is false. Thus, we have shown that the argument is invalid.

Now, let's see what happens when an argument is valid. Consider this one.

$$\begin{array}{c} P \supset Q / \sim R / P // Q \vee R \\ \hline T \quad T \quad T \quad F \end{array}$$

In this argument, there are three possible places to begin. The second premise, the third premise, and the conclusion all have exactly one possible truth-value assignment that would allow the premises to be true and the conclusion to be false.

### EXERCISE 8.25

**Your Turn!** What truth-values must be assigned to R, P, and Q in order for the second and third premises to be true, and the conclusion to be false?



Once you have determined the values that must be assigned for particular simple claims, insert those values throughout the argument.

$$\begin{array}{ccccccc} P \supset Q / \sim R / P // Q \vee R \\ \hline T & F & T & F & T & F & F \\ T & & T & & T & & F \end{array}$$

Now, notice what has happened to the first premise. Since the antecedent is true, and the consequent is false, the first premise must be false. It is important to remember that we have not randomly assigned truth-values to the simple claims. Instead, we assigned the only values possible that would make the conclusion false and the third premise true. Since doing so necessarily results in a false first premise, we know that it is impossible to have all true premises and a false conclusion. This means that the argument is valid as shown below.

$$\begin{array}{ccccccc} P \supset Q / \sim R / P // Q \vee R \\ \hline T & F & F & T & F & T & F \\ T & & T & & T & & F \end{array}$$

### EXERCISE 8.26

**Your Turn!** In your own words, explain why the previous argument must be valid according to the shortcut truth table.



Occasionally you may find that the truth-value of a particular simple claim will not make a difference to the truth-value of the premise or conclusion. In these cases, it is important that you do not assign a truth-value to claims like these because it may make a difference later on in the table. Consider this example.

$$\begin{array}{ccccccc} P \supset Q / \sim (P \bullet R) // \sim Q \vee \sim R \\ \hline T & & T & & & & F \end{array}$$

Since both of the premises can be made true in more than one way, we'll begin with the conclusion. What values must be assigned to Q and R to achieve a false conclusion? Insert them into the truth table.

$P \supset Q / \sim (P \bullet R) // \sim Q \vee \sim R$					
	T		T	F	T
	T	T		F	F

Now, let's look at the first premise. Since the consequent is true, what value must we assign to P? It doesn't matter! When the consequent is true, the conditional will be true regardless of whether the antecedent is true or false.

$P \supset Q / \sim (P \bullet R) // \sim Q \vee \sim R$					
?	T	T		T	F
	T	T		F	F

It is very important that we do not arbitrarily assign a value to P in that first premise! Since P occurs elsewhere in the argument, it may matter later on what value is assigned to it. So, let's leave the P in the first premise as an unknown truth-value, and move on to the second premise. What value must we assign to P here to end up with a true second premise? Because the main operator is negation, the conjunction must turn out false so that when it is negated, the premise is true. Since R is true, the conjunction will be false only when P is false.

$P \supset Q / \sim (P \bullet R) // \sim Q \vee \sim R$					
?	T	T	T	F	F
	T	T		F	F

What we have discovered, then, is that if we had assigned true to P, in the first premise, we would not have shown the second premise to be true. As a result, we would have mistakenly concluded that the argument is valid, when, in fact, it is invalid. Thus, you must be sure to assign a truth-value to a simple claim only when there is exactly one possible assignment that would achieve the desired outcome, namely all true premises and a false conclusion.

### How to Determine Validity Using the Shortcut Method

**Step 1:** Translate the argument into symbolic form.

**Step 2:** Write the argument horizontally, using / to separate premises and // in front of the conclusion.

**Step 3:** Write out the goal truth-values for each premise and conclusion, i.e., all true premises and false conclusion.

**Step 4:** Assign the truth-values to simple claims for which there is only one possible truth-value assignment that would result in a true premise or false conclusion.

**Step 5:** Insert truth-values throughout the argument for any simple claim whose value was determined in Step 4.

**Step 6:** Determine the truth-values of any remaining premise or conclusion.

**Step 7:** Evaluate whether the argument is valid or invalid by checking whether the truth-values of the premises and conclusion achieve the goal of all true premises and a false conclusion. If they do, then the argument is invalid. If they do not, then the argument is valid.

### EXERCISE 8.27

Determine whether each argument is valid by using the shortcut method.

$$\begin{array}{l} 1. A \supset B \\ B \\ \hline \therefore A \end{array}$$

$$\begin{array}{l} 2. C \vee \sim D \\ \sim D \\ \hline \therefore C \end{array}$$

$$\begin{array}{l} 3. G \supset J \\ \sim J \supset I \\ \hline \therefore \sim I \supset G \end{array}$$

$$\begin{array}{l} 4. \sim (M \vee N) \\ O \supset M \\ \hline \therefore \sim O \end{array}$$

$$\begin{array}{l} 5. S \vee \sim T \\ U \supset T \\ \hline \therefore S \supset \sim U \end{array}$$

$$\begin{array}{l} 6. \sim A \supset (B \vee C) \\ \sim B \\ \hline \therefore C \supset A \end{array}$$

$$\begin{array}{l} 7. R \supset (S \bullet T) \\ U \supset (V \bullet R) \\ W \bullet U \\ \hline \therefore W \bullet T \end{array}$$

$$\begin{array}{l} 8. A \supset (B \vee C) \\ B \supset D \\ A \\ \hline \therefore \sim C \supset D \end{array}$$

$$\begin{array}{l} 9. \sim A \supset B \\ C \supset A \\ C \supset \sim B \\ \hline \therefore A \vee \sim B \end{array}$$

$$\begin{array}{l} 10. X \supset Y \\ Y \supset Z \\ \sim W \supset X \\ \sim Z \\ \hline \therefore W \end{array}$$

### EXERCISE 8.28

Translate each argument into symbolic form and then determine whether the argument is valid or invalid using the shortcut method.

1. Qualified employees will be passed over if racial quotas are adopted for promoting employees, but prior discrimination will go unaddressed if racial quotas are not adopted for promoting employees. Therefore, either qualified employees will be passed over or prior discrimination will go unaddressed.

2. History should not be considered a social science unless historians collect data and that data can be quantified. Since history is not considered a social science, it must not be the case that historians collect data.
  3. If we want to avoid further catastrophic bridge collapses like the I-35 Mississippi River bridge collapse in Minnesota in 2007, then Congress needs to authorize massive spending for retrofitting the aging bridges in this country. Why? Because Congress will either authorize more funding for retrofitting or it will be responsible for the loss of life in future bridge collapses. And if Congress is responsible for the loss of life in future bridge collapses, the American voters will be outraged. We can trust that Congress will not do something to outrage the voters.
  4. If the D.A.R.E. (Drug Abuse Resistance Education) program is instituted in city schools, then many children will learn about the dangers of drugs. If students don't learn about the dangers of drugs, then they are likely to get into trouble with the law. Unfortunately, the D.A.R.E. program is being dropped from the city school budget. Thus, it is not the case that students are likely to get in trouble with the law and the D.A.R.E. program is being cut from the city school budget.
  5. Why isn't Pluto classified as a planet? Well, Pluto is classified as a planet if it is in orbit around the sun, has sufficient mass to form a round shape, and it has "cleared the neighborhood" around its orbit. Since Pluto is in orbit around the sun and has sufficient mass to form a round shape, it must not have "cleared the neighborhood" around its orbit, given that it is not classified as a planet.
  6. If your car won't start, then it is either out of gas or the battery is dead. But, your car can't be out of gas, in that you filled the tank this morning. Thus, either the car will start or the battery is dead.
  7. Business owners either look out for their own interests or they try to help others. And we all know that business owners look out for their own interests, for they are a profit-making enterprise. Accordingly, business owners do not try to help others.
  8. Either vitamins need to be regulated or they should only be available by prescription. I say this because vitamins are not always safely manufactured, and either vitamins should be always safely manufactured or they should be regulated. Also, if vitamins can pose a health risk, then they should only be available by prescription. Finally, if vitamins are not always safely manufactured, then they can pose a health risk.
  9. If Proposition 8 is a constitutional revision, then it is either quantitatively broad or qualitatively deep. Proposition 8 was improperly introduced if it is a constitutional revision, and if it was improperly introduced, then it is an invalid law. Since Proposition 8 is neither quantitatively broad nor qualitatively deep, it must not be an invalid law.
  10. Either video games enhance the cognitive capacities of users, or video games deaden the brains of users and decrease their motivation to think. Given that it's not true that video games deaden the brains of users and decrease their motivation to think, we can conclude that video games do enhance users' cognitive capacities. Besides, if video games enhance the cognitive capacities of users, then either video games are addictive or they are habit forming, and it's clear that video games are either addictive or habit forming.
-

## Putting It All Together: A Complete Analysis Plus Evaluation

Thus far, you have learned how to distinguish between arguments, explanations, and other non-arguments; diagram arguments; detect fallacies; identify various deductive and inductive arguments; determine whether a categorical argument is valid or invalid; and determine whether a truth-functional argument is valid or invalid. Now you can put all of these skills together in a Complete Analysis plus Evaluation. The first paragraphs should present your analysis. Remember that subarguments should be analyzed separately from the main argument. Once your analysis is complete, then you can present your evaluation of the argument.

### Directions for a Complete Analysis Plus Evaluation

In *paragraph form*, use complete sentences and proper English grammar and spelling to do the following:

**Step 1:** Write a Basic Analysis of the passage. (You may want to refer to the Directions for Basic Analysis, Chapter 3, page 49.)

**Step 2:** If the passage contains an argument, determine whether the argument commits a fallacy. If it does, write a separate paragraph identifying the fallacy committed, and explaining how this fallacy is committed.

**Step 3:** If the argument does not commit a fallacy, diagram it and verify that the diagram is consistent with your Basic Analysis.

**Step 4:** In a separate paragraph, identify the kind of argument.

- ▲ If the argument is deductive, identify it as a categorical argument or a truth-functional argument.
- ▲ If the argument is inductive, identify it as an analogical argument, an inductive generalization, or a causal argument.

**Step 5:** Evaluate the argument.

- ▲ If the argument is categorical, state the syllogism in standard form, and *demonstrate* whether the argument is valid or invalid using either a Venn diagram or the rules for valid syllogisms.
- ▲ If the argument is truth-functional, translate the argument, and *demonstrate* whether the argument is valid or invalid by identifying the argument form, using the truth table method, or using the shortcut method.

The most important thing for you to remember when performing a Complete Analysis plus Evaluation is that your evaluation should be directed to the main argument only. Since the premises of any subarguments support the premises of the main argument, not the conclusion, they should be excluded in the evaluative process. Let's walk



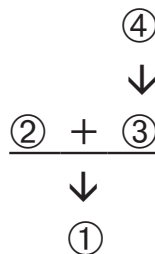
Kurt Busch drives his racecar through turn three during the Pennsylvania 500 in 2006.

through an example before you try some on your own. Consider the following.

*How do you think Kurt Busch will fare in the NASCAR Power Rankings? I think that he will be ranked among the top five. This is because he can be among the top five only if he outdrives one of the top two drivers, either Denny Hamlin or Jimmie Johnson. And, last week he outdrove both of them, since he won the All-Star Race.*

First, identify whether the passage is an argument, explanation, or neither. The passage contains two inference indicators, *this is because* and *since*, signaling that it is either an argument or an explanation. Since the reasons provide evidence for a conclusion, the passage contains an argument. Does the argument commit a fallacy? It does not, thus we can diagram it.

*How do you think Kurt Busch will fare in the NASCAR Power Rankings? I think that* ① *he will be ranked among the top five. This is because* ② *he can be among the top five only if he outdrives one of the top two drivers, either Denny Hamlin or Jimmie Johnson. And,* ③ *last week he outdrove both of them, since* ④ *he won the All-Star Race.*



Now, you can complete the Basic Analysis of the argument. Since the passage contains a subargument, the analysis will include two paragraphs.

**The passage contains an argument. The issue is whether Kurt Busch will be ranked among the top five in the NASCAR Power Rankings. The conclusion is that Kurt Busch will be ranked among the top five in the NASCAR Power Rankings. The first premise is that Kurt Busch can be among the top five only if he outdrives either Denny Hamlin or Jimmie Johnson. The second premise is that Kurt Busch outdrove both Denny Hamlin and Jimmie Johnson.**

**The passage contains a subargument. The intermediate conclusion is that Kurt Busch outdrove both Denny Hamlin and Jimmie Johnson. The premise is that Kurt Busch won the All-Star Race.**

Since the analysis is complete, next you should identify the kind of argument. Given that the argument is deductive and contains truth-functional claims, it is a truth-functional argument. You can, then, evaluate the argument using one of the evaluation tools you learned in this chapter. For example, translate the argument into symbolic form and

then complete a shortcut truth table for it. Notice that because the argument contains two premises, your translation should contain two premises. Let's use R to symbolize "Kurt Busch will be ranked among the top five in the NASCAR power rankings," D to symbolize "Kurt Busch outdrives Denny Hamlin," and J to symbolize "Kurt Busch outdrives Jimmie Johnson."

$R \supset (D \vee J) / D \bullet J // R$						
F	T	T	T	T	T	F

According to the shortcut truth table, the argument is invalid. The argument evaluation can be presented as follows.

**The main argument is a deductive truth-functional argument. The shortcut truth table shows that the argument is invalid because it is possible for the argument to contain all true premises when the conclusion is false.**

### EXERCISE 8.29

**Your Turn!** Using the language of necessary and sufficient conditions, explain why the previous argument is invalid.



### EXERCISE 8.30

Provide a Complete Analysis plus Evaluation for the following passages.

1. The detective couldn't have been the one who leaked the DNA information to the press. If he had done so, he would have been undermining his own case. And, you don't think he would undermine his own case, now, do you?
2. Did you see Mike today? He's ecstatic because he got a new job as a private detective.
3. The victim, Raymond Jones, age 38, was found dead in his apartment yesterday at 12:20 p.m. Investigators report that the police were called to the scene when neighbors heard a domestic disturbance. No one has yet been arrested for the murder.
4. The victim, Raymond Jones, who was found dead in his apartment with a knife in his back, either committed suicide or was murdered. But there's no way that he committed suicide because he couldn't have stabbed himself in the back. Therefore, Mr. Jones was murdered.
5. Given that no evidence has shown that the murder weapon is not the ball-peen hammer found in the defendant's possession, we must conclude that the ball-peen hammer is, indeed, the murder weapon.
6. African Americans are similar to other groups of people who have a country of origin outside the United States. We routinely refer to Irish Americans, Polish Americans, and Chinese Americans, for instance, using the country of



origin as the primary descriptor. Therefore, to designate people whose country of origin is in Africa as African Americans.—Walker, Spohn, and DeLeone, *The Color of Justice*

7. Remember the two benefits of failure. First, if you do fail, you learn what doesn't work; and second, the failure gives you the opportunity to try a new approach.—Roger von Oech
8. If the number of prime numbers is finite, then no one could ever find a prime number larger than the last prime number that has been found. But someone has found a larger prime number than the last one found. Consequently, an infinite number of prime numbers must exist.
9. If parents permit their children to hold other people in contempt, and take pleasure in their antics, the children will lose a sense of distinction between good and evil and will not shed their bad habits even after they become adults.—Kaibara Ekken in Peter Duus, *Modern Japan*
10. If President Richard Nixon thought that David Frost was not his intellectual equal, then he could agree to be interviewed by him. And if Richard Nixon could agree to be interviewed by David Frost, then the president must have felt that he could use the interview to salvage his reputation. So, if Nixon thought that Frost was not his intellectual equal, then Nixon must have felt that he could use the interview to salvage his reputation.
11. Some vocal "sports fans" have argued that penalties for using performance-enhancing drugs should be consistently enforced. But it doesn't make sense to take our most famous sports superstars, toss them in jail, and throw away the key. Such draconian penalties would break the hearts of sports fans, discourage children from participating in sports, and leave our economy in ruins.
12. Either profits for home sellers will increase or additional fees will be assessed on homebuyers. This is because if profits for home sellers increase, then realtors will have fewer customers and additional fees will be assessed on homebuyers. It turns out that realtors will not have fewer customers and additional fees will not be assessed on home buyers.
13. If President John Adams' diplomacy with French minister Tallyrand was successful, then war with France in 1799 was avoided. War with France was avoided, so it is clear that President Adams' diplomacy with Tallyrand was successful.
14. Since all European currencies are linked to the value of the dollar, and some Asian currencies are not linked to the value of the dollar, some European currencies are not Asian currencies.
15. Since a promissory note is a signed written promise to repay a debt, it is widely used as evidence in bankruptcy proceedings.

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### Chapter Review Questions

1. What is truth-functional logic?
2. How is a simple claim different from a compound claim?
3. What is a negation? A disjunction? A conjunction? A conditional?
4. How do you find the antecedent and consequent of a conditional claim?

5. What is the difference between the antecedent and consequent of a conditional claim?
6. What is the main operator of a claim?
7. What is DeMorgan's Law?
8. Explain why a modus ponens argument is valid.
9. Explain why a modus tollens argument is valid.
10. Explain why an argument that denies the antecedent is invalid.
11. Explain why an argument that affirms the consequent is invalid.
12. What is the purpose of a truth-functional definition?
13. Give the truth-functional definitions for negation, disjunction, conjunction, and conditional.
14. How is an inclusive disjunction different from an exclusive disjunction?
15. What is the difference between the truth table method and the shortcut method for determining validity?

# Evaluating Analogical Arguments

Think back to the discussion about whether to support the Smoke-Free Campus Initiative in Chapter 1. Among the responses presented was the following.



Joshua Hodge  
Photography/Stockphoto

**James says** I don't smoke, but I don't think it's a good idea to ban smoking on campus. Since when does completely banning something work? Alcohol and drugs are illegal on campus, so no one uses them, right? Wrong!

Using the skills you learned in Chapter 6, you should recognize this passage as containing an analogical argument. James is comparing banning smoking on campus to banning alcohol and drugs on campus. When he asks his final question and answers it with "Wrong!" he implies the claim that banning alcohol and drugs on campus does not work. From these two premises, you can identify his unstated conclusion, namely that banning smoking on campus will not work.

In this chapter you will learn how to recognize, analyze, and evaluate such analogical arguments. You will discover that all analogical arguments have the same basic structure, and will practice identifying the core features of that structure. In addition, you will learn how to determine which analogical arguments should convince and which should not.

This United Colors of Benetton advertisement implies an analogy. What two things are compared?



## Recognizing Analogical Arguments

An **analogical argument** is an inductive argument that uses an analogy to conclude that, because one case has some feature, the other case should, too. Analogical arguments always contain an analogy among their premises. An **analogy** is a comparison of two (or more) things, typically called **analogues**. Each of the following claims draws an analogy.

*A good education is like good health care.  
Accusing me of being lazy is like the pot calling the kettle black.  
Life is like a bowl of cherries.*

In the first analogy, the analogues are *good education* and *good health care*. In the second, the analogues are *accusing me of being lazy* and *the pot calling the kettle black*.

### EXERCISE 9.1

**Your Turn!** What are the analogues for the third example?



To identify an analogical argument, first verify that the passage is an inductive argument, and then look for an analogy among the premises of the argument. Consider the following example.

*The new laptop I bought is like my old laptop. Since my old laptop lasted over three years, it's reasonable to conclude that this new laptop will last over three years, too.*

Notice, first, that this passage is an argument. It contains at least two claims, one of which is supported by the others. Using the skills you learned in Chapter 3, you can provide a Formal Analysis of the argument.

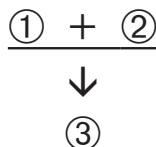
- P1:** The new laptop I bought is like my old laptop.  
**P2:** My old laptop lasted over three years.  
**∴** The new laptop will last over three years.

**Issue:** Whether my new laptop will last over three years

Next, notice that the argument uses inductive reasoning; if the premises are true, the conclusion is not necessarily, but *probably*, true. It is possible that even though my old laptop lasted over three years, this one will not last that long. Finally, notice that the argument contains an analogy among its premises. The first premise compares the new laptop to the old one.

Now, diagram the argument using the skills you learned in Chapter 4. Are the premises independent or dependent on each other? Since neither can prove the conclusion on its own, the premises must be linked.

① The new laptop I bought is like my old laptop. Since ② my old laptop lasted over three years, it's reasonable to conclude that ③ this new laptop will last over three years, too.



In fact, the premises of every analogical argument will be linked.

Remember that the conclusion of an argument may appear anywhere in the passage. Consider this one.

*Buying an energy efficient washing machine should save you money in the long run. This is because energy efficient washing machines are like energy efficient dishwashers, and energy efficient dishwashers save buyers money in the long run.*

This passage is also an inductive analogical argument. It is an inductive argument containing an analogy among the premises, namely that energy efficient washing machines are like energy efficient dishwashers. The Formal Analysis of the argument should look like this.

- P1:** Energy efficient washing machines are like energy efficient dishwashers.  
**P2:** Energy efficient dishwashers save buyers money in the long run.  
 $\therefore$  Energy efficient washing machines save buyers money in the long run.

**Issue:** Whether energy efficient washing machines save buyers money in the long run

### EXERCISE 9.2



**Your Turn!** Diagram the previous analogical argument.

### EXERCISE 9.3

For each analogical argument, complete a Formal Analysis and diagram it.

1. The new model of Avenger running shoes is like the past model of Avenger running shoes. The past model has a great deal of cushioning in the sole. Therefore, the new model probably has a great deal of cushioning in the sole.
2. Masking tape is similar to duct tape. Masking tape can be used on paper, so duct tape can probably be used on paper.
3. Beefsteak tomatoes are very juicy. Roma tomatoes are like Beefsteak tomatoes. Thus, Roma tomatoes are likely to be juicy.
4. The Spanish explorer Fernando Cortez was much like the English explorer Sir Francis Drake. Given that Cortez was eager to increase his country's influence in the New World, it seems probable that Drake was also eager to increase his country's influence in the New World.
5. A screwball is probably a very hard pitch to hit. This is because a screwball is like a curve ball, and a curve ball is a very hard pitch to hit.
6. The second chemistry exam is similar to the first chemistry exam. Because you did well on the first exam, it's likely that you will do well on the second exam.
7. Driving while under the influence of marijuana is a lot like driving under the influence of alcohol. Since you will lose your license if you are caught driving while under the influence of alcohol, you are also likely to lose

your license if you are caught driving while under the influence of marijuana.

8. A Canadian porcupine is akin to an African porcupine. Therefore, a Canadian porcupine probably does not “throw” its quills, because an African porcupine does not “throw” its quills.
9. The reason that the Hudson River is probably less polluted than it was a couple of decades ago is that the Hudson River is like the James River, and the James River is less polluted than it was a couple of decades ago.
10. Rats are similar to mice. Given that mice make great pets, rats probably also make great pets.

## Analyzing Analogical Arguments

You may have noticed that the Formal Analyses and diagrams of all the analogical arguments you have encountered so far are very similar. This is because every analogical argument has the same basic structure. We will refer to this structure as the general form of analogical arguments. In its general form, each analogical argument contains two premises supporting the conclusion. One premise provides the analogy, and the other premise identifies the feature that the arguer concludes must be shared by the analogues. This general form for analogical arguments can be stated as follows.

<b>P1:</b> (analogy)	T is like S.
<b>P2:</b> (feature)	S has F.
<b>∴</b>	T has F.

The first premise presents the analogy. To help distinguish between the analogues, we use the letters S and T to symbolize the sample and target, respectively. The term **sample** refers to the analogue given only among the premises, whereas the term **target** refers to the analogue that the arguer is drawing a conclusion about. The **feature** is the characteristic of the sample that the arguer is trying to prove is also true of the target. We symbolize it with F.

Although some analogical arguments may be constructed differently, they can all be translated into this general form. Here’s the pattern shown in one of the examples from the previous section.

*Buying an energy efficient washing machine should save you money in the long run. This is because energy efficient washing machines are like energy efficient dishwashers, and energy efficient dishwashers save buyers money in the long run.*

<b>P1:</b> (analogy)	T (energy efficient washing machines) are like S (energy efficient dishwashers).
<b>P2:</b> (feature)	S (energy efficient dishwashers) has F (saves buyers money in the long run).
<b>∴</b>	T (energy efficient washing machines) has F (saves buyers money in the long run).

Accurately identifying the sample, target, and feature are critical for the evaluation of analogical arguments. Here is an example of the proper identification from the previous argument.

**Sample:** energy efficient dishwashers

**Target:** energy efficient washing machines

**Feature:** saves buyers money in the long run

#### EXERCISE 9.4



**Your Turn!** State the sample, target, and feature for each argument in Exercise 9.3.

Understanding the general form for analogical arguments is important because many analogical arguments contain subarguments. These subarguments generally provide evidence to support the analogy (the claim that T is like S). In these cases, you must recognize that the evidence for the analogy is provided by premises in the subargument, not the main argument.

Consider the following example.

*In April 2010, Arizona signed into law the toughest bill on illegal immigration in generations, making the failure to carry immigration documents a crime. We can expect that New Mexico will soon pass a similar law. After all, New Mexico is a lot like Arizona, given that both have a large population of immigrants, and both are bordered by Mexico.*

Using the general form for analogical arguments, you can analyze the main argument formally. Notice that the first premise identifies the analogy (T is like S), and the second premise identifies the feature (S has F).

**P1:** New Mexico is a lot like Arizona.

**P2:** Arizona passed a law making the failure to carry immigration documents a crime.

---

**∴** New Mexico will pass a law making the failure to carry immigration documents a crime.

**Issue:** Whether New Mexico will pass a law making the failure to carry immigration documents a crime

**S:** Arizona

**T:** New Mexico

**F:** pass a law making the failure to carry immigration documents a crime





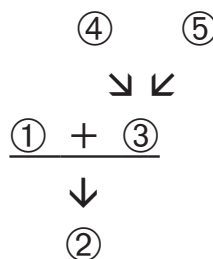
Protesters demonstrate against Arizona's tough new immigration laws at a large rally in Phoenix on May 29, 2010. What analogy is implied by the "Boycott Arizona" sign in the background?

What about the last two claims in the final sentence? Where do they fit? The indicator *given that* signals that they are premises for the first claim in that sentence. That is, they present evidence that New Mexico and Arizona are alike. Thus, the passage contains a subargument, as shown in the following Formal Analysis.

- P1:** New Mexico and Arizona have large populations of immigrants.  
**P2:** New Mexico and Arizona are bordered by Mexico.  
 $\therefore$  New Mexico is like Arizona.

Now, diagram the argument.

In April 2010, ① Arizona signed into law the toughest bill on illegal immigration in generations, making the failure to carry immigration documents a crime. We can expect that ② New Mexico will soon pass a similar law. After all, ③ New Mexico is a lot like Arizona, given that ④ both have a large population of immigrants, and ⑤ both are bordered by Mexico.





Notice that the main argument has the same structure as the other analogical arguments you have examined. There are two linked premises, one stating the analogy and the other identifying the feature. The subargument offers the reasons for the claim that New Mexico really is like Arizona.

Understanding the general form for analogical arguments is also helpful when the arguer does not explicitly state the analogy. In these cases, the arguer provides evidence for the analogy, but the analogy itself is missing. Part of the work, then, in analyzing analogical arguments includes identifying the analogy, even when it is not explicitly stated by the arguer.

Consider the following example.

*The Nissan Leaf and the Chevy Volt are both new electric cars. Since the Chevy Volt can travel over 40 miles on electric power alone, the Nissan Leaf is likely to travel 40 miles on only electric power, too.*

At first, this analogical argument appears to have a different structure than the ones we have examined thus far. However, on closer inspection, the difference lies in the fact that the arguer has not stated the analogy explicitly, but has, instead, only offered evidence for an analogy. Your task, then, is to identify this unstated claim in your analysis.

### EXERCISE 9.5



**Your Turn!** What two things is the arguer comparing in the previous example?

Once you have identified the analogues, you can use the general form of analogical arguments to analyze the main argument. Notice that the first premise is the unstated analogy.

- P1:** The Nissan Leaf is like the Chevy Volt.  
**P2:** The Chevy Volt can travel over 40 miles on electric power alone.  
**∴** The Nissan Leaf will travel 40 miles on only electric power.

**Issue:** Whether the Nissan Leaf will travel 40 miles on only electric power

- S:** the Chevy Volt  
**T:** the Nissan Leaf  
**F:** can travel over 40 miles on electric power alone

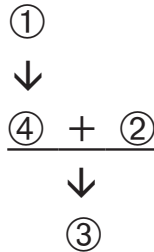
What, then, is the role of the first claim in the passage, namely that the Chevy Volt and the Nissan Leaf are both new electric cars? It tells us what makes the two analogues similar. In other words, it is a premise for the subargument. You can analyze it as follows, adding in the unstated conclusion.

- P:** The Nissan Leaf and the Chevy Volt are both new electric cars.  
**∴** The Nissan Leaf is like the Chevy Volt.

Using the skills you learned from Chapter 4, you can now diagram the argument.

① The Nissan Leaf and the Chevy Volt are both new electric cars. Since ② the Chevy Volt can travel over 40 miles on electric power alone, ③ the Nissan Leaf is likely to travel 40 miles on only electric power, too.

④ The Nissan Leaf is like the Chevy Volt.



Notice that the diagram identifies the unstated analogy as an intermediate conclusion; it functions both as the conclusion of the subargument and as a premise of the main argument.

Before trying some on your own, let's re-examine James's response regarding banning smoking on campus presented at the beginning of this chapter.

*I don't smoke, but I don't think it's a good idea to ban smoking on campus. Since when does completely banning something work? Alcohol and drugs are illegal on campus, so no one uses them, right? Wrong!*

Analyzing this analogical argument is particularly challenging because neither the analogy nor conclusion are explicitly stated. Nevertheless, having learned about the general form of analogical arguments, you can identify the sample, target, and feature.

**S:**   banning alcohol and drugs on campus  
**T:**   banning smoking on campus  
**F:**   doesn't work

### EXERCISE 9.6

**Your Turn!** Provide a Formal Analysis of James's analogical argument using the identified sample, target, and feature.



### EXERCISE 9.7

Provide a Formal Analysis and diagram of each of the following analogical arguments. Then, state the sample, target, and feature.

1. Lasagna and spaghetti both have pasta and tomato sauce, so lasagna is like spaghetti. Since spaghetti is tasty, lasagna is probably tasty.

2. A catfish has gills, and a trout has gills. Consequently, catfish are like trout. Now, catfish are able to live only a short while out of water. So, trout can probably only live a short while out of water.
  3. A prince is the child of a king. A princess, too, is the child of a king. So a prince is like a princess. Also, a princess leads a sheltered life. Thus, a prince most likely leads a sheltered life.
  4. Horses, dogs, and cats all can be taught tricks by using positive reinforcement and lots of food treats. Thus, birds are probably trainable in the same way.
  5. A DVD is read by a laser beam. A CD is also read by a laser beam. Therefore, a DVD is like a CD. Because a CD must not be scratched, a DVD probably shouldn't be scratched, either.
  6. Astrology studies the stars and has been around for hundreds of years. Astronomy also studies the stars and has been around for hundreds of years. We know that astronomy is worthy of being called a science. Therefore, astrology is likewise worthy of being called a science.
  7. Both high school principals and high school counselors have advanced degrees in education. Thus, high school principals are paid more than teachers, since counselors receive more pay than teachers.
  8. Since navel oranges have thick rinds, an acidic core, and are protected by thick leaves, and Valencia oranges have similar rinds, acidic cores, and leaf protection, navel oranges are like Valencia oranges. Given that Valencia oranges can withstand a light freeze, navel oranges can be expected to withstand a light freeze as well.
  9. The Mississippi River, the Potomac River, and the Hudson River all flow toward the ocean. So, the Nile River probably flows toward the ocean.
  10. Chimpanzees are highly intelligent, social, and able to use rudimentary tools. Thus, chimpanzees are like mandrills, because they, too, are highly intelligent, social, tool-using animals. Because mandrills are capable of learning a simple form of sign language, chimpanzees can probably learn a simple form of sign language, too.
  11. Eyes are like ears, because both eyes and ears are sensitive to outside stimulation and have nerves leading directly to the brain. Thus, since ears give incomplete information about the outside environment, eyes, too, probably give incomplete information about the outside world.
  12. We can infer that Utah is much like California because Utah is dry, mountainous, and dependent on water from other states and California is dry, mountainous, and dependent on water from other states. Because California has profited from large-scale drip irrigation of agricultural land, Utah would probably also profit from large-scale drip irrigation of agricultural land.
  13. The last three economic recessions were made less damaging to people after Congress passed a stimulus package that gave all taxpayers a few hundred extra dollars to spend. It seems likely, then, that the current economic recession will be made less damaging to people if Congress passes a similar stimulus package.
  14. Apple, apricot, and plum trees all need to be pruned after their leaves fall. It stands to reason that peach trees will need to be pruned after their leaves fall.
  15. Comedies and musicals are both theatrical performances. Given that musicals incorporate dancing, comedies are likely to incorporate dancing also.
-

## Evaluating the Evidence for the Analogy

When you evaluate analogical arguments you should use the terms appropriate for evaluating inductive arguments. Recall that an inductive argument is strong when the premises make the conclusion very likely to be true. Unlike deductive arguments, which are either valid or invalid, the strength of inductive arguments varies across a continuum from very strong to very weak. This means that assessing the strength of analogical arguments will involve using different criteria than assessing the validity of deductive arguments.

The strength of an analogical argument depends on how much and in what ways the target is like the sample. So, in evaluating the strength of analogical arguments, you should begin by attending to the amount of evidence provided for the analogy. This involves two considerations: the sample size and the quantity of similarities between the sample and target.

The first consideration in evaluating the evidence for the analogy is the sample size. How many instances are being compared to the target? The more instances provided in the sample, the stronger the argument. To see this, compare two analogical arguments. First, consider this one.

*I have taken a course in black and white photography, and it was interesting and fun. Therefore, I am likely to find a course in fashion photography interesting and fun.*

Analyzed formally, the argument looks like this.

- P1:** The course in fashion photography is like the course in black and white photography.  
**P2:** The course in black and white photography was interesting and fun.  
**∴** The course in fashion photography will be interesting and fun.

**Issue:** Whether the course in fashion photography will be interesting and fun

Now identify the sample, target, and feature.

- S:** the course in black and white photography  
**T:** the course in fashion photography  
**F:** interesting and fun

Compare that argument to this one.

*I have taken courses in black and white photography, color photography, and documentary photography, and found all of them interesting and fun. Therefore, I am likely to find a course in fashion photography interesting and fun.*

Analyzed formally, the argument looks like this.

- P1:** The course in fashion photography is like the courses in black and white photography, color photography, and documentary photography.  
**P2:** The courses in black and white photography, color photography, and documentary photography were interesting and fun.  
**∴** The course in fashion photography will be interesting and fun.

**Issue:** Whether the course in fashion photography will be interesting and fun

Now identify the sample, target, and feature.

- S:** the courses in black and white photography, color photography, and documentary photography
- T:** the course in fashion photography
- F:** interesting and fun

In both arguments, the target is *the course in fashion photography* and the feature is *interesting and fun*. But, notice the difference in the samples. The first argument provides only one instance in the sample, whereas the second provides three. Of the two, then, the second is stronger because the sample size is larger.

The second consideration in evaluating the evidence for the analogy is the quantity of similarities between the sample and target. The more relevant characteristics shared by the sample and target, the stronger the argument. To see this, compare another pair of analogical arguments. First, consider this one.

*Ron and Brian both like the movie Shaun of the Dead. Since Ron also likes the movie Zombieland, Brian will, too.*

Notice that this argument contains a subargument. Analyzed formally, with the subargument presented first as always, the argument looks like this.

- P:** Ron and Brian both like the movie *Shaun of the Dead*.
- ∴** Brian is like Ron.
- P1:** Brian is like Ron.
- P2:** Ron likes the movie *Zombieland*.
- ∴** Brian will like the movie *Zombieland*.

**Issue:** Whether Brian will like the movie *Zombieland*

Now identify the sample, target, and feature.

- S:** Ron
- T:** Brian
- F:** likes the movie *Zombieland*

Compare that argument to this one.

*Ron and Brian both like the movies Evil Dead 2, Day of the Dead, Army of Darkness, and Shaun of the Dead. Since Ron also likes the movie Zombieland, Brian will, too.*

Notice that this argument also contains a subargument. Analyzed formally, the argument looks like this.

- P:** Ron and Brian both like the movies *Evil Dead 2, Day of the Dead, Army of Darkness, and Shaun of the Dead*.
- ∴** Brian is like Ron.

- P1: Brian is like Ron.  
 P2: Ron likes the movie *Zombieland*.  
 ∴ Brian will like the movie *Zombieland*.

**Issue:** Whether Brian will like the movie *Zombieland*

### EXERCISE 9.8

**Your Turn!** Identify the sample, target, and feature of the previous argument.



In both arguments, the sample, target, and feature are identical because the main arguments are identical. What differs is the amount of evidence provided in the subargument to support the analogy. In the first argument, Ron is like Brian because they both like one movie, and in the second argument, Ron is like Brian because they both like four movies. This means that the second argument is stronger due to the fact that there are a larger quantity of commonalities relevant to the feature (liking *Zombieland*) identified between the sample and target. The more that the analogues have in common, the more likely it is that the conclusion of the argument is true.

### EXERCISE 9.9

For each of the following pairs of analogical arguments, determine which is stronger and explain why.

1. A. My Scion xB gets at least 25 miles per gallon, so this Scion xD will also get at least 25 miles per gallon.  
 B. The Scion xA gets at least 25 miles per gallon. The Scion xB gets at least 25 miles per gallon. And, the Scion tC gets at least 25 miles per gallon. You can, then, expect the Scion xD to get at least 25 miles per gallon.
2. A. I have visited Six Flags, Hershey Park, Kings Island, Joyland, and Carowinds, all of which had a wide selection of roller coasters. So, I bet Disney World also has a wide selection of roller coasters.  
 B. I have visited Six Flags and Hershey Park, both of which had a wide selection of roller coasters. So, I bet Disney World also has a wide selection of roller coasters.
3. A. Preparing for a final exam requires studying and skill. Preparing for a wrestling tournament also requires study and skill. Since wrestlers do better if they get a good night's sleep before a match, students taking final exams should also do better on a good night's sleep.  
 B. Preparing for a final exam requires studying, skill, and discipline. Preparing for a wrestling tournament also requires study, skill, and discipline. Since wrestlers do better if they get a good night's sleep before a match, students taking final exams should also do better on a good night's sleep.

4. A. Gopher snakes have brown markings on their backs, and they are harmless to people. Rattlesnakes also have brown markings on their backs, so they, too, must be harmless to people.  
B. Gopher snakes, Great Plains rat snakes, and Eastern Hog-nosed snakes all have brown markings on their backs, and they are harmless to people. Rattlesnakes also have brown markings on their backs, so they, too, must be harmless to people.
5. A. Commercial airplane flights are long, boring, and cramped. Commercial space flights will also be long, boring, and cramped. People can endure long commercial airplane flights if they are offered movies, food breaks, and space to walk around. Therefore, these options will be useful for commercial space flights.  
B. Commercial airplane flights are long and boring. Commercial space flights will also be long and boring. People can endure long commercial airplane flights if they are offered movies, food breaks, and space to walk around. Therefore, these options will be useful for commercial space flights.
6. A. Tigers have strong leg muscles, long legs, loose-fitting skin, and a strong predatory instinct. Cheetahs, too, have strong leg muscles, long legs, loose-fitting skin, and a strong predatory instinct. Since cheetahs are extremely fast runners, tigers are probably also fast runners.  
B. Tigers have strong leg muscles, long legs, and a strong predatory instinct. Cheetahs also have strong leg muscles, long legs, and a strong predatory instinct. Since cheetahs are extremely fast runners, tigers are probably also fast runners.
7. A. Lawyers, doctors, engineers, and high school teachers all have advanced degrees. Therefore, high school teachers earn a much higher-than-average salary since lawyers, doctors, and engineers earn a much higher-than-average salary.  
B. Lawyers and high school teachers have advanced degrees. Therefore, high school teachers earn a much higher-than-average salary since lawyers earn a much higher-than-average salary.
8. A. People can use e-mail to write informally to close friends and to write formally to strangers. Regular mail also can be used to write informally to close friends and to write formally to strangers. Since using sarcasm in regular mail can lead to misunderstandings, using sarcasm in e-mail can also lead to misunderstandings.  
B. People can use e-mail to write informally to close friends, to write formally to strangers, and to manage various business issues. Regular mail also can be used to write informally to close friends, to write formally to strangers, and to manage various business issues. Since using sarcasm in regular mail can lead to misunderstandings, using sarcasm in e-mail can also lead to misunderstandings.
9. A. MySpace and Facebook are both social networking websites that allow users to send messages to one another. Because Facebook is free for all users, MySpace is likely also free for all users.  
B. MySpace and Facebook are both social networking websites that allow users to share information and photographs, as well as send messages to one

another. Because Facebook is free for all users, MySpace is likely also free for all users.

10. A. Gwen and Charles are very similar: They are the same age, exercise regularly, eat a well-balanced diet, and have no family history of heart disease. Since Charles has healthy cholesterol levels, Gwen should also.
- B. Gwen and Charles are both 47 years old. Since Charles has healthy cholesterol levels, Gwen should also.

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## Evaluating the Relevance of the Analogy

Once you have determined how much evidence the analogy provides to support the conclusion, you should then turn your attention to the relevance of the analogy. For any given analogy, there will be numerous ways that the analogues are similar, but what makes the conclusion more likely to be true or not is the extent to which these similarities are relevant to the feature.

Consider, for example, the following analogical argument.

*Humans are a lot like rats. They are both mammals, and they both have the same basic physiology. Since rats that are exposed to secondhand smoke have a high risk of developing cancer, humans who are exposed to secondhand smoke have a high risk of developing cancer.*


In this example, humans are compared to rats. The arguer has identified two ways that they are similar: They are both mammals, and they have the same basic physiology. In evaluating this analogical argument, we must consider whether these similarities between humans and rats are relevant or irrelevant to the conclusion of the argument. The issue is whether humans who are exposed to secondhand smoke have a high risk of developing cancer. With respect to this issue, the similarities identified by the arguer (being mammals and having the same basic physiology) are relevant to the feature.

Now consider this argument.

*Soccer is a lot like ice hockey: Both involve one team trying to outscore another; the teams each have one player guarding the goal; and players are penalized for being "offside." Given that ice hockey is played wearing ice skates, soccer must also be played wearing ice skates.*

For anyone who knows even a little bit about ice hockey and soccer, it should be clear that something has gone wrong in this argument. The arguer compares soccer to ice hockey, and indeed they do have these and many other similarities. Are the similarities relevant to the feature? Given that the issue is whether soccer is played wearing ice skates, the stated similarities are irrelevant; what kind of footwear players wear is not determined by the scoring and penalty rules of the game. Whenever the similarities between the sample and target are irrelevant to the feature, we say that the argument uses a **faulty analogy**.





**Hint!** Unfortunately, determining whether the similarities between the analogues are relevant or irrelevant to the feature is often a tricky business. This is primarily because in presenting an analogy, arguers will emphasize the similarities between the analogues and are unlikely to point out any relevant differences. After all, they are trying to convince you to accept their conclusion!

### EXERCISE 9.10

For each of the following, state the sample, target, and feature. Then, evaluate the analogy by identifying the similarities between the sample and target, and determining whether those similarities are relevant or irrelevant to the feature.

1. The University of Hawaii at Manoa is a lot like the University of Colorado at Denver. They are both public, coeducational universities located in the capital city of their state, and they both have student populations of approximately 20,000 students. Since 64% of the students at the University of Hawaii are of Asian or Pacific Island descent, approximately the same number of students at the University of Oklahoma are of Asian or Pacific Island descent.
2. Two years ago, my aunt had symptoms just like yours. She was tired all the time, experienced joint and muscle stiffness, had swollen lymph nodes, and her limbs would often go numb, just like what has been happening to you. It turned out that she had Lyme disease, and I bet that's what you've got, too.
3. Director Tim Burton's next feature film is *Maleficent*, a retelling of Disney's *Sleeping Beauty* from the villain's perspective. There's little doubt this film will star Johnny Depp. This is because over the past five years, Burton has made four films—*Charlie and the Chocolate Factory*, *Corpse Bride*, *Sweeney Todd*, and *Alice in Wonderland*—all of which have starred Johnny Depp. So, Burton will probably choose him again.
4. Workers in California are guaranteed by law six weeks of paid leave to care for their newborns, and workers in Washington are guaranteed by law five weeks of paid leave to care for their newborns. Therefore, since Texas is like California and Washington—they are all states located in the United States—workers in Texas are probably guaranteed by law several weeks of paid leave to care for their newborns.
5. Cars are four-wheeled vehicles, and are used to transport people and goods from one place to another. A horse-drawn carriage is also a four-wheeled vehicle, and is used to transport people and goods from one place to another. Since cars can be safely driven on the freeway, a horse-drawn carriage can probably be safely driven on the freeway.

**EXERCISE 9.11**

For each of the following analogical arguments, determine whether each piece of additional information would strengthen, weaken, or result in no change to the strength of the original argument.

1. Organic spinach from California was contaminated with *E coli* bacteria. Thus, organic lettuce could also be contaminated with *E coli* bacteria.
  - a. Suppose the lettuce was from California.
  - b. Suppose the lettuce was not organic.
  - c. Suppose the spinach, chard, and arugula all were contaminated with *E coli* bacteria.
  - d. Suppose it was broccoli that had been contaminated with *E coli* bacteria.
2. The new sports car Bob recently bought is equipped with a powerful V-8 engine, four-speed transmission, and a racing clutch. The previous sports car Bob owned also had a V-8 engine, four-speed transmission, and a racing clutch. So, the new car is similar to the old one. Because Bob got several speeding tickets with his old car, he's probably going to get speeding tickets with the new one.
  - a. Suppose Bob has owned six other sports cars, and he has gotten a speeding ticket driving each of them.
  - b. Suppose Bob's old car was turbocharged, and so is his new one.
  - c. Suppose Bob's new car has a four-cylinder engine.
  - d. Suppose Bob's old car was black, and his new one is red.
3. The stocks that Harold purchased are from Internet startups, are highly rated, and are selling for a low price. The stocks that Ashley bought are also from Internet startups, are highly rated, and are selling for a low price. Thus, Harold's stocks are similar to Ashley's stocks. Since Ashley's stocks made a 10% profit in the first year, Harold can expect his stocks to make at least a 10% profit, too.
  - a. Suppose Gregg purchased stocks from Internet startups that were highly rated and selling for a low price, which also made a 10% profit in the first year.
  - b. Suppose Harold bought stocks that were low rated.
  - c. Suppose Harold bought stocks that were from a traditional brick-and-mortar business.
  - d. Suppose Harold bought his stocks from a broker.
4. Cleveland, Butte, and San Diego are three cities that have recently lost large numbers of factory jobs. However, all three cities have successfully developed a training program to teach ex-factory workers how to install and repair solar panels and other alternative energy devices. Detroit has also lost factory jobs. So, since the program worked well for Cleveland, Butte, and San Diego, it ought to work well here in Detroit.
  - a. Suppose the factory jobs in Cleveland, Butte, and San Diego were all high-skilled jobs, and Detroit's factory jobs are high-skilled, too.
  - b. Suppose five cities that lost factory jobs had success with the training program.
  - c. Suppose Cleveland, Butte, and San Diego all had some solar energy companies and Detroit does not.
  - d. Suppose Detroit recently laid off a large number of city employees.

5. The Lions have won their last four home football games. Therefore, they will probably win when they play at home next Saturday.
  - a. Suppose the previous games were played in fair weather, and rain is predicted for this Saturday's game.
  - b. Suppose the Lions' star receiver who scored two touchdowns in each of the previous games is out for the rest of the season.
  - c. Suppose the Lions won their last six home games.
  - d. Suppose the Lions have four players on the Dean's list for academic excellence.

## Putting It All Together: A Complete Analysis Plus Evaluation

This chapter has provided you with a set of skills—recognizing, analyzing, and evaluating analogical arguments—to add to those you have already acquired. You can now include these skills in your Complete Analysis plus Evaluation. The first paragraphs should consist of your analysis. Once your analysis is complete, you should then present your evaluation of the argument.

### Directions for Complete Analysis Plus Evaluation

In *paragraph form*, use complete sentences and proper English grammar and spelling to do the following:

**Step 1:** Write a Basic Analysis of the passage. (You may want to refer to the Directions for Basic Analysis, Chapter 3, page 49.)

**Step 2:** If the passage contains an argument, determine whether the argument commits a fallacy. If it does, write a separate paragraph identifying the fallacy committed, and explaining how this fallacy is committed.

**Step 3:** If the argument does not commit a fallacy, diagram it and verify that the diagram is consistent with your Basic Analysis.

**Step 4:** In a separate paragraph, identify the kind of argument.

- ▲ If the argument is deductive, identify it as a categorical argument or a truth-functional argument.
- ▲ If the argument is inductive, identify it as an analogical argument, an inductive generalization, or a causal argument.

**Step 5:** Evaluate the argument.

- ▲ If the argument is categorical, state the syllogism in standard form, and *demonstrate* whether the argument is valid or invalid using either a Venn diagram or the rules for valid syllogisms.
- ▲ If the argument is truth-functional, translate the argument, and *demonstrate* whether the argument is valid or invalid by identifying the argument form, using the truth table method, or using the shortcut method.
- ▲ If the argument is analogical, evaluate its strength by considering the evidence provided for the analogy and the relevance of the analogy to the feature.

Let's consider a few examples of a Complete Analysis Plus Evaluation before you try some on your own.

*A woman without a man is like a fish without a bicycle.—Gloria Steinem*

First, identify the passage as an argument, explanation, or neither. You probably noticed that this passage contains an analogy. The author compares a woman without a man to a fish without a bicycle, presumably to counter assumptions that a woman needs a man. However, notice that there is only one claim here, so it cannot be either an argument or an explanation. The analysis, then, should read as follows.

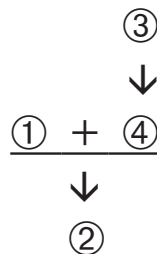
**This passage by Gloria Steinem is neither an argument nor an explanation. It contains only one claim, and both arguments and explanations need at least two claims.**

Next, consider this passage.

*When I ordered pizza from the Pizza Shoppe, it took about 30 minutes for delivery. I bet when I order pizza from Pizza King, it will take about 30 minutes for delivery. After all, Pizza King and the Pizza Shoppe are in the same part of town.*

The first step is Basic Analysis. The passage has at least two claims, and upon reflection you should be able to see that the second sentence contains the conclusion, whereas the supporting premise is in the first sentence. Notice, however, that the analogy is unstated. The arguer is comparing Pizza King to the Pizza Shoppe when pointing out that they are both in the same part of town. The diagram and analysis will need to include this unstated analogy.

① When I ordered pizza from the Pizza Shoppe, it took about 30 minutes for delivery. I bet ② when I order pizza from Pizza King, it will take about 30 minutes for delivery. After all, ③ Pizza King and the Pizza Shoppe are in the same part of town.  
④ Pizza King is like the Pizza Shoppe.



This passage contains an argument. The issue is whether when I order pizza from Pizza King, it will take about 30 minutes for delivery. The conclusion is that when I order pizza from Pizza King, it will take about 30 minutes for delivery. The first premise is that when I ordered pizza from the Pizza Shoppe, it took about 30 minutes for delivery. The second, unstated premise is that Pizza King is like the Pizza Shoppe.

The passage contains a subargument. The intermediate conclusion is that Pizza King is like the Pizza Shoppe. The premise is that Pizza King and the Pizza Shoppe are in the same part of town.

Next, identify the kind of argument and evaluate it. Since this is an analogical argument, you should consider the evidence provided for the analogy and the relevance of the analogy to the feature.

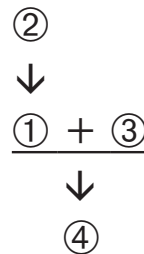
**This passage is an inductive analogical argument. The analogy is relevant to the feature in question because where a business is located is relevant to how long it takes for that business to deliver their goods. The argument provides somewhat weak evidence for the analogy in that it offers only one similarity to support the analogy, and provides only one instance in the sample.**

Let's consider one more before trying some on your own.

*Are computer programmers the only employees we have who can remove viruses from computers? Data entry clerks are a lot like computer programmers because both need excellent typing skills to be effective at their jobs. In view of the fact that computer programmers are good at removing viruses from computers, data entry clerks are also likely to be good at removing viruses from computers.*

Notice that the first sentence is not a claim, and that the passage contains a subargument.

***Are computer programmers the only employees we have who can remove viruses from computers? ① Data entry clerks are a lot like computer programmers because ② both need excellent typing skills to be effective at their jobs. In view of the fact that ③ computer programmers are good at removing viruses from computers, ④ data entry clerks are also likely to be good at removing viruses from computers.***



This passage contains an argument. The issue is whether data entry clerks are good at removing viruses from computers. The conclusion is that data entry clerks are good at removing viruses from computers. The first premise is that data entry clerks are like computer programmers. The second premise is that computer programmers are good at removing viruses from computers.

The passage contains a subargument. The intermediate conclusion is that data entry clerks are like computer programmers. The premise is that both data entry clerks and computer programmers need excellent typing skills to be effective at their jobs.

Next, identify the kind of argument and evaluate it. Since this is an analogical argument, you should consider the evidence provided for the analogy and the relevance of the analogy to the feature.

**This passage is an inductive analogical argument. The argument provides weak evidence for the analogy. There is one similarity identified and there is only one instance in the sample. Moreover, the analogy is irrelevant to the feature. Having excellent typing skills is irrelevant to whether or not someone is good at removing viruses from computers.**

### EXERCISE 9.12

Write a Complete Analysis Plus Evaluation for the following passages.

1. It appears that the workers at the Caterpillar Assembly Plant downtown are very unhappy with their working conditions. The *Des Moines Telegraph* surveyed one hundred of the workers, and they said the conditions were terrible.
2. If the government does not do something about white-collar crime, then we will not have a rebound in the stock market. Since the government will soon be doing something about white-collar crime, because Congress demands action, we can count on seeing the stock market rebound.
3. All swimmers are athletes, and all athletes need lots of training and practice. Therefore, all swimmers require lots of training and practice.
4. The United States is a lot like Canada. Both are predominantly English-speaking countries, both are located in North America, and both were former British colonies. Given that the United States has won at least one gold medal at every Winter Olympic Games since the first was held in 1924, it's very likely that Canada has also won at least one gold medal at every Winter Olympics.
5. After the disaster at the Chernobyl nuclear reactor in 1986, approximately 4,000 cases of thyroid cancer have been documented in children living nearby. Since this is three times higher than the normal rate of thyroid cancer, it is clear that this higher rate of thyroid cancer is a result of the Chernobyl nuclear accident.
6. Giving out your credit card information on the Internet is like giving a burglar the keys to your house.
7. When studying the frontal lobe, the part of the brain that considers the consequences of actions, neuroscientist Francis Jensen made an insightful discovery about the adolescent brain. A major reason why adolescents often make poor decisions is because the nerve cells that connect their frontal lobes with the rest of their brains are sluggish.
8. In 2010, a killer whale attacked and killed a trainer at Sea World in Florida as the audience watched in horror. According to officials, the 12,000-pound whale has killed three people in the past.
9. Potters are a lot like typists in that they both predominantly use their hands to perform their jobs. Given that typists often develop carpal tunnel syndrome, I'd expect that potters also often develop carpal tunnel syndrome.
10. Despite what some people say, constructing a new Super Mart in our town won't hurt local businesses. First of all, the Super Mart will create 700 new

entry-level jobs, which will provide great opportunities for our county's high school graduates. Moreover, the wide variety of products sold at Super Mart will be greatly appreciated by all shoppers.

11. Gumball candies are like SuperBall toys. They are both small, round, and prone to choke small children. Since SuperBall has to carry warnings and can't be marketed to children, we can expect that Gumball candies will carry warnings and won't be marketed to children.
12. Many women who develop diabetes as adults are obese, and many women who develop diabetes are pregnant. We must conclude, therefore, that pregnant women are obese.
13. You should go to rehab if you abuse drugs or alcohol. If you don't go to rehab and you abuse drugs or alcohol, you will end up in prison. Consequently, you won't go to prison unless you abuse drugs or alcohol.
14. Children can outperform adults on memory tests when they are tested on something they know well. In a study by Michelene Chi (1978), a group of graduate students were compared to a group of 10-year-old chess experts. The adults outperformed the children when it came to remembering strings of numbers, but the children clearly outperformed the adults when it came to remembering positions of pieces on a chess board. These findings indicate that having a detailed knowledge base for a particular domain (in this case chess) facilitates memory performance for information from that domain but not necessarily for information from other areas.—Schaffer and Kipp, *Developmental Psychology: Children and Adolescents*
15. It is evident that prostitution is immoral. This is because it is always wrong to be sexually intimate with someone for money.

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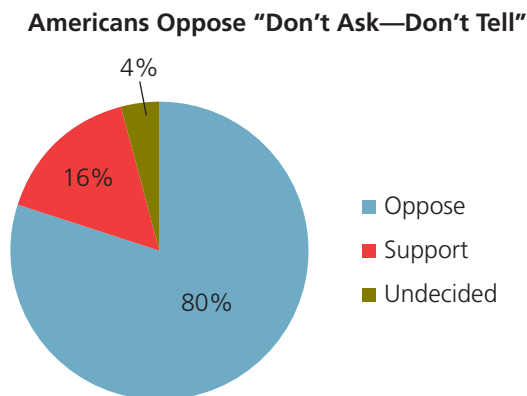
### Chapter Review Questions

1. Define *analogy*.
2. What is an analogical argument?
3. What is the general form of an analogical argument?
4. How can the sample size and quantity of similarities make an analogical argument stronger?
5. How do you determine the relevance of the analogy in an analogical argument?
6. What specifically goes wrong in a faulty analogy?

# Evaluating Inductive Generalizations

## CHAPTER 10

While looking through a newspaper or magazine, you have probably seen a pie chart like this one.



The result of 1,126 respondents nationwide randomly polled by telephone and asked whether they supported, opposed, or were undecided about the American military's policy of "Don't Ask—Don't Tell" toward gays serving in the military.

Even though this chart and the accompanying text is not written in the form of an argument, it is clearly meant to convince you of the truth of a claim—that “Americans oppose ‘Don’t Ask—Don’t Tell.’” The evidence for that claim is given in the chart and the information directly surrounding it. We are told that 1,126 people nationwide were telephoned and asked their opinion of the controversial military policy. Of those who gave an answer, 80% opposed the current policy; 16% supported the policy; and 4% had not decided whether they supported or opposed it.

How does this argument work? Based on the information gathered from the survey about a portion of Americans (the 1,126 respondents), an inference is made about the entire group (all Americans). From what you learned in Chapter 6 you should recognize this argument as an inductive generalization. An **inductive generalization** is an argument that concludes that some, most, or all of a particular group has some feature based on evidence that a portion of that group has the feature. In this chapter, you will learn how to recognize, analyze, and evaluate inductive generalizations like this one. Equipped with all of these skills, you will be able to decide which arguments should convince and which should not.



## Recognizing Inductive Generalizations

Since an inductive generalization has a general claim in the conclusion, the key to recognizing inductive generalizations is recognizing general claims. A **general claim** makes a statement about all, most, or some members of a class, group, or set. The following are some examples of general claims.

*All college freshmen must take general education courses.*  
*Every performance-enhancing drug is banned in the Tour de France.*  
*Herbal tea does not contain caffeine.*  
*Most cats are domestic pets.*

Although the style of each of these four claims differs, all are general claims. Since the first two use the words *all* and *every*, you can recognize without much trouble that they refer to all members of a class, group, or set. The first refers to all members of the group *college freshmen*; the second refers to all members of the group *performance-enhancing drugs*. Even though the third claim does not use the words *every* or *all*, it, too, is a general claim. Further, this claim is no less general just because it declares what herbal tea does *not* contain. The final example specifically mentions *most* cats, but still you should understand that it refers to the entire class of cats. It makes a general claim about the whole class of cats because it claims that most are *domestic pets* and implies that the remainder are not.

### EXERCISE 10.1



**Your Turn!** Write two examples of general claims without using *all* or *every*.

The conclusion of every inductive generalization is a general claim. So, in order to recognize an inductive generalization, you must first analyze the argument and look for a general claim in the conclusion. Let's look at an example of an argument to see if the conclusion contains a general claim.

*Life on Earth can only exist when sufficient oxygen is present. Therefore, all life in the universe can only exist when sufficient oxygen is present.*

You can identify this passage as an argument because it contains at least two claims, one of which is supported by the other. Using the skills you learned in Chapter 3, you can set it out in a Formal Analysis, like this:

**P:** Life on Earth can only exist when sufficient oxygen is present.  
**∴** All life in the universe can only exist when sufficient oxygen is present.

**Issue:** Whether all life in the universe can only exist when sufficient oxygen is present

You can also determine that the argument uses inductive reasoning. Even though the premise is true, it's possible that life elsewhere in the universe is different than it is on Earth. Finally, you can identify the argument as an inductive generalization

because the conclusion is a general claim about all life in the universe. This conclusion is supported using evidence that a portion of that group—life on Earth—has some feature. Finally, using the skills you learned in Chapter 4, you can draw an argument diagram.

- ① *Life on Earth can only exist when sufficient oxygen is present. Therefore,*  
 ② *all life in the universe can only exist when sufficient oxygen is present.*



Here's a second example of an inductive generalization that you are likely to encounter.

*The majority of voters in South Dakota think their state government is moving in the wrong direction. This is the result of a statewide poll in which 75% of respondents agreed with the statement, "The state government is moving in the wrong direction."*

In this example, you can again determine that it is an argument since it has a conclusion and supporting premise. Here it is in a Formal Analysis.

- P:** In a statewide poll, 75% of respondents agreed with the statement,  
 "The state government is moving in the wrong direction."  
 ∴ The majority of voters in South Dakota think their state government is  
 moving in the wrong direction.

**Issue:** Whether the majority of voters in South Dakota think their state government is moving in the wrong direction

This survey is an inductive generalization because the conclusion is only probably true if the premises are true, and the premises support the general claim in the conclusion.

### EXERCISE 10.2

**Your Turn!** Diagram the previous inductive generalization.



### EXERCISE 10.3

Analyze each of the following inductive generalizations using Formal Analysis and then diagram it.

- Most of the history majors in the senior seminar class at SMU are planning to teach high school after they earn their degree. Therefore, it's likely that most history majors at SMU are seeking a career teaching high school.

2. The “Trails” model of Avenger running shoes has a great deal of cushioning in the sole. Therefore, all Avenger running shoes probably have a great deal of cushioning in the sole.
3. Chili peppers are very hot. This is because Serrano chili peppers are very hot.
4. The majority of people who responded to a campus poll favored a student fee to finance a new recreation center. Thus, it’s likely that most students on campus favor such a fee.
5. The ash trees in my neighborhood have become infested with white flies. It’s likely that all the ash trees in town are becoming infested with white flies.
6. All motorized vehicles need to be insured, since motorcycles, cars, and trucks need to be insured.
7. Javier has earned high grades in the four music courses he has taken in college. Thus, he probably will do well in all of the music courses he takes in college.
8. The food has been tasty every time I’ve eaten at Minnie’s Deli. We can expect that all their food is tasty.
9. In a CNN opinion poll about the war in Afghanistan, 52% of the respondents said the war has turned into another Vietnam. Thus, it is reasonable to accept that a slight majority of Americans believe the war in Afghanistan has turned into another Vietnam.
10. Truth and Reconciliation commissions helped prevent violence in South Africa, Guatemala, and Chile. This means that such commissions will help prevent violence in all countries traumatized by years of governmental abuse and mistreatment.

### Analyzing Inductive Generalizations

In the previous exercise, you were able to practice recognizing inductive generalizations and identifying their premises and conclusion in an argument analysis. When you look closely at your results, you may notice a common pattern. That pattern is what we call the general form of inductive generalizations, and it looks like the following.

**P:**     A sample *S* of the members of *T* have *F*.  
**∴**     All (or many or most) members of *T* have *F*.



**Hint!** The sample in an inductive generalization is a subset, or a part, of the target. That means that you can distinguish between analogical arguments and inductive generalization by examining the sample and target. The argument is an inductive generalization if the members of the sample are members of the target.

Here’s the pattern shown in an earlier example.

*Life on Earth can only exist when sufficient oxygen is present. Therefore, all life in the universe can only exist when sufficient oxygen is present.*

- P:** A sample S (life on Earth) of the members of T (all life in the universe) have F (exist only when sufficient oxygen is present).  
**∴** All members of T (all life in the universe) have F (exist only when sufficient oxygen is present).

As you can readily see, inductive generalizations, like analogical arguments, contain a sample (S), a target (T), and a feature (F). However, the relationship between the sample and target of an inductive generalization differs from that in an analogical argument. For an inductive generalization, the **sample** is a portion of an entire class or group, and it appears in the premise. The entire group or class represented by the sample is called the **target**. Thus, the sample *is a part of* the target. The argument works by citing the fact that the sample has a particular feature and making the inference that the target will have the feature, too.

When analyzing inductive generalizations, it is critical that you learn to properly isolate and identify the sample, target, and feature. This is because these parts of the argument play a critical role in evaluating the arguments. As you can see in the previous example, the feature is given as an attribute of both the sample and the target. Here are the three parts as you should identify them.

- Sample:** life on Earth  
**Target:** all life in the universe  
**Feature:** exists only when sufficient oxygen is present

#### EXERCISE 10.4

**Your Turn!** For each inductive generalization in Exercise 10.3, identify the sample, target, and feature.



Not all inductive generalizations appear in this general form, but they can all be analyzed to fit the pattern. They may contain extra claims as in the following example.

*During the summer, the university does not follow the same schedule as during the school year. This summer, the library, the dining halls, and the recreation center are all closed on Fridays. Therefore, probably most buildings on campus are closed on Fridays during the summer months.*

First, diagram this argument.

① *During the summer, the university does not follow the same schedule as during the school year.* ② *This summer, the library, the dining halls, and the recreation center are all closed on Fridays.* Therefore, probably ③ *most buildings on campus are closed on Fridays during the summer months.*

The first thing to notice is that claim ③ is the conclusion. Claim ② supports claim ③, but claim ① does not—it is an extra claim. The fact that the university does not follow the same schedule as during the school year is not evidence that most buildings

on campus are closed on Fridays during the summer months. So, in the diagram you would leave claim ① out.

②



③

The Formal Analysis, then, looks like this:

**P:** This summer, the library, the dining halls, and the recreation center are all closed on Fridays.  
**∴** Most buildings on campus are closed on Fridays during the summer months.

**Issue:** Whether most buildings on campus are closed on Fridays during the summer months

**S:** the library, the dining halls, and the recreation center  
**T:** all buildings on campus  
**F:** closed on Fridays during the summer months



**Hint!** Even though the conclusion is about *most* of the buildings on campus, as you can see, the target is still *all buildings on campus*. The target of all generalizations is always *all* of the members of that class. The claim is that *most* of them have the feature and the others don't—hence, the claim addresses all members of the target.

Here's another example of an inductive generalization, this one resulting from an opinion poll.

*An online survey in the Journal of Computer-Mediated Communication suggests that people who post comments of a personal nature on their blogs are likely to have gotten into trouble for things they've written. A total of 492 bloggers filled out the online surveys. Of these, some 70% reported that they had gotten into trouble with family and friends for something they had posted. Researchers point out that additional research is needed to better understand privacy concerns inherent in the practice of blogging.*

First, diagram the argument.

① *An online survey in the Journal of Computer-Mediated Communication suggests that people who post comments of a personal nature on their blogs are likely to have gotten into trouble for things they've written.* ② *A total of 492 bloggers filled out the online surveys.* ③ *Of these, some 70% reported that they*

*had gotten into trouble with family and friends for something they had posted.*

④ *Researchers point out that additional research is needed to better understand privacy concerns inherent in the practice of blogging.*

This argument contains two extra claims—claim ② and claim ④.

### EXERCISE 10.5

**Your Turn!** Diagram the previous inductive generalization.



Here is the argument, presented in a Formal Analysis.

- P:** Some 70% of the 492 bloggers who responded to an online survey in the *Journal of Computer-Mediated Communication* reported that they had gotten into trouble with family and friends for posting something of a personal nature.
- 
- ∴** People who post comments of a personal nature on their blogs have gotten into trouble for posting something of a personal nature.
- Issue:** Whether people who post comments of a personal nature on their blogs have gotten into trouble for posting something of a personal nature
- S:** the 492 bloggers who responded to an online survey
- T:** all bloggers
- F:** have gotten into trouble with family and friends for posting something of a personal nature

Finally, return to the pie chart with polling results from the beginning of this chapter. Since this is a chart, you must construct the argument that the headline and the evidence from the chart implies. First, the headline implies the conclusion, and it is supported by the data given in the poll.

- P:** 80% of the 1,126 respondents nationwide randomly polled by telephone oppose the “Don’t Ask—Don’t Tell” policy regarding gays serving in the military.
- 
- ∴** A large majority of Americans oppose the “Don’t Ask—Don’t Tell” policy regarding gays serving in the military.
- Issue:** Whether a large majority of Americans oppose the “Don’t Ask—Don’t Tell” policy regarding gays serving in the military

### EXERCISE 10.6

**Your Turn!** Identify the sample, target, and feature in the preceding argument.



**EXERCISE 10.7**

Provide a Formal Analysis and diagram of each of the following inductive generalizations. Then, state the sample, target, and feature.

1. I've eaten lasagna and spaghetti. I thought both were delicious. Thus, I'll most likely find all Italian pasta dishes delicious.
2. Albuquerque is an arid region trying to create a stable economic base to fuel future growth. Restriction on urban sprawl helped Albuquerque become a more attractive place for business investment. So, restrictions on urban sprawl will probably have the same results for every large community in the Southwest desert.
3. How do most Americans refer to a group of two or more people? They use the words *you guys*. This is the conclusion of an online survey of English usage conducted by Professor Bert Vaux of Harvard University that has had over 30,000 participants. When people were asked how they addressed a group of two or more people, the largest number (42.5%) said they used *you guys*. Interestingly, *y'all* was given by 14% of the respondents.
4. Since mice and rats are both rodents, and they each make great pets, most rodents make great pets.
5. Hybrid cars are likely to get more than 40 miles per gallon. This is because both the Toyota Prius and the Ford Fusion get over 40 miles per gallon.
6. A catfish is a freshwater fish, and a trout is also a freshwater fish. Neither trout nor catfish can live very long out of water. Consequently, it's unlikely that any freshwater fish can live very long out of water.
7. *Salary.com* reports that employees are unsatisfied with their jobs. The survey included over 7,000 employees, 65% of whom said they were actively looking for another job.
8. I have visited five small towns in southern Chile, and every one of them has had an old Spanish cathedral. It appears likely that the majority of small towns in southern Chile have old Spanish cathedrals.
9. Recently a team of archaeologists found a previously undiscovered Native American campsite in Michigan that contained hundreds of hunting implements. Five of the several hundred arrowheads and other hunting implements found at the site were carbon dated. They were shown to be over 2,000 years old. So, it's likely that the vast majority of those tools that were discovered at the site are a couple of thousand years old.
10. Salt marshes on the east coast are among the most productive ecosystems in the country. The majority of them are in South Carolina. Unfortunately, these marshes are home to fewer birds and fish than in the recent past. It's a good bet that most salt marshes on the east coast are having similar problems.

**Evaluating the Randomness of the Sample**

Since inductive generalizations are inductive, you will evaluate them using language appropriate for inductive reasoning. In Chapter 6 you learned that an inductive argument is strong when the truth of the premises makes the conclusion probably true. Inductive arguments lacking that kind of support from the premises are weak arguments.

Also, recall from Chapter 6 that *strong* and *weak* are relative terms ranging from very strong to very weak. Inductive generalizations are evaluated according to how well the sample *represents* the target. As the sample gets more representative, the argument gets stronger.

In order for the sample to be representative of the target, it first must contain a similar degree of whatever relevant diversity exists in the target. So if, for example, you want to draw a generalized conclusion about some group you belong to (such as a sports club, local political group, or college major) and the group has both male and female members, the sample needs to include both some men and some women in proportion to the make-up of the group in order to be representative of the entire group. Thus, when you choose your sample, you need to make sure that both men and women are among the ones chosen.

One way to ensure sufficient relevant diversity is by making the sample random. A **random sample** is one in which all members of the target have an equal opportunity to be in the sample. For instance, you could interview members randomly by choosing every fifth or tenth name on the membership list. Another possibility would be to randomly interview people in a common meeting place. Of course, better and worse ways exist to create a random sample, but in each case the aim is to ensure that the diversity of the target is reflected by the sample. What would not be a random sample is one that excludes part of the target. For example, a sample chosen from the members in the men's locker room would not include any women in the sample.

By comparing two similar examples, you can see the difference between an argument with a relevant sample and one in which the sample is not relevant to the target. Let's consider the first argument.

*As part of a class project, I surveyed owners of a variety of businesses to see whether they expected to hire additional workers next year. Of the 36 owners, 20 said they had no plans to increase their workforce, 10 said they weren't sure, and 6 planned to add employees. Thus, the majority of local business owners probably will not be hiring more workers next year.*

First, show the argument in a Formal Analysis and identify the sample, target, and feature.

**P:** Of the 36 business owners from a variety of businesses I surveyed about their plans for the following year, 20 said they had no plans to increase their workforce, 10 said they weren't sure, and 6 planned to add employees.  
**∴** The majority of local business owners will not be hiring more workers next year.

**Issue:** Whether the majority of local businesses will be hiring more workers next year

**S:** the 36 business owners from a variety of businesses I surveyed  
**T:** all local business owners  
**F:** do not plan to hire more workers next year

Now, consider the second argument.

*As part of a class project, I surveyed business owners who had filed for bankruptcy to see whether they expected to hire additional workers next year. Of the*



*36 owners, 20 said they had no plans to increase the workforce, 10 said they weren't sure, and 6 planned to add employees. Thus, the majority of local business owners will not be hiring more workers next year.*

Again, show the argument in a Formal Analysis and identify the sample, target, and feature.

- P:** Of the 36 business owners of bankrupt businesses I surveyed about their plans for the following fiscal year, 20 said they had no plans to increase the workforce, 10 said they weren't sure, and 6 planned to add employees.
- ∴** The majority of local business owners will not be hiring more workers next year.
- Issue:** Whether the majority of local businesses will be hiring more workers next year
- S:** the 36 business owners of bankrupt businesses I surveyed
- T:** all local business owners
- F:** do not plan to hire more workers next year

In these two arguments, the target is the same (all local business owners) and the feature is the same (do not plan to hire additional workers in the next fiscal year). The same number of business owners were sampled in each argument. Even the conclusion is the same. What is different is the sample itself: The business owners in the first argument represent a variety of businesses, so the sample is random. However, the business owners chosen for the second sample had all filed for bankruptcy and are, thus, less likely to hire new workers. That means the sample is not random. When an inductive generalization's sample misrepresents the target, the argument is called a **biased generalization**. So, this second version of the argument is weak because it is a biased generalization.

Pop-up polls like this one are common on the Internet. In what ways might the results of this poll be biased?



Samples may also be biased when surveys require participants to initiate contact rather than using a survey taker to actively solicit responses. For example, surveys requiring that participants respond by sending a text message, going online, or phoning in their response are likely to get unrepresentative results since the respondents are self-selected. Only people who are particularly interested in the issue are likely to respond to the survey. To make matters worse, unless surveys prevent respondents from contributing their answers more than once, the data is likely to be skewed by unscrupulous repeat respondents who are trying to influence the outcome.

## EXERCISE 10.8

**Your Turn!** Which of the following sampling techniques for a voter survey would qualify as random? Why?



1. Choosing every tenth name on a list of registered voters.
2. Randomly dialing phone numbers.
3. Interviewing potential voters as they picked their children up from school.
4. Placing a survey on an Internet site and inviting whoever is interested to participate.

## EXERCISE 10.9

For each of the following pairs of inductive generalizations, determine which is stronger and explain why.

- A.** The majority of students on campus exercise regularly. I took a survey of students leaving the weight room, and the vast majority of the respondents said they exercised regularly.
  - B.** The majority of students on campus exercise regularly. I took a survey of students outside of the cafeteria, and the vast majority of the respondents said they exercised regularly.
- A.** The local newspaper conducted a survey of its readers to determine which comics were most popular. The majority of the 175 respondents said that *Bizzaro* was their favorite. Thus, *Bizarro* must be the most popular comic strip among all readers.
  - B.** The local newspaper conducted a survey of its readers to determine which comics were most popular. The majority of the 175 respondents under the age of 21 said that *Bizarro* was their favorite. Thus, *Bizarro* must be the most popular comic strip among all readers.
- A.** How do most Americans refer to a group of two or more people? They use the words *you guys*. This is the conclusion of an online survey of English usage conducted by Professor Bert Vaux of Harvard University that has had over 30,000 participants. When people were asked how they addressed a group of two or more people, the largest number (42.5%) said they used *you guys*. Interestingly, *y'all* was given by 14% of the respondents.
  - B.** How do most Americans refer to a group of two or more people? They use the words *y'all*. This is the conclusion of a survey of 30 people outside of the Opryland Hotel in Nashville, Tennessee. When they were asked how they addressed a group of two or more people, the majority said they used *y'all*.
- A.** The four literature courses I have taken assign one novel a week to read. Thus, most literature courses probably assign a novel a week to read.
  - B.** The six literature courses I have taken assign one novel a week to read. Thus, most college courses probably assign a novel a week to read.

5. A. To determine the water temperature at the lake, I set a thermometer in the top six inches of water and found the temperature to be 80°F. Thus, the water in the lake is probably around 80°F.
- B. To determine the water temperature at the lake, I recorded the temperature in the top six inches of water, again at 10 feet deep, and once more at a depth of 30 feet. The average temperature was 58°F. Thus, the lake water is probably near 58°F.

## Evaluating Sample Size

The size of the sample is the second important factor in determining how well the sample represents the target in an inductive generalization. As a rule, the larger the sample, the stronger the argument, because larger samples are more representative of the target. Of course, if an argument had the largest possible sample—in other words, if all members of the target were in the sample—the premise would be identical to the conclusion. So, in an inductive generalization the sample will always be smaller than the target.

### EXERCISE 10.10



**Your Turn!** Why must the sample always be smaller than the target in an inductive generalization?

At the other extreme, when the sample is much too small to offer even minimal support for the conclusion, the argument is called a **hasty generalization**. For example, if I argue that because my cousin, her husband, and I all think Proposition 22 should be defeated, a majority of voters believe the proposition should be defeated, then my argument is a hasty generalization. This is because the sample consists of only three voters (my cousin, her husband, and me). A sample of three people cannot possibly be large enough to provide evidence regarding all voters in any state.

In order to see how the size of the sample can be evaluated in an argument, we will consider another pair of generalizations. Examine the first one.

*The student newspaper conducted a survey of its readers to determine which video games were most popular. Over 70% of the 175 who responded to the random survey said that World of Warcraft was their favorite. Thus, World of Warcraft must be the most popular video game among all readers.*

First, show the argument in a Formal Analysis and identify the sample, target, and feature.

- P: Of the 175 respondents to the student newspaper survey, over 70% said that *World of Warcraft* was their favorite video game.
- ∴ *World of Warcraft* is the most popular video game among all readers.

**Issue:** Whether *World of Warcraft* is the most popular video game among all readers

**S:** the 175 respondents to the student newspaper's survey

**T:** all readers of the student newspaper

**F:** said *World of Warcraft* was their favorite video game

Now, let's consider the second argument.

*The student newspaper conducted a survey of its readers to determine which video games were most popular. Over 70% of the 545 who responded to the random survey said that World of Warcraft was their favorite. Thus, World of Warcraft must be the most popular among all readers.*

Again, show the argument in a Formal Analysis and identify the sample, target, and feature.

**P:** Of the 545 respondents to the local newspaper survey, over 70% said that *World of Warcraft* was their favorite video game.

**∴** *World of Warcraft* is the most popular video game among all readers.

**Issue:** Whether *World of Warcraft* is the most popular video game among all readers

**S:** the 545 respondents to the student newspaper's survey

**T:** all readers of the student newspaper

**F:** said *World of Warcraft* was their favorite video game

Hundreds of computer gamers play the game "World Of Warcraft" during the first day of BlizzCon 2008 at the Anaheim Convention Center.

Both arguments have the same target (all readers of the newspaper) and the same feature (said *World of Warcraft* was their favorite video game). However, the sizes of the samples are different in each argument. The first contains a sample of 175 readers, whereas the second contains 545. Provided that the respondents were chosen in the same manner to represent the diversity of the target, the survey with the larger sample is a stronger argument. This is because a larger sample provides more evidence for the conclusion than a smaller one.





**Hint!** Professional pollsters ensure a representative sample by making the sample random. Interestingly, sample size does not always have to be huge if the sample is random. For instance, most nationwide surveys done by reputable polling companies use samples of only 1,000 to 1,200 respondents.

### EXERCISE 10.11

For each of the following pairs of inductive generalizations, determine which is stronger and explain why.

1. **A.** I have visited 10 amusement parks, all of which had a wide selection of roller coasters. So, I bet all amusement parks I visit will have a wide selection of roller coasters.  
**B.** I have visited two amusement parks, both of which had a wide selection of roller coasters. So, I bet all amusement parks I visit will have a wide selection of roller coasters.
2. **A.** All professionals earn much higher-than-average salaries. This is because lawyers, doctors, engineers, and high school teachers all have advanced degrees, and all of them earn a much higher-than-average salary.  
**B.** All professionals earn much higher-than-average salaries. This is because lawyers and high school teachers have advanced degrees, and each of them earns a much higher-than-average salary.
3. **A.** I tasted three of the oranges from my tree, and all were sour. This tree must have very poor fruit.  
**B.** I tasted 10 of the oranges from my tree, and all were sour. This tree must have very poor fruit.
4. **A.** Grocery prices at a locally owned market are not much higher than those at one of the national supermarket chains. We bought an identical shopping basket of foods from the local market and from the chain market. The price of the basket of foods from the local market was higher by only 4%.  
**B.** Grocery prices at a locally owned market are not much higher than those at one of the national supermarket chains. We bought an identical shopping basket of foods once a week for a month from the local market and from the chain market. The price of the basket of foods from the local market was higher by only 4%.
5. **A.** Apartment prices around the university are really high. I called to inquire about four apartments that had a vacancy, and all were more expensive than I could afford.  
**B.** Apartment prices around the university are really high. I called to inquire about 12 apartments that had a vacancy, and all were more expensive than I could afford.

**EXERCISE 10.12**

For each inductive generalization, consider the relevance of the sample and the sample size to determine whether the revised argument is stronger or weaker than the original. Briefly explain why.

1. Most of the customers of the West Lake Shopping Center would like to see a fitness center added to the complex. A survey of over 200 customers at the shopping center's main entrance showed that nearly 80% favored adding a fitness center to the complex.
  - a. Suppose 450 customers at the shopping center were surveyed.
  - b. Suppose 200 responses came from the comment card drop-box.
  - c. Suppose 200 customers at the sporting goods store were surveyed.
  - d. Suppose the members of one family were surveyed.
2. The food at the Residence Commons is not very good. I've eaten breakfast there twice, and I didn't like it at all.
  - a. Suppose I've eaten breakfast, lunch, and dinner at the Residence Commons.
  - b. Suppose I've eaten breakfast at the Residence Commons six times.
  - c. Suppose I've eaten breakfast there twice, and my roommate has eaten lunch there three times.
  - d. Suppose I've never eaten there but have talked to 10 people who have.
3. What do Americans think about handgun waiting periods? Residents surveyed in three major high-crime metropolitan areas in the Northeast approved of waiting periods for handgun purchases. Therefore, it's clear that Americans approve of waiting periods for handgun purchases.
  - a. Suppose residents were surveyed in three rural counties in the Northeast.
  - b. Suppose residents were surveyed from states in the north, south, east, west, and middle parts of the country.
  - c. Suppose residents from each of the 50 states were surveyed.
  - d. Suppose victims of armed robbery were surveyed.
4. Laptop computers are likely to last at least three years. Our company purchased four identical new laptops three years ago, and all four are still working fine.
  - a. Suppose our company purchased two identical laptop computers three-years ago.
  - b. Suppose our company also purchased four desktop computers that lasted for three years.
  - c. Suppose our company purchased four laptop computers from four different manufacturers three years ago.
  - d. Suppose our company purchased two laptop computers and two desktop computers three years ago.
5. Whether or not to use designated hitters in professional baseball continues to be controversial. But sports fans approve of it. We distributed a survey in the sports section of the newspaper in 10 major league cities. More than 55% of respondents said they favored having a designated hitter.
  - a. Suppose the survey was a random telephone survey in those 10 major league cities.
  - b. Suppose we set up a website and asked people to voice their opinions.



- c. Suppose we announced the survey during a televised baseball game and asked respondents to text their answers.
  - d. Suppose we surveyed fans leaving the stadium of the most recent World Series winners.
- 6. A survey of over 320 alumni from Selma Community College showed that a majority believed they received a good or very good education from SCC. Thus, it's likely that a majority of graduates of SCC are pleased with the education they received.
  - a. Suppose the survey was of 510 alumni.
  - b. Suppose alumni were asked in the alumni newsletter to text their opinion.
  - c. Suppose 320 alumni who attended the most recent commencement were surveyed as they left the event.
  - d. Suppose 320 successfully employed alumni were surveyed.
- 7. Golf on television is boring; I was bored silly watching golf on TV last weekend.
  - a. Suppose I watched golf the last four weekends.
  - b. Suppose last weekend I watched a local high school golf tournament on television and was bored.
  - c. Suppose four of my friends watched golf with me, and all four of us were bored.
  - d. Suppose I am also bored playing golf.
- 8. A recent survey by HealthSaver published by *Marketcharts.com* demonstrates that about one-half of all Americans consume caffeine every day. The second annual HealthSaver 2008 Caffeinated Cities Survey was conducted to determine the caffeine consumption habits and attitudes of consumers across the United States, and to learn more about cultural views and health effects of this caffeine. The telephone survey of people in 20 major metropolitan areas in the United States considered numerous caffeine sources, including coffee, tea, sodas, energy drinks, chocolate, pain relievers, and caffeine pills.  
 Nearly half (49%) of all respondents nationwide said they drink caffeinated coffee every day, whereas cola and tea tied with a 20% daily consumption rate, the survey found. Sweets containing chocolate ranked fourth among caffeine products, with a 13% daily consumption rate, the survey found.
  - a. Suppose the telephone survey was conducted in 30 major metropolitan areas.
  - b. Suppose the survey was posted on CNN's website.
  - c. Suppose the survey was posted on Starbuck's coffee website.
  - d. Suppose people at the local Starbuck's coffee were surveyed.
- 9. Harmful fecal bacteria may lurk in soda fountains. This is the conclusion of a study of 30 soda fountains in Virginia. Researchers found coliform bacteria, bacteria that could contain fecal matter, in 48% of the fountains. In addition, *E. coli*, candida, staph, and other harmful bacteria were found in more than 11% of the drinks.—*Journal of Food Microbiology*
  - a. Suppose 45 soda fountains in Virginia were examined.
  - b. Suppose 30 soda fountains in 10 different states were examined.
  - c. Suppose 30 soda fountains in 10 different countries were examined.
  - d. Suppose water fountains and soda fountains both were sampled and both had bacteria.
- 10. A Web poll reveals that the top feature iPod users would want on the next generation of the popular music player is an FM radio tuner. A recent

online survey of more than 25,000 participants by Detroit-based rock radio consultants, Jacobs Media, found a full 43% of iPod owners want an FM radio integrated into the next version of the iPod. These participants are more than likely listeners to rock stations on the radio. Participation was solicited on 69 different rock radio stations.—*Infosyncworld.com*

- a. Suppose participants were solicited on iTunes.
- b. Suppose participants were solicited on 69 television stations.
- c. Suppose the survey was of 1,200 randomly chosen iPod owners.
- d. Suppose the online survey gathered 35,000 participants.

## Putting It All Together: A Complete Analysis Plus Evaluation

In Chapters 2, 3, and 4, you learned how to recognize and analyze arguments, as well as how to present a Basic Analysis with an argument diagram. In Chapters 5 and 6, you also learned how to identify fallacious reasoning and distinguish between different kinds of arguments in a Complete Analysis. Now that you can analyze and evaluate inductive generalizations, you can put all of these skills together by adding evaluating an inductive generalization to the Complete Analysis assignments.

### Directions for a Complete Analysis Plus Evaluation

In *paragraph form*, use complete sentences and proper English grammar and spelling to do the following:

**Step 1:** Write a Basic Analysis of the passage. (You may want to refer to the Directions for Basic Analysis, Chapter 3, page 49).

**Step 2:** If the passage contains an argument, determine whether the argument commits a fallacy. If it does, write a separate paragraph identifying the fallacy committed, and explaining how this fallacy is committed.

**Step 3:** If the argument does not commit a fallacy, diagram it and verify that the diagram is consistent with your Basic Analysis.

**Step 4:** In a separate paragraph, identify the kind of argument.

- ▲ If the argument is deductive, identify it as a categorical argument or a truth-functional argument.
- ▲ If the argument is inductive, identify it as an analogical argument, an inductive generalization, or a causal argument.

**Step 5:** Evaluate the argument.

- ▲ If the argument is categorical, state the syllogism in standard form, and *demonstrate* whether the argument is valid or invalid using either a Venn diagram or the rules for valid syllogisms.
- ▲ If the argument is truth-functional, translate the argument, and *demonstrate* whether the argument is valid or invalid by identifying the argument form, using the truth table method, or using the shortcut method.



- ▲ If the argument is analogical, evaluate its strength by considering the evidence provided for the analogy and the relevance of the analogy to the feature.
- ▲ If the argument is an inductive generalization, then evaluate its strength by considering sample randomness and sample size.

Let's walk through a few examples of Complete Analysis Plus Evaluation before you try some on your own.

*It appears that most of the teachers at East High School are very unhappy with the school district administration. The Telegraph surveyed a dozen teachers who were recently laid off, and they complained about administrators.*

This passage is an argument since it contains at least two claims, one of which provides support for the other. It does not contain a fallacy, so you should provide a Basic Analysis and argument diagram.

***It appears that ① most of the teachers at East High School are very unhappy with the school district administration. ② The Telegraph surveyed a dozen teachers who were recently laid off, and ③ they complained about administrators.***

③



①

**This passage contains an argument. The issue is whether most of the teachers at East High School are happy with the school district administration. The conclusion is that most of the teachers at East High School are very unhappy with the school district administration. The premise is that the dozen laid-off teachers who were surveyed complained about administrators.**

Notice that the extra claim is left out of the analysis and diagram. Because the passage is an inductive generalization, you must next evaluate the argument.

**This argument is an inductive generalization. It is weak because the sample is biased and small. The sample is not random—it consists only of teachers who were recently laid off. Since they are more likely to be unhappy, they do not represent all of the teachers. The sample size is only a dozen teachers, so it is too small to make a strong argument.**

Here's another example, this one a survey of the kind that is readily available in newspapers, magazines, and websites.

*Twitter users don't think that people with more followers are smarter. This is the result of a survey of 432 highly involved Twitter users (who spend an average of*

*2¾ hours per day on Twitter). Over 80% of the respondents either mildly or strongly disagreed with the statement that “People who have a large number of followers are smarter than those who don’t.”—  
MarketProfs Twitter Survey, April 2009*

This passage is an argument since it contains at least two claims, one of which provides support for the other. It does not contain a fallacy, so you should provide a Basic Analysis and argument diagram.

① Twitter users don’t think that people with more followers are smarter. ② This is the result of a survey of 432 highly involved Twitter users (who spend an average of 2¾ hours per day on Twitter). ③ Over 80% of the respondents either mildly or strongly disagreed with the statement that “People who have a large number of followers are smarter than those who don’t.”

③



①

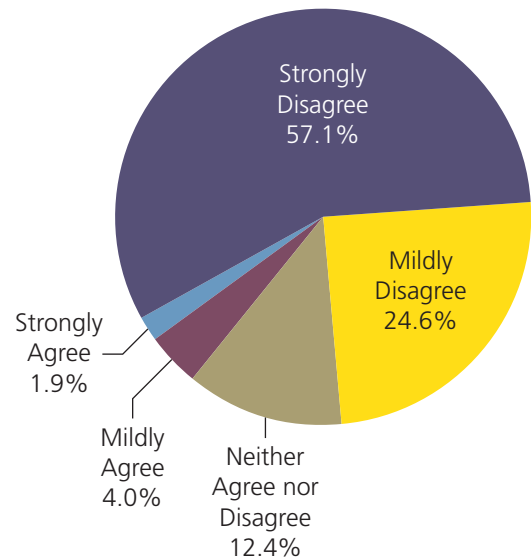
Remember, surveys often have more sentences than they have claims in the argument. This one is no exception since we will include the information about the survey in claim ③.

This passage contains an argument. The issue is whether Twitter users think that people with more followers are smarter. The conclusion is that Twitter users don’t think that people with more followers are smarter. The premise is that in a survey of 432 highly involved Twitter users, over 80% either mildly or strongly disagreed with the statement that “People who have a large number of followers are smarter than those who don’t.”

This argument is an inductive generalization. It is somewhat strong because the sample size is reasonably large. However, the sample is not random, and thus we must question whether those surveyed are more likely to have the feature than those left out of the survey.

### Large Twitter Following = Smart?

“People who have a large number of followers are smarter than those who don’t.”



## EXERCISE 10.13

Write a Complete Analysis Plus Evaluation for the following passages.

1. The United States is similar to ancient Rome. They are both the most powerful countries of their era, and they both have the rule of law. Since Rome controlled crime by public execution of criminals, the United States also could control crime by public execution of criminals.
2. The elections held in the Iraqi provinces that were randomly checked by U.N. election monitors have been deemed fair by those monitors. Consequently, the Iraqi elections were probably fair in all provinces.

3. No moral principle can be proved *a priori* because there can be no *a priori* proof that anything moves anything to act. And morals must move us to act.  
—David Hume, *A Treatise of Human Nature*
4. In 2008, several universities participated in a study in which 80 randomly selected new high school graduates were compared to another 82 students who served as the control group. The students who attended summer programs enrolled in college at a higher rate than the control group, they were more likely to attend a four-year school (41% compared to 26%), and they were more likely to enroll full-time (48% compared to 32% in the control group). This proves that the participants in the study are much more likely to enroll in college as a result of their participation in summer programs. Therefore, most students will benefit from summer programs run by their high schools that provide them with the information, skills, and support they need to succeed in college.—Karen Arnold et al., “The Summer Flood: The Invisible Gap Among Low-Income Students,” *Thought and Action*
5. If the government does not do something about white-collar crime, then we will not have a rebound in the stock market. Since the government will certainly be doing something about white-collar crime because Congress demands action, we can count on seeing the stock market rebound.
6. Infants can recognize human voices as early as 7 months of age. Researchers studied brain activity in 32 infants, half of whom were 4 months of age and the other half 7 months old. Researchers played different sounds, including human voices speaking nonsense languages, and brain activity suggested the 7-month-olds could distinguish the human voice from the other sounds, and the 4-month-olds could not.—*Neuron*
7. In the mountains, snow usually lingers on the ground for a longer time on north slopes than on the warmer south slopes. For this reason, ski runs are built facing north whenever possible.—C. Donald Ahrens, *Essentials of Meteorology*
8. Last year I had a patient a lot like you. Like you, she is a nonsmoker, a light drinker, a regular jogger, eats lots of fruit, watches her weight, and she’s only two years older than you. We caught her cancer at almost exactly the same stage as yours, and she went through precisely the same treatment program that you’ll be on. She made a complete recovery, so there’s a good reason to believe that you also have an excellent chance of recovery.
9. Among people who use multiple dietary supplements, fish oil/omega-3 supplements now top multivitamins in popularity, according to a recent survey by *ConsumerLab.com*. The survey is based on 6,012 responses collected in November from a sampling of subscribers to the *ConsumerLab.com* free e-newsletter. Fish oil/omega-3 supplements were used by 74% of respondents, followed in popularity by multivitamins, which were used by 72%.—*ConsumerLab.com*
10. If any lies, like other sins, steal upon us, they should seek not to be justified but to be pardoned.—St. Augustine, “On Lying”
11. Autistic children are occasionally helped by aversive therapy. But aversive therapy is sometimes inhumane. Thus, autistic children are sometimes helped by inhumane treatment.
12. Since the sixteenth century, opium had been produced in India and carried by Dutch, and later, British traders. In fact, opium (derived from the poppy plant) was one of the very few commodities that Europeans could sell in China, and

for this reason it became crucial to the balance of East-West trade.—Coffin and Stacey, *Western Civilizations*

13. The art critic Felicia Cummings gave some good reasons that investing in local artists is a wise financial investment, but her so-called “investment advice” is financially unsound. One of her former employees told the newspaper that Ms. Cummings doesn’t own a single painting by a local artist.
  14. Anything will give up its secrets if you love it enough. Not only have I found that when I talk to the little flower or to the little peanut they will give up their secrets, but I have found that when I silently commune with people they give up their secrets also, if you love them enough.—George Washington Carver
  15. The life in us is like the water in a river. It may rise this year higher than man has ever known it, and flood the parched uplands.—Henry David Thoreau, *Walden*
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### Chapter Review Questions

1. Define general claim.
2. Define inductive generalization.
3. Which part of the argument contains the sample?
4. Which part of the argument contains the target?
5. What is the relation between the sample and the target in an inductive generalization?
6. If the conclusion is “78% of CSU undergraduates are right-handed,” what is the target?
7. What terms are used to evaluate inductive generalizations?
8. How do you determine whether the sample is representative of the target?
9. What makes a generalization biased?
10. What is a hasty generalization?

## CHAPTER 11

# Evaluating Causal Arguments

Researchers examine a dead whale beached in the Bahamas. Autopsies suggest a possible link between U.S. Navy anti-submarine sonar and ear hemorrhages that disoriented the whale.

Causal arguments are the final kind of argument you will learn to evaluate in this book. These arguments and the reasoning they employ are frequently used in solving everyday problems, as well as in scientific and legal reasoning. Consider the following example.

*In 2000, 17 whales of four different species were stranded on a beach in the Bahamas. Seven of the animals are known to have died, and ten other animals were returned to the water alive. Studies of the dead animals showed some sort of acoustic, or impulse trauma. Based on the way in which the strandings coincided with ongoing naval activity involving tactical mid-range frequency sonar use in terms of both time and geography and the absence of any other acoustic sources, the investigation team concludes that tactical mid-range frequency sonars aboard U.S. Navy ships that were in use during the sonar exercise were the most plausible source of this acoustic or impulse trauma.—Joint Interim Report, Bahamas Marine Mammal Stranding, Event of 15–16 March 2000<sup>1</sup>*

Using the skills you learned in Chapter 6, you can recognize this as an inductive causal argument. The argument uses inductive reasoning because the arguer attempts to show that the truth of the conclusion probably follows from the truth of the premises. Moreover, the argument is causal because the conclusion is a causal claim. In this chapter, you will learn how to recognize, analyze, and evaluate causal arguments. Just as with the other two inductive arguments you have learned about in this text—analogue arguments and inductive generalizations—you will discover that all causal arguments share a basic underlying structure. After a brief review of how to recognize causal arguments, you will practice analyzing and identifying the core features of these arguments.

<sup>1</sup> [http://www.nmfs.noaa.gov/pr/pdfs/health/stranding\\_bahamas2000.pdf](http://www.nmfs.noaa.gov/pr/pdfs/health/stranding_bahamas2000.pdf)



Then, you will learn how to determine which causal arguments should convince and which should not.

## Recognizing Causal Arguments

Because a **causal argument** is an inductive argument that provides evidence to prove that a causal claim is true, the conclusion of every causal argument will be a causal claim. A **causal claim** is a statement indicating a causal relationship between one event and another. The following are some examples of causal claims.

*The cause of Jacob's high fever was H1N1.*

*Your sore back is the result of incorrect lifting.*

*Increased regulation of banks will prevent future economic disasters.*

Even though these claims differ in content and style, they all are causal. The first claim states that Jacob's high fever was *caused* by H1N1. Even though we often speak about causes in this fashion, as if an object can cause something to happen, such language is actually inaccurate and misleading. Causes and effects are not objects, but *events*. Therefore, the first claim should be understood as expressing the claim that Jacob's *having* a high fever was *caused* by *contracting* H1N1. The second claim, then, states that your back being sore was *caused* by lifting incorrectly. In the third claim, the causal relation is stated in terms of one event being prevented by another, yet speaking about *prevention* is still a way of making a *causal* claim. So, the third claim indicates that avoiding future economic disasters is *caused* by increased bank regulation. When you analyze causal arguments, remember that your statement of the causal claim should always be phrased in terms of events.

### EXERCISE 11.1

**Your Turn!** Restate the following causal claim in the form of one event being caused by another event.

*Tactical mid-range frequency sonars aboard U.S. Navy ships that were in use during the sonar exercise were the most plausible source of the acoustic or impulse trauma to the injured whales.*



### EXERCISE 11.2

Determine which of the following are causal claims. Then restate the claim in the form of one event being caused by another event.

1. I have a headache from watching too much television.
2. Too many pesticides will render the water non-potable.
3. Disneyland is the happiest place on Earth.
4. After I painted that foul-tasting polish on my daughter's fingernails, she stopped biting them.

5. Most of my professors wear glasses.
6. The root cause of homelessness is poverty.
7. The coffee tastes better after I clean the coffee pot.
8. Cheaper house prices are the result of the record-high loan default rates.
9. The next philosophy class is like the previous philosophy classes.
10. Updating your antivirus software prevented your computer from getting the latest computer virus.

To recognize a causal argument, make sure that the argument is inductive, then look for a causal claim in the conclusion. Consider the following.

*I failed my Geology midterm. My professor doesn't like me, so that must be the cause of my failing the test.*

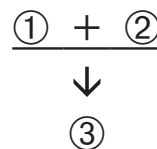
Let's first identify the premises and conclusions using a Formal Analysis.

**P1:** I failed my Geology midterm.  
**P2:** My professor doesn't like me.  
**∴** My teacher not liking me caused me to fail the Geology midterm.

**Issue:** Whether my teacher not liking me caused me to fail the Geology midterm

In this example, even though the conclusion is preceded with *that must be* the cause, it is possible that the reason I failed the Geology midterm was something besides the professor not liking me. For instance, I might not have studied enough or the test may have been different than I expected. As you may remember from Chapter 6, arguers sometimes deceptively use deductive argument indicators in inductive arguments to make the conclusion appear more certain. So, the argument is an *inductive* one, since the truth of the premises makes the truth of the conclusion at best only probable, not necessary. Further, you can identify the argument as an inductive *causal* argument because the conclusion is a causal claim. It states that my failing the Geology test was *caused* by the teacher's not liking me. Finally, you can represent the structure of this argument using an argument diagram.

① *I failed my Geology midterm.* ② *My teacher doesn't like me, so* ③ *that must be the cause of my failing the test.*



Consider another example of a causal argument, this one from a scientific study.

*In a recent study, rats that were fed bacon, sausage, cheesecake, frosting, and other fattening foods became compulsive eaters. The high-fat, high-calorie food*



*must have been the cause, since of the three groups of rats in the study, only the ones fed the fattening diet ate compulsively.*

Here's the Formal Analysis of the argument.

- P1:** In a recent study, rats that were fed bacon, sausage, cheesecake, frosting, and other fattening foods became compulsive eaters.
- P2:** Of the three groups of rats in the study, only the ones fed the fattening diet ate compulsively.
- 
- ∴** Being fed high-fat, high-calorie food was the cause of the compulsive eating by the rats in the study.
- Issue:** Whether being fed high-fat, high-calorie food was the cause of the compulsive eating by the rats in the study

### EXERCISE 11.3

**Your Turn!** Diagram the previous argument.



### EXERCISE 11.4

Present a Formal Analysis of each of the following causal arguments. Then diagram the argument.

1. You say you've had insomnia the last three nights, and each of those three nights you drank coffee after dinner. It seems likely, then, that the coffee is what kept you awake.
2. I run the mile almost 10 seconds faster than my teammate. Since I do weight training every day and she doesn't, that is probably the reason I'm faster than she is.
3. The bugs that were eating the spinach in my garden have disappeared. Given that I surrounded my garden with marigolds, the marigolds must have caused the bugs to disappear.
4. Fewer fish are being caught in Miller Lake than used to be the case just a year ago. The likely cause is pollution from the nearby sewage treatment plant, which began operations just this last year.
5. Newspaper prices have gone up in Los Angeles, Salt Lake City, and Dallas. Because the common step taken by the major newspapers in all three cities is that they recently negotiated a higher salary package for their reporters and editors, the price increase must be caused by that extra cost to the papers.
6. It's likely that the clam chowder caused my two friends and I to get sick last night. This is because we all got sick after eating dinner together, and we all ate the clam chowder.
7. My dogs all started scratching yesterday morning. Their itching must be caused by fleas, since it's the only thing I can think of that would cause them all to itch so badly.



8. My car's battery was dead this morning. Since I had a car radio installed yesterday afternoon, the car radio installation must have caused the battery to die.
9. Tax increases last year led to an increased number of scofflaws, who don't pay taxes. The IRS reported a higher-than-usual number of people not paying their taxes last year, and this was the first year in a decade that taxes were increased.
10. Most of the small towns in the Owens Valley area have reported that their populations have decreased since the last census. Since seismic activity has been particularly heavy over that decade, it's likely that people are leaving the area for fear of earthquakes.

## Analyzing Causal Arguments

You may have noticed a similar pattern in all of the causal arguments you analyzed in the preceding exercise. Each contains two premises supporting a conclusion. We call this causal argument pattern the general form of the argument. Although some causal arguments may appear to be somewhat different from these examples, every causal argument can be analyzed into this general form.

- P1:** Some (resulting) event occurred.  
**P2:** Some (precipitating) event preceded it.  
**∴** The resulting event was caused by the precipitating event.

Here's the pattern shown in one of the examples from the previous section.

- P1:** I failed my Geology midterm. (resulting event)  
**P2:** My professor doesn't like me. (precipitating event)  
**∴** My failing the Geology midterm (resulting event) was caused by my teacher not liking me (precipitating event).

In this pattern you can identify the two events that the arguer concludes are causally related. We identify these events as the *resulting event* and the *precipitating event*. The **resulting event** is the event that the arguer knows has occurred, and for which he or she infers the cause. The **precipitating event** is the event that the arguer knows has occurred *prior* to the resulting event, and that he or she suspects is the cause of that resulting event.

- Resulting event:** my failing the Geology midterm  
**Precipitating event:** my professor not liking me



**Hint!** Although it might seem more natural to speak about these events as the effect and the cause, our analysis cannot assume what the argument is trying to prove, namely that one is in fact the cause of the other. For this reason we employ the terms precipitating event and resulting event, rather than cause and effect.

Although all causal arguments will identify a precipitating event among their premises, they can provide evidence that this event is the cause of the resulting event in many different ways. Nineteenth-century British philosopher John Stuart Mill identified and categorized five different methods of reasoning in causal arguments, collectively known as Mill's Methods. Two of the most commonly used of these methods are the method of agreement and the method of difference. When analyzing causal arguments, you should add the identification of the method to your identification of the resulting event and precipitating event.

First consider an example of a causal argument that utilizes the method of agreement.

*It's likely that the clam chowder caused my two friends and I to get sick last night. This is because we all got sick after eating dinner together, and we all ate clam chowder.*

Here's the argument presented in the general form with the resulting event (R) and precipitating event (P) identified.

- P1:** My two friends and I got sick after eating dinner together last night. (R)  
**P2:** My two friends and I ate clam chowder. (P)  
**∴** My two friends and I getting sick after eating dinner together last night (R) was caused by our eating clam chowder (P).  
**R:** my two friends and I being sick last night  
**P:** eating clam chowder

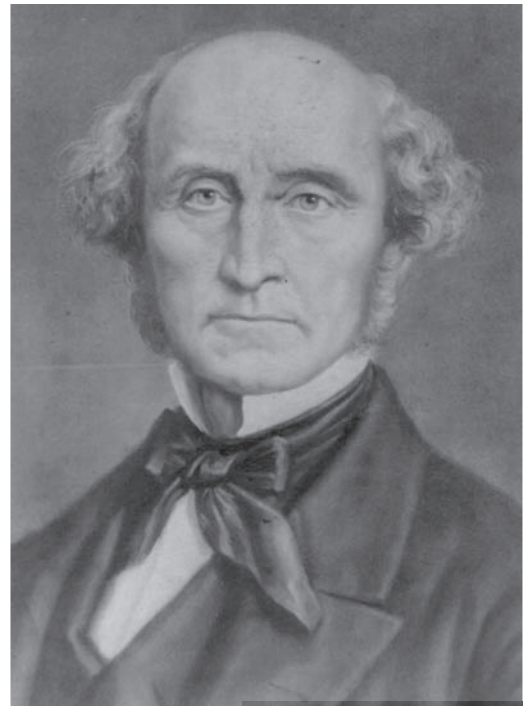
Next, you should identify the method the arguer uses to support the causal claim in the conclusion. To do this, consider why the arguer suspects that eating clam chowder is the cause of the sickness. It is not only because it occurred prior to the resulting event, but also because it is an event *in common* among everyone who experienced the resulting event. This method of causal reasoning is called the **method of agreement**. We should add the identification of the method to our analysis, as shown.

- M:** agreement

A second way that arguers may attempt to support a causal claim is by singling out the factor that is different between the occurrence and non-occurrence of the resulting event. The reasoning here is that whatever factor is different between the times the resulting event happened and the times it did not is likely to be the cause of the resulting event. Let's look at an example of this method of causal reasoning from the previous exercise.

*My car's battery was dead this morning. Since I had a car radio installed yesterday afternoon, the car radio installation must have caused the battery to die.*

Here is the Formal Analysis of the argument with the resulting event and precipitating event identified afterward.



British philosopher and social reformer, John Stuart Mill (1806–73).

- P1:** The car battery was dead this morning.  
**P2:** I had a car radio installed yesterday afternoon.  
 $\therefore$  Installing a car radio yesterday afternoon caused the car battery to die.

**Issue:** Whether installing a car radio yesterday afternoon caused the car battery to die

- R:** my car's battery being dead  
**P:** installing a car radio

Notice that the premises in this causal argument support the conclusion in a different manner than in the previous example. Instead of having multiple instances of the resulting event as we saw in the previous argument, only one instance of the resulting event is given. This means that the resulting event is something different, possibly caused by the introduction of the precipitating event. Rather than identifying what all cases of the resulting event have in common this argument identifies what is *different* between the occurrence of the resulting event and times when it doesn't occur. In this example, the argument identifies the installation of the car radio as the difference between the occurrence of the resulting event (the car battery being dead) and its non-occurrence (the battery working). This method of causal reasoning is called the **method of difference**, and you should add it to your analysis.

- M:** difference

### EXERCISE 11.5



**Your Turn!** State the precipitating event, the resulting event, and the method for all of the arguments in Exercise 11.4.

Knowing the general form of causal arguments can help you identify when causal arguments are presented with subarguments or extra claims. For example, causal arguments often contain subarguments to support the isolation of the precipitating event from other possible causes. Consider this one.

*The coffee this morning tasted terrible. It must have been caused by using tap water, since that was the only thing different from the way I usually make coffee. I used the same beans, the same coffee maker, and the same filter.*

Here is the Formal Analysis of the causal argument with the resulting event, precipitating event, and method of causal reasoning identified.

- P1:** The coffee this morning tasted terrible.  
**P2:** Using tap water was the only thing different from the way I usually make coffee.  
 $\therefore$  The cause of the terrible tasting coffee must have been using tap water.

**Issue:** Whether the cause of the terrible tasting coffee must have been using tap water

- R:** the coffee tasting terrible  
**P:** brewing the coffee with tap water  
**M:** difference

What role does the fourth sentence play in the passage, namely that “I used the same beans, the same coffee maker, and the same filter”? It supports the premise that singles out the precipitating event, namely that the tap water is the only difference between the occurrence of the resulting event and its non-occurrence. That means the argument has a subargument. In this case, the fourth sentence in the passage is supporting the second premise in the argument. So, the subargument looks like this.

- P1:** I used the same beans as usual to make today's coffee.  
**P2:** I used the same coffee maker as usual to make today's coffee.  
**P3:** I used the same filter as usual to make today's coffee.  
 $\therefore$  Using tap water was the only thing different from the way I usually make coffee.

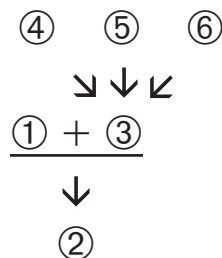
### EXERCISE 11.6

**Your Turn!** Write out the entire Formal Analysis in the proper order with the issue included.



Now, let's diagram the argument.

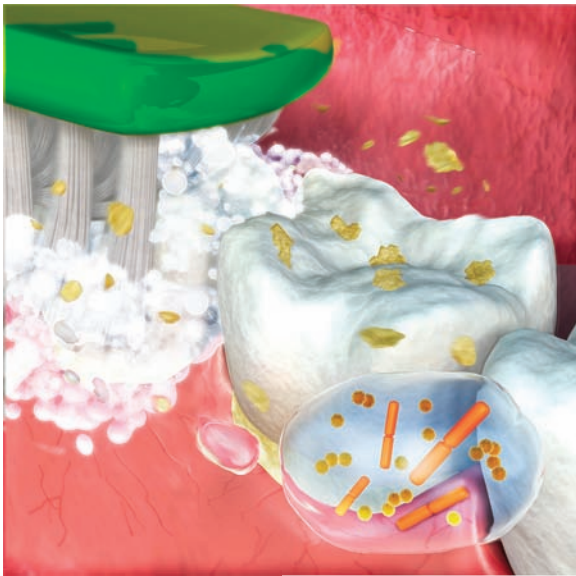
① *The coffee this morning tasted terrible.* ② *It must have been caused by using tap water, since* ③ *that was the only thing different from the way I usually make coffee.* ④ *I used the same beans,* ⑤ *the same coffee maker, and* ⑥ *the same filter.*



### EXERCISE 11.7

**Your Turn!** Provide a Formal Analysis and diagram of the causal argument about whales that began this chapter. Then identify the resulting event, precipitating event, and method of causal reasoning.





What messages does this digital illustration convey?

Causal arguments are often used in clinical studies in a particular way. Clinical studies conclude that some causal claim is true by conducting experiments involving two groups, an experimental group and a control group. The difference between them is that only the experimental group experiences the precipitating event. When the resulting event occurs more often in the experimental group than in the control group, the researchers conclude that the two events are causally related. Then, the researchers generalize from the sample (the experimental and control groups) that participated in the study to an appropriate target population. Thus, the causal argument serves only as a subargument supporting an inductive generalization.

Here's an example of such use of a causal argument.

*Brushing your teeth after each meal helps prevent cavities. A study in New Mexico found that 25% of a group of 40 young people who brushed their teeth after each meal had no cavities compared to 10% of the 35 young people who only brushed in the morning and at night. The only difference between the groups was the number of times they brushed each day.*

### EXERCISE 11.8



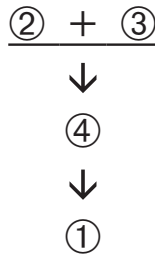
**Your Turn!** Identify the experimental group and the control group in this clinical study.

First, underline and number each claim given in the argument.

① Brushing your teeth after each meal helps prevent cavities. ② A study in New Mexico found that 25% of a group of 40 young people who brushed their teeth after each meal had no cavities compared to 10% of the 35 young people who only brushed in the morning and at night. ③ The only difference between the groups was the number of times they brushed each day.

The first claim is the main conclusion of the argument. Notice that it is a causal claim about teeth brushing preventing cavities, but it's not a causal claim about the young people actually observed. Instead, it generalizes from that sample group to the target of all young people. Therefore, since the conclusion is a general claim, the argument is an inductive generalization. The information in the claims about the study, claim ② and claim ③, actually imply a conclusion. To diagram the argument, then, you must supply this missing conclusion as claim ④. It serves as both the conclusion of the subargument and as a premise in the main argument.

④ Brushing teeth after each meal helped prevent cavities in the young people who took part in this New Mexico study.



Here is the entire argument set out in a Formal Analysis.

- P1:** A study in New Mexico found that 25% of a group of 40 young people who brushed their teeth after each meal had no cavities compared to 10% of the 35 young people who only brushed in the morning and at night.
- P2:** The only difference between the two groups was the number of times they brushed each day.
- 
- ∴** Brushing teeth after each meal helps prevent cavities in the young people who took part in the study in New Mexico.
- 
- P:** Brushing teeth after each meal helps prevent cavities in the young people who took part in the study in New Mexico.
- 
- ∴** Brushing your teeth after each meal helps prevent cavities.

**Issue:** Whether brushing your teeth after each meal helps prevent cavities

From the Formal Analysis of the subargument, we can identify the resulting event, the precipitating event, and the method of reasoning used in the argument.

- R:** having fewer cavities  
**P:** brushing teeth  
**M:** difference

You can recognize this causal argument as a clinical study because of two things: First, it has two groups that illustrate the precipitating event and the non-occurrence of that event. Also, the causal claim in the conclusion is a general claim. That is, the researchers generalized from the two groups of young people (the sample) to the entire group of people (the target).

**Hint!** Clinical studies are chain arguments consisting of two different inductive arguments. The main one is an inductive generalization, and the subargument is causal. When you evaluate these arguments, you do so as you would any chain argument, by evaluating the main argument only. Thus, in the case of clinical studies, you evaluate the inductive generalization. (See Chapter 10.)



## EXERCISE 11.9

Provide a Formal Analysis and diagram of each of the following passages. Then, identify the resulting event, precipitating event, and method of reasoning.

1. An inadequate job of soil compaction for the Rancho Estates housing development must be causing the cracking of the concrete sidewalks and driveways. This is because the sidewalks and driveways have started cracking in Rancho Estates, and compacting of the soil is the only difference between the work done there and that done in the nearby Prairie View development, where no cracking occurred. The concrete work for both developments was performed by the same contractor.
2. Beginning this week, my sister started sneezing the minute she walked in my door. Given that the only thing that is different in my apartment is that I got a kitten, she must be allergic to the cat. I don't have any flowers in the house, the house is not dustier than usual, and I don't use air fresheners or other deodorizers.
3. Traffic is heavier on Milton Avenue since the beginning of the month. Since the road department finished widening the road right about that time, it's probably responsible for the extra traffic.
4. My three siblings and I are all adopted, and yet we all are unusually meticulous about keeping our apartments clean and extremely tidy. Given that we were all raised in the same household, we must have learned that behavior from observing our adoptive parents, who were also very meticulous and tidy.
5. An outbreak of salmonella poisoning occurred at the hospital. It must have been caused by eating eggs from a shipment that had gone bad because the only thing the patients had in common was eating custard pudding (which has eggs in it) for dessert. One of the patients had tuna salad, another had soup, and the third had meat loaf and mashed potatoes.
6. In three major metropolitan areas in the Northeast, mandatory waiting periods for handgun purchases were signed into law last year. Since then, homicide rates dropped by an average of 15%. It is reasonable to conclude that waiting periods for handgun purchases reduce homicides.
7. People who have big smiles live longer. Researchers examined the smiles from photos of 230 baseball players who began playing professional baseball prior to 1950. The smiles were rated for intensity, and then compared with data from deaths that occurred between 2006 and 2009. Some players lived an average of 72.9 years while others lived an average of 79.9 years. Given that the only thing that differentiates those players who lived longer from those who did not is their smiles, their longer lives must have been caused by their larger smiles.—*Psychological Science*
8. HIV is thought to have evolved from a simian virus found in African chimpanzees in the early 1930s. However, the virus spread very slowly until the middle of the 1950s, when it began to spread rapidly. One important change took place about that time, namely the smallpox vaccine was withdrawn. It could have been helping to prevent the spread of the virus.
9. That old Native American cure for poison oak—covering the blistered area in a paste made from soaked and cooked acorns—is clearly effective. While hiking



yesterday, you brushed up against some poison oak, and your blisters have shrunk considerably since you began putting on the acorn paste.

10. Since Alex Rodriguez was sidelined two weeks ago with a sprained ankle, the Yankees have fallen from first place, losing five of their last eight games. The only difference in the lineup is Rodriguez. They have the same exact infield and outfield from the previous month when they were winning 60% of their games. Also, the pitchers are all healthy and rotating as usual. This just shows that Rodriguez is the one who makes the Yankees win.

## Evaluating Causal Arguments

Since causal arguments are inductive, they are evaluated using the terms appropriate to inductive arguments. As you remember, an inductive argument is strong when its premises, if true, would probably make the conclusion true. So, judgments about a causal argument's structure will be made in terms of the argument's strength.

To determine whether or not a causal argument is strong, you must focus on how well the arguer demonstrates that the precipitating event is *the only reasonable cause* of the resulting event. For causal arguments that utilize the method of agreement, this means that you will evaluate the evidence that the precipitating event is *the only common* event that could cause the resulting event. And, for causal arguments that utilize the method of difference, you will evaluate the evidence that the precipitating event is *the only different* event that could cause the resulting event.

**Hint!** Many of the causal arguments you encounter in your life involve multiple precipitating events that serve as contributing factors to the resulting event or situations in which the full range of contributing causes is unknown. In this chapter's exercises, you do not need to distinguish between precipitating events that may produce a particular resulting event on their own and those which are only part of a more complex causal process.



When an arguer presents a causal argument without offering any evidence that the precipitating event is the only reasonable cause of the resulting event, the argument is known as a **post hoc ergo propter hoc** (post hoc, for short) argument. The name is Latin for “after this, therefore, because of this.” The mistake in this case is that the arguer concludes that one event was caused by another simply because one preceded the other. However, without considering whether the order of events is simply coincidence, whether both resulting and precipitating events are a result of some other event, or whether there is another event that could be more reasonably considered the cause, the arguer has unjustifiably jumped to a conclusion.

Here is an example of a post hoc causal argument.

*The coffee this morning tasted terrible. It must have been caused by using tap water, since that was different from the way I usually make coffee.*



To evaluate this argument, first analyze it.

- P1:** The coffee this morning tasted terrible.  
**P2:** Using tap water was different from the way I usually make coffee.  
**∴** The cause of this morning's coffee tasting terrible must have been using tap water.
- Issue:** Whether the cause of this morning's coffee tasting terrible must have been using tap water
- R:** the coffee tasting terrible  
**P:** brewing the coffee with tap water  
**M:** difference

Of course, it is *logically* possible that using tap water to make coffee causes the coffee to taste terrible. Notice, however, that the arguer neither claims nor provides evidence that using tap water is the only reasonable cause of the bad taste. Instead, he or she only shows that one event preceded the other. Perhaps the bad taste is a result of using stale coffee beans, or a dirty coffee pot, or drinking from a plastic cup that has affected the flavor of the coffee. Without any evidence that the two events are causally related, the arguer has not given us good reasons to accept the conclusion that the coffee tasting terrible is caused by brewing the coffee with tap water.

Let's now look at a better version of that argument.

*The coffee this morning tasted terrible. It must have been caused by using tap water, since that was the only difference from the way I usually make coffee.*

Again, the first step is a Formal Analysis.

- P1:** The coffee this morning tasted terrible.  
**P2:** Using tap water was the only difference from the way I usually make coffee.  
**∴** The cause of this morning's coffee tasting terrible must have been using tap water.
- Issue:** Whether the cause of this morning's coffee tasting terrible must have been using tap water
- R:** the coffee tasting terrible  
**P:** brewing the coffee with tap water  
**M:** difference

Notice that what has changed in this version of the argument is the second premise. In the post hoc version, the arguer identifies using tap water as *a* difference from the way he or she usually makes coffee, whereas in the second version identifies using tap water as the *only* difference from the way he or she usually makes coffee. This second argument is stronger than the previous one, because if the premises were true—that the coffee tasted terrible and that the tap water was the only thing different—then the conclusion is likely to be true.

Finally, let's consider an even stronger version of the argument. This one does not simply assert that the only difference is that tap water was used to make the coffee, but it also contains a subargument with premises to support that claim.

*The coffee this morning tasted terrible. It must have been caused by using tap water, since that was the only difference from the way I usually make coffee. I used the same beans, the same coffee maker, and the same filter.*

Here's the Formal Analysis.

- P1:** I used the same beans as usual to make today's coffee.  
**P2:** I used the same coffee maker as usual to make today's coffee.  
**P3:** I used the same filter as usual to make today's coffee.  
 $\therefore$  Tap water was the only difference from the way I usually make coffee.
- 
- P1:** The coffee this morning tasted terrible.  
**P2:** Using tap water was the only difference from the way I usually make coffee.  
 $\therefore$  The cause of the terrible tasting coffee must have been using tap water.
- Issue:** Whether the cause of the terrible tasting coffee must have been using tap water
- R:** the coffee tasting terrible  
**P:** brewing the coffee with tap water  
**M:** difference

Notice that this analysis begins with the subargument that provides *evidence* for the claim that using the tap water was the only difference between this morning's coffee and that of other mornings. This evidence rules out three other possible precipitating events, any one of which could reasonably be considered the cause of the resulting event. Since this third version of the argument provides evidence supporting the causal connection between the precipitating event and the resulting event, it is stronger than both of the previous arguments.

## EXERCISE 11.10

For each of the following pairs of causal arguments, determine which version of the argument, A or B, is stronger. Briefly explain why.

- A.** Your pack has a huge hole in it. It must be the scissors that caused it, since they are the only sharp things inside.

**B.** Your pack has a huge hole in it. It must be the scissors that caused it, since they are sharp.
- A.** The pizzas from Big John's have always been hot when they are delivered. However, the last two times they were barely warm when we got them. The new driver must not know his way around town.

**B.** The pizzas from Big John's have always been hot when they are delivered. However, the last two times they were barely warm when we got them. The only thing different is that they have a new driver, and he must not know his way around town. I was in the restaurant the other day and they certainly aren't busier than usual.

3. A. Four of the swimmers avoided the flu that was going around this summer. All four had the flu shots given out by the campus clinic, and that was the only preventative step they had in common. Three had been exposed to someone who was sick, two of them took vitamin C but the other two didn't, and only one of them eats a healthy diet.  
B. Four of the swimmers avoided the flu that was going around this summer. All four had the flu shots given out by the campus clinic, and that was the only preventative step they had in common.
4. A. Why did I do so badly on the midterm? The answer is simple. Yesterday I broke a mirror and that means seven years of bad luck. So it's obvious that my poor grade resulted from that broken mirror.  
B. Why did I do so badly on the midterm? The answer is simple. Yesterday I broke a mirror and that means seven years of bad luck. I studied just as hard as the previous exam, got a good night's sleep, and thought I really knew the material. So it's obvious that my poor grade resulted from that broken mirror.
5. A. Many people reported seeing flashing lights in the sky last night. Apparently, the sightings were caused by the car lot grand opening, since the only possible difference was that the business was shining search lights all night long. No airport is nearby, no fireworks were set off, and we're too far south for the Aurora Borealis.  
B. Many people reported seeing flashing lights in the sky last night. Apparently, the sightings were caused by the car lot grand opening, since the business was shining search lights all night long.
6. A. Did you hear that Simon left *American Idol*? Advertisers were complaining about his nasty comments, and that must be the cause of his dismissal.  
B. Did you hear that Simon left *American Idol*? The only plausible cause is that advertisers were complaining about his nasty comments, so that must be the cause of his dismissal.
7. A. India has experienced below-normal rainfall during the monsoon season for the last three years. Each time, the surface temperature of the Pacific Ocean off the coast of Latin America has been warmer than usual. Thus, the warmer ocean water off Latin America probably caused those occasions of below-normal rainfall in India during the monsoon season.  
B. India has experienced below-normal rainfall during the monsoon season for the last three years. Each time, the only relevant common characteristic is that the surface temperature of the Pacific Ocean off the coast of Latin America has been warmer than usual. Thus, the warmer ocean water off Latin America probably caused those occasions of below-normal rainfall in India during the monsoon season.
8. A. The residence hall suffered a serious fire last night. During the investigation of the tragedy, detectives found a short in the electrical system. Therefore, the fire was probably caused by a short in the new electrical system. The investigation ruled out other possible causes. There was no sign of arson, the heater was working fine, and smoking is not allowed in the building.  
B. The residence hall suffered a serious fire last night. During the investigation of the tragedy, detectives found a short in the electrical system. Therefore, the fire was probably caused by a short in the new electrical system. The investigation ruled out other possible causes.

9. A. Several children have recently visited the clinic complaining of severe headaches. They all live in apartments with chipped lead paint on the walls. We believe that the lead paint is causing their headaches.  
B. Several children have recently visited the clinic complaining of severe headaches. The only commonality with them is that they all live in apartments with chipped lead paint on the walls. We believe that the lead paint is causing their headaches.
10. A. Johnson won the sales award two times in the past year. The only event that preceded each of his wins was attending a seminar on promoting teamwork—otherwise, he had contacted his usual clients and done his usual follow-up calls. Apparently, these seminars work.  
B. Johnson won the sales award two times in the past year. The only event that preceded each of his wins was attending a seminar on promoting teamwork—otherwise, he had contacted his usual clients, attended the usual sales meetings, and done his usual follow-up calls. Apparently, these seminars work.

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### EXERCISE 11.11

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For each of the following causal arguments, determine whether the revised argument is stronger, weaker, or neither stronger nor weaker than the original. Briefly explain why.

1. Three members of the golf team have set personal records during the last month. Each of them has been spending extra hours at the putting green this month, so the extra work is likely to be the cause of their improved performances.
  - a. Suppose each member had begun working out at the weight room this month, too.
  - b. Suppose that only two of the members had been spending extra hours at the putting green this month.
  - c. Suppose the extra hours at the putting green are the only common precipitating event for the three of them.
  - d. Suppose that each of the members of the golf team has a different coach.
2. My younger brothers recently realized they could actually remember a couple of events that happened before they were born. Both of them were recently hypnotized, so that must be the cause of their new-found memories.
  - a. Suppose being hypnotized is the only thing that has recently happened to both of them.
  - b. Suppose that they both also underwent psychoanalysis.
  - c. Suppose that false memories, psychoanalysis, and hallucinations were all ruled out as possible precipitating events.
  - d. Suppose they each recently started learning French.
3. My car's battery was dead this morning. Since the only difference from when the battery was fine was having a car radio installed yesterday afternoon, the car radio installation must have caused the battery to die.
  - a. Suppose it rained today but yesterday it was sunny.
  - b. Suppose the interior lights were not left on last night.

- c. Suppose the car also had a new alternator installed yesterday.
- d. Suppose the car also had a new alternator installed two weeks ago.
- 4. It's likely that the clam chowder caused my two friends and I to get sick last night. This is because we all got sick after eating dinner together, and we all ate clam chowder.
  - a. Suppose the only food we ate in common was the clam chowder.
  - b. Suppose we all had different beverages with our meals.
  - c. Suppose that before we went to dinner, we visited a friend in the hospital.
  - d. Suppose we all used the same salt shaker to flavor our clam chowder.
- 5. Last year the county saw a reduction of 24% in the amount of solid waste material that was put into the county landfill. This means that the curbside recycling program, just instituted this year, is working.
  - a. Suppose in the past 10 months the county reduced garbage pickup to one can per week.
  - b. Suppose the county no longer accepts solid waste material from neighboring counties.
  - c. Suppose that the population of the county has decreased by 10%.
  - d. Suppose the population of the county has remained stable over the past year.

## Putting It All Together: A Complete Analysis Plus Evaluation

With the completion of this chapter, you have learned to recognize, analyze, and evaluate the structure of five different kinds of arguments, as well as detect arguments that commit fallacies. Let's now put this into a Complete Analysis Plus Evaluation.

### Directions for a Complete Analysis Plus Evaluation

In *paragraph form*, use complete sentences and proper English grammar and spelling to do the following:

**Step 1:** Write a Basic Analysis of the passage. (You may want to refer to the Directions for Basic Analysis, Chapter 3, page 49).

**Step 2:** If the passage contains an argument, determine whether the argument commits a fallacy. If it does, write a separate paragraph identifying the fallacy committed, and explaining how this fallacy is committed.

**Step 3:** If the argument does not commit a fallacy, diagram it and verify that the diagram is consistent with your Basic Analysis.

**Step 4:** In a separate paragraph, identify the kind of argument.

- ▲ If the argument is deductive, identify it as a categorical argument or a truth-functional argument.
- ▲ If the argument is inductive, identify it as an analogical argument, an inductive generalization, or a causal argument.

**Step 5:** Evaluate the argument.

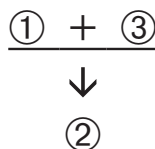
- ▲ If the argument is categorical, state the syllogism in standard form, and *demonstrate* whether the argument is valid or invalid using either a Venn diagram or the rules for valid syllogisms.
- ▲ If the argument is truth-functional, translate the argument, and *demonstrate* whether the argument is valid or invalid by identifying the argument form, using the truth table method, or using the shortcut method.
- ▲ If the argument is analogical, evaluate its strength by considering the evidence provided for the analogy and the relevance of the analogy to the feature.
- ▲ If the argument is an inductive generalization, then evaluate its strength by considering sample randomness and sample size.
- ▲ If the argument is a causal argument, evaluate its strength by considering the evidence that the precipitating event is *the only reasonable cause* of the resulting effect.

Here are some samples of a Complete Analysis plus Evaluation for a causal argument. After seeing how these are done, you will try some on your own.

*Wolf populations in the mountains of the western United States have increased in the last two decades. This result is most likely caused by the two decades of prohibition against hunting wolves, since that is the only significant difference between conditions now and conditions prior to the last two decades.*

First, identify the passage as an argument, explanation, or neither. This passage is an argument because it is trying to convince the reader that the wolf population increase was caused by the restrictions on hunting. Does it commit a fallacy? It does not. Since the phrase *is most likely* indicates that the argument utilizes inductive reasoning and the conclusion is a causal claim, we can recognize the argument as an inductive causal argument. Thus, we will analyze and evaluate the argument in this manner.

① **Wolf populations in the mountains of the western United States have increased in the last two decades.** ② **This result is most likely caused by the two decades of prohibition against hunting wolves, since** ③ **that is the only significant difference between conditions now and conditions prior to the last two decades.**



This passage contains an argument. The issue is whether the increased populations of wolves in the western United States are caused by the two decades of prohibition against hunting wolves. The conclusion is that the

increased populations of wolves in the western United States are caused by the two decades of prohibition against hunting wolves. The premises are that wolf populations in the mountains of the western United States have increased in the last two decades, and that the prohibition against hunting is the only significant difference between conditions now and conditions prior to the last two decades.

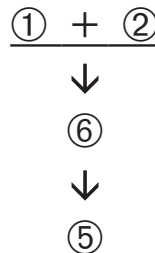
This argument is an inductive causal argument. It is a fairly strong argument because it states that the ban on hunting is the only reasonable cause of the increased wolf population.

Let's consider another example, this time one that is a clinical study.

*In a university study, 42 college students described themselves as regular binge drinkers and 53 students stated that they do not drink alcohol regularly. Of these, the binge drinkers performed significantly worse on a memory test while sober. For men, binge drinking is defined as having five or more alcoholic drinks during a two-hour period. For women, that number is four or more in that period of time. Researchers concluded that binge drinking may impair the brains of binge drinkers even when they are not drinking.*—Alcoholism: Clinical and Experimental Research

The final sentence of the passage is the conclusion, with the other claims intending to convince the reader of the truth of the conclusion. Thus, the passage is an argument. Does it commit a fallacy? It does not. Since the conclusion is not about the causal effects on the college students in the study, but rather the target (all people) of which the college students are a sample, this is a clinical study; the main argument will be an inductive generalization whereas the causal argument is a subargument. Here is the analysis and evaluation.

- ① *In a university study, 42 college students described themselves as regular binge drinkers and 53 students stated that they do not drink alcohol regularly.* ② *Of these, the binge drinkers performed significantly worse on a memory test while sober.* ③ *For men, binge drinking is defined as having five or more alcoholic drinks during a two-hour period.* ④ *For women, that number is four or more in that period of time. Researchers concluded that* ⑤ *binge drinking may impair the brains of binge drinkers even when they are not drinking.*  
 ⑥ Binge drinking impaired the brains of the 42 students in the study who described themselves as regular binge drinkers.



This passage from *Alcoholism: Clinical and Experimental Research* contains an argument. The issue is whether binge drinking may impair the brains of binge drinkers even when they are not drinking. The conclusion is that binge drinking may impair the brains of binge drinkers even when they are not drinking. The premise is that binge drinking impaired the brains of the 42 students in the study who described themselves as regular binge drinkers.

This argument contains a subargument. The intermediate conclusion is that binge drinking impaired the brains of the 42 students in the study who described themselves as regular binge drinkers. The first premise is that 42 college students described themselves as regular binge drinkers and 53 students stated that they do not drink alcohol regularly. The second premise is that the binge drinkers performed significantly worse on a memory test while sober than the non-drinkers.

The main argument is an inductive generalization. The argument is somewhat strong, since the sample size of 95 students is reasonably large. The argument does not identify how the participants were selected or their gender percentages, thus we cannot determine whether the sample was random.

Notice that the causal argument is not evaluated because it is not the main argument. Also, claims ③ and ④—defining what is meant by binge drinking for men and for women—are extra claims, and so are not included in the analysis. This is because these claims are neither premises nor conclusions; they only clarify what qualifies as binge drinking.

## EXERCISE 11.12

Write a Complete Analysis plus Evaluation for the following passages.

1. A recent study suggests that depression causes employees to have problems at work. Researchers compared 286 depressed workers with 193 others who were not depressed. Since only the depressed workers had such problems as fatigue, lack of motivation, and trouble managing their usual workload, researchers concluded that depression was the cause of their problems at work.—*American Journal of Health Promotion*
2. If the demands of justice can be assessed only with the help of public reasoning, and if public reasoning is constitutively related to the idea of democracy, then there is an intimate connection between justice and democracy.—Amartya Sen, *The Idea of Justice*
3. Shows like *Survivor* are alluring precisely because they mirror the ancient struggles within our minds and among our peers.—Christakis and Fowler, *Connected*
4. Since many art majors are creative artists, and no creative artists need to learn the history of art, it makes sense that not all art majors need to learn the history of art.
5. Middle-aged and older women who have migraines and who experience auras (e.g., flashing lights that might signal the onset of pain) appear to have a higher risk of strokes and heart attacks than their migraine-free



peers, a new study suggests. The study looked at 27,798 female health professionals ages 45 and older, including 3,568 who had migraines. It showed that women with weekly migraines with auras were four times as likely to have had a stroke during the 12-year study as women without migraines.—*Neurology*

6. Many bloggers have argued recently that obesity is a major cause of premature death. But no one can live forever. Therefore, we needn't be bothered about whether obesity is a major cause of premature death.
  7. Our team lost the game last night, and I have figured out the cause. I didn't wear my lucky socks.
  8. The lawmakers in this country clearly are not interested in protecting our children from harmful advertising on television. I say this because if they were interested in protecting children, then legislation limiting advertising aimed at children would be enacted into law, and that just isn't going to happen. Why not? Because advertising lobbyists have been spending freely to persuade your government representatives to kill the legislation.
  9. Because in India girls traditionally do not receive an inheritance on the death of their parents, the dowry is considered an "up front" payment of a potential inheritance.—John Weeks, *Population: An Introduction to Concepts and Issues*
  10. If mine safety is really important to the people in this country, then they would be putting constant pressure on their elected officials to strengthen the power of regulatory agencies to close down mines with serious safety infractions. Since this doesn't seem to be happening, people must not be very concerned about mine safety.
  11. When I went hiking last weekend, I saw hundreds of dead bees lying on the trails. I bet they died from PFOA or perfluorooctanoic acid poisoning, since a new plastics manufacturing plant was built upwind last year.
  12. The "two meals for the price of one" program we tried out in two of our restaurants this spring has been a huge success. Therefore, this is bound to be a great success when we launch the program for all restaurants this fall.
  13. Did you realize that teaching in college is quite similar to teaching in high school? Teachers in college face many of the same problems with students who learn in different ways as do teachers in high school. So, since high school teachers benefit from learning a variety of teaching strategies to reach students who learn in different ways, college teachers likewise would benefit from learning a variety of teaching strategies, too.
  14. If there ever was in the history of humanity an enemy who was truly universal, an enemy whose acts and moves trouble the entire world, threaten the entire world, attack the entire world in any way or another, that real and really universal enemy is precisely Yankee imperialism.—Fidel Castro
  15. Rising unemployment is resulting in a crime wave in our county. The police department reported that violent crime has risen 6% since last year, whereas property crimes are up nearly 12%. The only thing different is that unemployment is up by two full percentage points over last year.
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### Chapter Review Questions

1. How can you recognize that an argument is a causal argument?
2. What is a causal claim?
3. What is the difference between a precipitating event and a resulting event?
4. What are the two methods of causal reasoning described in this chapter?
5. How does a clinical study utilize causal reasoning?
6. What terms are used for evaluating inductive arguments?
7. What goes wrong in a “post hoc ergo propter hoc” causal argument?
8. How do you determine whether a causal argument is strong?

## CHAPTER 12

# Constructing Arguments

At some point during your college studies, an instructor will give you an assignment to write an argumentative essay. Let's suppose that, while trying to think of an appropriate topic, you come across a Facebook entry about a movement aiming to make your campus smoke-free, like the one presented at the beginning of this book.



**Sara says** Hey people! Check out this link! We should definitely start this campaign on our campus...



**Smoke-Free Campus** The Smoke-Free Campus Initiative aims to promote a clean, safe, and healthy campus environment by eliminating smoking from college campuses...

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You think that this issue is certainly controversial and also something about which you have a strong opinion. In fact, you are tempted to participate in the debate online. Choosing this topic for your essay will allow you to think through the issue in a more organized fashion, create an essay for your assignment, and contribute to the online debate. But how should you go about developing an argument?

The overarching skills you have practiced and learned in this book—recognizing, analyzing, and evaluating arguments—will help you develop good arguments of your own, whether you want to join in an online debate, support your position in a conversation with friends or classmates, or successfully write an argumentative essay. Even though the arguments you construct in these three contexts most likely will differ in style and length, each requires the same foundational critical thinking tools that you have acquired in the preceding chapters. However, instead of identifying an argument's premises and conclusions and judging how much support the conclusion is given, you

will be defending a conclusion by providing relevant premises that support it. To use the formal terms from Bloom's Taxonomy, you will be synthesizing rather than analyzing.

Good writing is a process, which typically requires prewriting, writing, and revision. In this chapter, we do not provide instructions for improving your writing skills. Instead, we help you use the critical thinking skills which you have learned in this text in order to produce a logically convincing argument or argumentative essay. Even though an argumentative essay is generally longer and more formal than arguments you might post online or present to friends or classmates, the basic steps you will learn in this chapter can be applied to a wide range of argumentative writing formats.

## Formulating Your Argument

In your writing or composition classes, you may have learned some prewriting techniques to help you generate ideas about your topic. One that may be useful for your argumentative essay is brainstorming. When you **brainstorm**, you write down as many ideas as you can that relate to the issue you have chosen to write about. Just think about the issue and write down any ideas that might be relevant to your argument. Don't worry about the form of the ideas or how well they might work for your essay. The purpose of the exercise is simply to engage your mind and start collecting ideas you may have.

### EXERCISE 12.1

**Your Turn!** Brainstorm at least five ideas for and five ideas against a campus-wide smoking ban.



Once you have generated some ideas through prewriting, you will need to examine them to decide which will be most convincing in your essay. Remember, as you learned in Chapter 2, an argument's purpose is to persuade the reader or listener of the truth of your conclusion, so you must be sure that you understand the issue, that your conclusion is clearly stated and completely addresses the issue, and that your premises support your conclusion as clearly and forcefully as possible. When your reader needs convincing, you cannot expect that he or she will readily agree with you; instead, you should construct your argument as if the reader's opinion opposes your own. What will convince him or her? Only clearly stated reasons relevant to the conclusion you are putting forward will be convincing.

Let's suppose that you have decided to argue in favor of the Smoke-Free Campus Initiative. What kinds of reasons can you offer to support this view? As you assemble reasons that will best convince someone who is not already inclined to accept your position, make sure that you do not utilize fallacious reasoning. First, when stating a premise, do not give a claim that simply restates the conclusion, as in the following example.

*We should ban smoking on campus because smoking on campus should be prohibited.*

As you learned in Chapter 5, to say that “some claim is true because that claim is true” is to commit the fallacy of begging the question. No one who didn’t already accept the conclusion would accept this premise.

Second, do not shift the burden of proof, as in the following example.

*We should ban smoking on campus. This is because no one has given a good reason to believe that we shouldn’t.*

This argument commits the fallacy of appeal to ignorance because, rather than offering reasons to accept the conclusion, the arguer illegitimately shifts the burden of proof to his or her opponent. If you want to convince someone that your conclusion is true, you must provide reasons for that conclusion rather than expect your opponent to do all the work.

Finally, make sure that the premises you provide are relevant to the conclusion they are intended to support. Consider the following example.

*We should ban smoking on campus. After all, tobacco companies use deceptive marketing tactics targeted to young people in order to manipulate them into becoming lifelong smokers. And, for what? Pure profit!*

Although the premises in this argument may support penalizing tobacco companies for their social irresponsibility, they do not support the stated conclusion, namely that we should ban smoking on campus. In this way, the argument comes dangerously close to committing the red herring fallacy.

Common Fallacies	
Begging the question	The conclusion of an argument is assumed by the argument’s premises.
Appeal to ignorance	The arguer illegitimately shifts the burden of proof to his or her opponent.
Appeal to illegitimate authority	The arguer uses a source who is not an authority on the subject in question to support a conclusion.
Ad hominem	The arguer rejects an opposing argument based on the characteristics of its author.
Strawman	The arguer mischaracterizes the conclusion of his or her opponent’s argument, and then attacks the argument in its distorted form.
Red herring	The arguer distracts the reader from the issue by using irrelevant premises.

What *good* reasons can you provide for supporting a campus-wide ban on smoking? Let’s suppose that you agree with the Smoke-Free Campus Initiative because it will make for a cleaner, safer, and healthier campus. You can use a Formal Analysis to outline your argument.

- P1: Cleaner campus.  
 P2: Safer campus.  
 P3: Healthier campus.  
 ∴ Ban smoking.

**Issue:** Smoking on campus

### EXERCISE 12.2

**Your Turn!** What has gone wrong in the previous Formal Analysis?



You should be able to recognize two problems with the Formal Analysis that was just stated. First, the premises and conclusion are not stated as claims. Recall from Chapter 2 that you can determine whether a sentence is a claim by placing the phrase *it is true that . . .* in front of it. You wouldn't say "It is true that cleaner campus" or "It is true that ban smoking." These need to be reformulated as claims that are clear and specific.

The second problem with this Formal Analysis is that the issue is not properly identified. "Smoking on campus" is a topic, not an issue. Recall from Chapter 3 that every issue begins with the word *whether*. Once you have formulated your conclusion as a claim, place *whether* in front of it, and the result will be the issue. Notice how the following Formal Analysis clearly presents the premises and conclusion as claims and properly identifies the issue.

- P1: Cigarette butts are a significant source of litter on campus.  
 P2: Secondhand smoke is hazardous to both smokers and nonsmokers.  
 P3: Banning smoking supports those students who want to quit smoking.  
 ∴ We should ban smoking on campus.

**Issue:** Whether we should ban smoking on campus

### EXERCISE 12.3

**Your Turn!** Write a Formal Analysis containing three premises supporting a conclusion on the other side of this issue.



## Introducing Your Argument

An argumentative essay typically consists of four to six well-developed paragraphs comprising three main parts: an introduction, a body, and a conclusion. Since the purpose of an argument, and thus an argumentative essay, is to convince the reader of something, an inviting and compelling introduction is vital. Within this paragraph, you must grab the reader's attention, identify the issue and show its importance, and make clear what main point you intend to support in the body of the paper.

In an attempt to gain reader interest, writers commonly construct ineffective introductions, as in the following example.

*Since the beginning of time, some people have believed that they are allowed to do whatever they want, even if it endangers others. The case of the so-called “rights” of smokers to foul the public air with their secondhand smoke is a current example of this problem. Students on this campus are trying to ban all cigarette smoking, and I completely agree with them. In this paper I intend to prove beyond a shadow of a doubt that my conclusion is the only possible correct one.*

In trying to catch the reader’s attention, this introduction commits a common mistake by giving an overly simplified generalization that is factually inaccurate.

*Since the beginning of time, some people have believed that they are allowed to do whatever they want, even if it endangers others.*

The problem of people endangering others hasn’t occurred since the “beginning of time,” if for no other reason than people haven’t existed since the beginning of time. It also misstates what the issue is by claiming people want to do “whatever they want.” The issue is whether cigarette smoking should be banned on campus, a much more specific issue.

The second sentence continues the theme of trying to be dramatic as a way of getting the reader to pay attention.

*The case of the so-called “rights” of smokers to foul the public air with their secondhand smoke is a current example of this problem.*

Smokers may harm or annoy others, but doing so is not their primary motivation. To suggest otherwise mischaracterizes the position of smokers’ rights advocates, a mistake you should recognize as a strawman fallacy. Furthermore, smoking outdoors certainly leads to less exposure to secondhand smoke than smoking indoors.

In the third sentence, the writer is attempting to present his or her main point. Although the reader might be able to figure out the writer’s position on the issue, it would be better if the conclusion were explicitly stated. When you are attempting to convince a reader of the truth of your conclusion, you want that conclusion to be easily understood.

Finally, the last sentence in the introduction overreaches.

*In this paper I intend to prove beyond a shadow of a doubt that my conclusion is the only possible correct one.*

Here the writer has substituted not-so-subtle rhetoric—“prove beyond a shadow of a doubt” and “my conclusion is the only possible correct one”—for good argumentation. You may recall the problems with this tactic that were discussed in Chapter 3. When analyzing an argument, you were taught to leave such rhetorical flourish out of the analysis of the argument, because the conclusion is not more likely to be true just because the author claims that it is “proven.” Also, the task in the paper is to give a good argument, not prove something beyond any possible doubt.

So, how could this paragraph be improved? Consider the following example.

*Many states prohibit smoking not only in designated areas, but have banned smoking entirely in workplaces and other public spaces. This movement has extended to college campuses. According to the American Nonsmokers' Rights Foundation, nearly 400 U.S. college campuses have enacted smoke-free campus policies with no exemptions ("U.S. Colleges and Universities with Smokefree Air Policies"). Many people disagree about whether smoking should be completely prohibited on college campuses. In this essay, I will argue that our university should completely prohibit smoking across campus because doing so will make our campus cleaner, safer, and healthier.*

In this introduction, the author presents a clear context for the debate over banning smoking on campus. The initial sentence is still general, but much more in line with what most of us would acknowledge to be the case—that fewer and fewer public places, such as offices and restaurants, allow people to smoke. The context as it is developed in the first two sentences begins quite generally, but by the third sentence has narrowed to the debate on campus. This is sometimes referred to as a funnel introduction. With this kind of context development, the author gives evidence that the issue is important, and if the issue is important, the essay arguing about that issue is important, too.

Finally, the fifth sentence in the paragraph presents the exact conclusion that will be supported in this essay and summarizes the reasons to support that conclusion. This is sometimes referred to as the thesis of the essay. Notice that, as you learned in Chapter 3, the issue and conclusion should be consistent. The issue stated in the fourth sentence employs almost identical terms to those used to identify the conclusion supported by the arguer.

#### EXERCISE 12.4

**Your Turn!** Write an effective introduction to the argument you outlined in Exercise 12.3.



### Supporting Your Conclusion

In the body of the essay, you will take each of your premises that support the main conclusion and make them the focus of an individual paragraph. Thus, in the first paragraph of the body of the essay, you will restate your first premise and give additional evidence and/or examples to clarify and support that premise. In other words, each paragraph should present a subargument in support of one of the premises in your main argument. Depending on the assignment, you may need to offer support from reliable outside sources or you may just offer support based on your own careful thinking. Again, since the reader cannot be expected to already be on your side in this matter, you must give the best subarguments you can and be clear about how all of this contributes to the support of each premise.



We have chosen to give an argument with three premises, but you could construct an argument with a different number of premises. Three or four solid reasons often provide substantive support for an argument while remaining a small enough number to not overwhelm the reader. As you build each subargument, remember to state clearly each intermediate conclusion and its supporting premises as claims. To help the reader differentiate the premises for the main conclusion from the premises for the intermediate conclusion, use inference indicators generously. Also, if you utilize sources to support your claims, make sure that the sources are ones that your reader will find credible.

Let's start with the first premise, "Cigarette butts are a significant source of litter on campus." What reasons can you offer that support this claim? Suppose that you are disgusted by the number of cigarette butts littering the areas surrounding building entrances. You write the following paragraph to reflect your feelings.

*First, cigarette butts are a significant source of litter on campus. Who likes to see that? It's gross. Stop using the campus as an ashtray!*

You may remember from Chapter 3 the difficulty of identifying claims that are implied by rhetorical questions and commands like the ones used in this passage. Although they can be interpreted as implying premises, this is usually a poor argument technique. Using rhetorical questions and commands rests on the reader's ability to figure out what claims you intend as support. Therefore, if you want to convince the reader to accept your conclusion, you will be more successful if you clearly state your reasons rather than hope that the reader will be able to figure out what you mean.

In the following example, the author presents the subargument with each claim explicitly stated. Notice the use of inference indicators to help the reader distinguish the intermediate conclusion (serving here as a topic sentence) from the premises that support it.

*First, cigarette butts are a significant source of litter on campus. This is because, although courteous smokers use designated cigarette waste receptacles, many smokers extinguish their cigarettes on the ground or in other unsuitable places, leaving the smoldering butts behind. Since so many smokers refuse to responsibly dispose of their cigarette waste, the campus has a serious litter problem.*

Now it is clear that the second and third claims are premises of the subargument that are meant to support the first premise of the main argument. Notice also

that the fourth claim is a restatement of the first. To develop the paragraph further, you can explain how litter is a problem or give examples of problem areas on campus associated with smokers. Just make sure that the reasons you offer in your subargument are clearly stated and relevant to the conclusion they are supporting.



Now, let's turn to the second premise of the main argument, namely "Secondhand smoke is hazardous to both smokers and nonsmokers." Although you might think it is common knowledge that secondhand smoke is a health hazard, your argument will be stronger if you provide evidence that this is true. Suppose this passage is what you come up with.

*The second reason for banning smoking on campus is that secondhand smoke is hazardous to both smokers and nonsmokers. According to Americans for Nonsmokers' Rights, secondhand smoke kills over 50,000 people each year ("Secondhand Smoke"). Eliminating smoke on campus will lessen the number of people on campus who are exposed to these toxic fumes.*

Although the statistic that secondhand smoke kills over 50,000 people each year, if true, would add a lot of power to your argument, you must remember that you are trying to convince a potentially skeptical reader. That means that whatever sources you use must be ones that your reader will find credible.

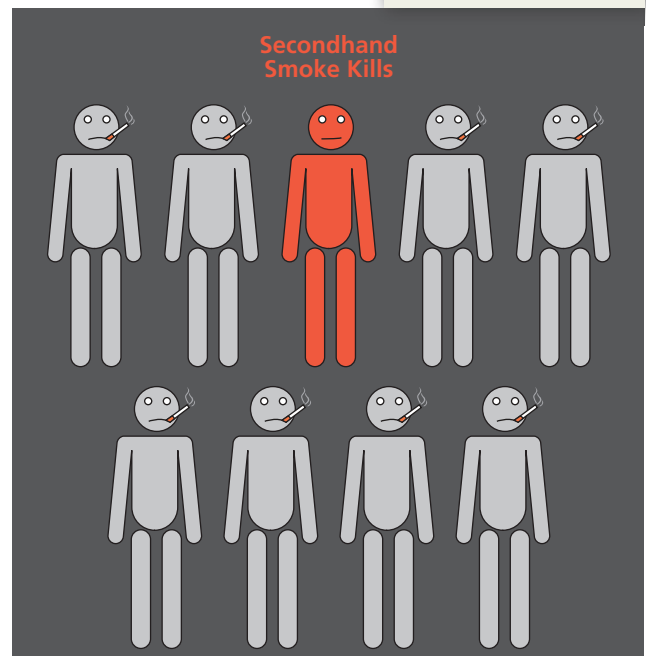
**Hint!** Anytime you use another's ideas or words, you must cite the source. We have used MLA formatting, and the full bibliographic information appears in the Works Cited section at the end of the essay. See the following section, "Citing Your Sources."



For every eight smokers killed by their habit, they take one nonsmoker with them, through exposure to secondhand smoke.\*

What makes a source credible? A credible source is *knowledgeable* about the subject and one who readers can trust to be *honest*. After all, a source is hardly to be believed if he or she is ignorant of the subject. And a source can't be trusted if he or she is likely to be biased, dishonest, or trying somehow to take advantage of the reader. As you should remember from Chapter 5, when you reference an authority who is not knowledgeable about the subject in question, you commit a fallacy of inappropriate authority. Moreover, if the source you reference is an advocate for one side of the debate, your reader is unlikely to trust that source. Although what the advocate says may be true, the source is unlikely to convince your reader. You are better off citing sources that are considered objective.

*The second reason for banning smoking on campus is that secondhand smoke is hazardous to both smokers and nonsmokers. According to the Centers for Disease Control and Prevention, smoking not only causes heart disease and lung cancer in smokers, but also causes heart disease and cancer in adults who*



\*Glantz, S. A., and W. Parmley. "Passive Smoking and Heart Disease: Epidemiology, Physiology, and Biochemistry." *Circulation* 83.1 (1991): 1-12.  
Taylor, A., D. Johnson, and H. Kazemi. "Environmental Tobacco Smoke and Cardiovascular Disease." *Circulation* 86 (1992): 699-702.

*have never smoked. Nonsmokers who are exposed to secondhand smoke at home or at work increase their risk of developing heart disease by 25–30% and increase their risk of developing lung cancer by 20–30% (“Health Effects of Secondhand Smoke”). Since secondhand smoke poses a health hazard to nonsmokers, we should ban smoking to protect the health of everyone on campus.*

This argument is more likely to convince a skeptical reader since it references a source, the Centers for Disease Control and Prevention, that is both knowledgeable about the subject and commonly regarded as objective.

Finally, let’s turn to the third premise of the main argument, “Banning smoking supports those students who want to quit smoking.” Suppose you provide the following support for this premise.

*The final reason to ban smoking on campus is that banning smoking supports those students who want to quit. For example, when I moved to California in 2000, I was finally able to quit smoking, in part, because smoking was prohibited in enclosed public spaces. So, banning smoking on campus will likely help others do the same.*

Using examples is a great way to support your claims. However, notice that with only this one example, the argument is rather weak. You learned in Chapter 10 that arguments which generalize from a very small sample size to a larger population are mistakes in reasoning called hasty generalizations. The argument would be stronger with more evidence. Consider this one.

*The final reason to ban smoking on campus is that banning smoking supports those students who want to quit. This is demonstrated by a 2007 study comparing the effects of having strong (a complete smoking ban) to weak (all other “no smoking” restrictions) smoking regulations for restaurants in 351 Massachusetts towns. Researchers randomly interviewed 1,712 adult smokers, and found that living in a town with a strong regulation was associated with a threefold increase in the odds of making a quit attempt (Albers et al.). Therefore, complete smoking bans encourage people to quit smoking.*

Notice how much stronger the evidence is in the second version. A study with a sample size of 1,712 people is much stronger than the previous anecdotal evidence with a sample size of one.

### EXERCISE 12.5



**Your Turn!** Develop effective subarguments to support the premises of the argument you introduced in Exercise 12.4.

## Considering Objections

The last part of the body of the essay is where you consider an objection that would likely be made by someone who does not accept your position. Although it might be tempting to present an objection that you can easily dismiss or disarm, the strength of

your essay is proportionate to the strength of the objection you are able to refute. You can think of it like the scoring in an Olympic diving competition—the more difficult the dive, the higher your score if you perform it successfully. So, for this section, choose the objection you believe most forcefully opposes your position and state it clearly and in its most powerful form.

Suppose that you believe the strongest reason not to support the smoking ban is that it infringes on an individual's right to choose how to live. Present this objection as clearly and forcefully as you can.

*Many people who object to banning smoking on college campuses claim that doing so violates an individual's right to choose how to live his or her life. They claim that the only legitimate reason to limit a person's freedom is to prevent harm to others, and if smokers want to risk their health, it should be their choice. Besides, nonsmokers can choose whether or not to be around smoke. If they don't want to risk breathing secondhand smoke, they can just avoid designated smoking areas.*

Next, you should reply to the objection. If you can show that there is a major flaw in the argument's premises or that the objection can be overcome by your argument, your position on the issue will be more convincing. However, be careful not to claim too much, as is done in the following example.

*However, we should reject this argument because it's clear that anyone who supports so-called smokers' rights is himself or herself a smoker.*

This reply isn't very effective. As you learned in Chapter 5, arguments that attack the arguer instead of the argument commit the ad hominem fallacy. In fact, that is what has happened here. Although smokers are likely to be advocates of smoker's rights, the fact that they have a vested interest in their position does not mean that they have given a poor argument. To show that their conclusion is false, you must respond to their argument, not attack them.

Most controversial issues have good reasons for and against supporting them, and you should acknowledge a good objection if one exists. So, instead of pretending that a good objection is easily dismissed, you should honestly appraise the point and concede what needs to be conceded. This reply to the objection, for example, is more effective than the first version.

*This argument makes a good point. Any ban on smoking does limit the freedom of those individuals who would choose to smoke, so it is not something that should be taken lightly. However, on many occasions, as in the case of seatbelt or helmet laws, the public safety benefits outweigh the loss of freedom to the individual. Besides, nonsmokers shouldn't have their freedom restricted in order to avoid health hazards. Let the smokers be the ones to move.*

Rather than misrepresenting the opponent's viewpoint, this reply acknowledges the strength of the objection. However, it proposes that, even in spite of the strength of the objection, the reasons for the other side of the argument are still the most reasonable.

## EXERCISE 12.6



**Your Turn!** Present the strongest objection you can think of to your argument against the Smoke-Free Campus Initiative, and write an effective response to it.

### Summarizing Your Argument

Your final paragraph is your last chance to convince the reader of your side of the issue. The most effective strategy is to briefly restate the major points of your argument, namely the conclusion and premises of your main argument. If handled poorly, a conclusion can actually leave the reader with less inclination to be convinced rather than with more. Let's consider one example.

*Smoking is an unhealthy, disgusting, and expensive habit that does not belong on a college campus. We must ban smoking wherever we find it. Won't you please join me in eliminating this scourge from our campus community?*

Although this conclusion may be passionate, it is neither effective nor does it follow the guidelines for a successful concluding paragraph. First, this paragraph is clear about which side of the issue is defended, but it doesn't restate the main points of the essay. The second sentence goes beyond the conclusion argued for in the premise by urging a universal ban on smoking. Finally, the essay ends on a weak plea for help, one that is not likely to win any converts to the cause.

Let's look now at a better way of concluding the essay.

*In this essay, I have argued that we should ban smoking on campus. I have supported this conclusion with three lines of reasoning. First, banning smoking will reduce litter on campus. Second, banning smoking will reduce student exposure to secondhand smoke. And, third, banning smoking will help students who smoke quit. Although banning smoking on campus will somewhat limit the freedom of individuals, the benefits of doing so greatly outweigh the inconvenience of having to leave campus to smoke. In order to rid the university of the ill-effects of cigarette smoking, we next need to work with administrators to create a smoke-free campus.*

Not only does this conclusion summarize the main points of the argument in somewhat different language, it also shows the importance of your argument. By suggesting the actions that follow from accepting the conclusion, you connect the argument to its larger implications.

## EXERCISE 12.7



**Your Turn!** Develop an effective conclusion for your argumentative essay.

## Citing Your Sources

Whenever you use the ideas or words of another person, you must acknowledge doing so and utilize proper citation techniques. Otherwise, whether done deliberately or accidentally, you commit **plagiarism**, the presentation of another person's ideas or words as if they are your own. In the example essay we constructed, we have utilized MLA formatting. However, this is not the only way to properly cite sources; APA and Chicago Style are also commonly used in academic writing. Be sure to check with your instructor to find out which citation style he or she requires for essays.

At the end of your essay, you should include a list of "Works Cited." It is very important that you provide the information about your sources in the proper format so that your reader can verify the evidence you provide in your argument. If your citations do not match, the reader will likely find you unreliable and will not be convinced by your argument (or, worse, your essay will be penalized!).

### Works Cited

- Albers, Alison B., et al. "Effect of Smoking Regulations in Local Restaurants on Smokers' Anti-Smoking Attitudes and Quitting Behaviours." *Tobacco Control* 16.2 (2007): 101–6. Print.
- "Health Effects of Secondhand Smoke." *Centers for Disease Control and Prevention*. 12 January 2010. Web. 1 July 2010.
- "Secondhand Smoke." *Americans for Nonsmokers' Rights*. 4 Mar 2009. Web. 1 July 2010.
- "U.S. Colleges and Universities with Smokefree Air Policies." *Americans for Nonsmokers' Rights*. 1 April 2010. Web. 1 July 2010.

Each of the four references to sources we used in this chapter (including the one source we deemed not credible) has a corresponding entry in the "Works Cited" list.

### EXERCISE 12.8

**Your Turn!** Write a "Works Cited" page for any sources you utilize in developing your argument.



**Hint!** Re-read and revise your essay to make sure the argument is clear and that you have not committed any grammatical or spelling mistakes. **Peer review**—having a classmate or friend critically evaluate your paper—is an effective means of improving the quality of your essay. Another set of eyes (hopefully, *before* your instructor's) can spot errors in logic or grammar that you have overlooked.





**Writing an Argumentative Essay**

**Step 1:** Outline your argument.

- ▲ Match the conclusion with the issue.
- ▲ State premises and conclusion as claims.
- ▲ Choose premises clearly relevant to the conclusion.

**Step 2:** Introduce your argument.

- ▲ Grab the reader's attention.
- ▲ Identify the issue and set out the context.
- ▲ Clearly state your conclusion.
- ▲ Summarize your premises.

**Step 3:** Support your conclusion.

- ▲ Identify each of the main premises and state each as a claim.
- ▲ Provide reasons, evidence, and/or examples that support each premise.

**Step 4:** Consider objections.

- ▲ Accurately represent the strongest point(s) against your view.
- ▲ Honestly appraise how your argument accommodates the objection(s).

**Step 5:** Summarize your argument.

- ▲ Repeat your main conclusion.
- ▲ Restate your main premises in the same order they appear but using different language.
- ▲ Suggest one important larger implication of your argument.

**Step 6:** Cite your sources.

- ▲ Choose credible sources.
- ▲ Give full and detailed credit for others' ideas to avoid plagiarism.

**EXERCISE 12.9**

As a class or on your own, choose an issue from the following list and use it to write an argumentative paper. Alternatively, your instructor may assign the entire class to work on a single issue.

1. Issue: Whether the United States government should re-institute a military draft
2. Issue: Whether juveniles who commit violent crimes should be treated as adults in the criminal justice system
3. Issue: Whether terminally ill people should be euthanized to end extreme suffering
4. Issue: Whether using cell phones while driving should be banned
5. Issue: Whether health care should be free for all citizens
6. Issue: Whether torture is ever acceptable
7. Issue: Whether animals should be used for scientific research
8. Issue: Whether English should be the official language of the United States
9. Issue: Whether same-sex couples should be allowed to marry
10. Issue: Whether marijuana should be legalized

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### Chapter Review Questions

1. How does brainstorming help you formulate your argument?
2. What goes in the first paragraph of an argumentative essay?
3. What goes in the second paragraph of an argumentative essay?
4. Why should you avoid using rhetorical questions?
5. What goes in the third paragraph of an argumentative essay?
6. What are the two features of a credible source?
7. What goes in the fourth paragraph of an argumentative essay?
8. What goes in the fifth paragraph of an argumentative essay?
9. Why must you respond to the strongest objection to your position when writing an argumentative essay?
10. What goes in the last paragraph of an argumentative essay?
11. How can you successfully avoid plagiarism in your argumentative essays?



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# Glossary

## | A |

**Ad hominem:** a fallacious argument in which an opposing argument is rejected based on the characteristics of its arguer.

**Affirming the consequent:** an invalid, truth-functional argument form that treats a necessary condition as if it were sufficient.

**Analogical argument:** an inductive argument that uses an analogy to conclude that, because one case has a particular feature, the other case should, too.

**Analogues:** the things that are compared in an analogy.

**Analogy:** a comparison of two (or more) things.

**Analyze:** to break something into its most elementary parts; in the case of an argument, to identify the conclusion, premise(s), and issue.

**Antecedent:** the part of a conditional claim that is a sufficient condition for the consequent to be true; normally, this is the part of the claim following the word *if*.

**Appeal to ignorance:** a fallacious argument in which the arguer illegitimately shifts the burden of proof to his or her opponent.

**Appeal to illegitimate authority:** a fallacious argument in which a source who is not an authority on the subject in question is relied upon to support a conclusion.

**Argument:** a set of claims, one of which is supported by the others.

**Argument diagram:** a visual representation of an argument's structure.

**Argument evaluation:** a judgment that an argument's conclusion does or does not follow from its premise(s).

**Argument with multiple conclusions:** two or more arguments that share the same premise(s).

## | B |

**Basic Analysis:** a critical thinking tool that demonstrates in paragraph form the recognition and analysis of arguments and other forms of discourse.

**Begging the question:** a fallacious argument in which the conclusion is assumed by the premise(s).

**Biased generalization:** an inductive generalization in which the sample misrepresents the target.

**Brainstorm:** a prewriting tool for generating ideas; in argument construction, you list as many ideas as you can that relate to the issue you have chosen to write about.

**Burden of proof:** a phrase indicating who has the responsibility of providing reasons to support his or her conclusion.

## | C |

**Categorical argument:** a deductive argument that contains categorical claims.

**Categorical claim:** a claim that relates two categories of things.

**Categorical syllogism:** a common type of categorical argument, containing two premises and a conclusion.

**Causal argument:** an inductive argument that provides evidence that a causal claim is true.

**Causal claim:** a claim indicating a causal relationship between one event and another.

**Chain argument:** two or more arguments constituting a chain of reasoning, in which the conclusion of one argument is the premise of another.

**Claim:** a statement that has truth-value.

**Cogent inductive argument:** an inductive argument that is both strong and has all true premises.

**Compound claim:** one or more simple claims combined with a logical operator.

**Conclusion:** the claim being supported in an argument.

**Conclusion indicator:** a word or phrase signaling that the claim following it is a conclusion.

**Conditional claim:** (also called a *hypothetical claim*, *implication*, or *material implication*) a compound claim that combines two other claims (called the *antecedent* and the *consequent*) using the phrase *if...then...* or its equivalent.

**Conjunct:** one of the two claims combined in a conjunction.

**Conjunction:** a compound claim that combines two claims (called *conjuncts*) using the word *and* or its equivalent.

**Consequent:** the part of a conditional claim that is a necessary condition for the antecedent to be true; normally, this is the part of the claim following the word *then*.

**Convergent premises:** two or more premises that each provide independent support for the same conclusion.

**Copula:** in a categorical claim, the verb linking the subject and predicate terms.

## | D |

**Deductive argument:** an argument in which the arguer attempts to demonstrate that the truth of the conclusion *necessarily* follows from the premises.

**DeMorgan's Law:** a rule in truth-functional logic used to change the negation of a conjunction into a disjunction, or the negation of a disjunction into a conjunction.

**Denying the antecedent:** an invalid, truth-functional argument form that treats a sufficient condition as if it were necessary.

**Descriptive claim:** a claim that describes a situation.

**Diagram:** see **argument diagram** or **Venn diagram**.

**Disjunct:** one of the two claims combined in a disjunction.

**Disjunction:** (or *disjunctive claim*) a compound claim that combines two claims (called *disjuncts*) using the phrase *either...or* or its equivalent.

**Disjunctive claim:** see **disjunction**.

**Distributed term:** in a categorical claim, a subject or predicate term that refers to every member of the group that the subject or predicate term represents.

**Dogmatic assertion:** a judgment presented without providing reasons or justification for its truth.

## | E |

**Enthymeme:** a deductive categorical argument in which a premise or conclusion is unstated.

**Evaluative claim:** a claim that evaluates, or makes a judgment about, whether something is good or bad, right or wrong, useful or useless, beautiful or ugly, or the like.

**Exclusive disjunction:** a disjunction in which, in order for the compound claim to be true, exactly one of the disjuncts is true.

**Explanandum:** in an explanation, the fact being explained.

**Explanans:** in an explanation, the reasons offered for the explanandum.

**Explanation:** a set of claims, one of which offers an account of how or why some given claim is true.

**Extended argument:** a chain argument that contains several subarguments.

**Extra claim:** a claim that is neither a conclusion nor a premise but which accompanies an argument.

## | F |

**Fallacy:** a common mistake in reasoning that is often rhetorically persuasive.

**Faulty analogy:** in an analogical argument, a mistake in reasoning in which the arguer refers to similarities between the sample and target that are irrelevant to the feature.

**Feature:** in both an analogical argument and an inductive generalization, the characteristic of the sample that the arguer is trying to prove is also true of the target.

**Formal Analysis:** a method for presenting the analysis of an argument in which the premises are listed above a line with the conclusion stated under it.

## | G |

**General claim:** a claim that makes a statement about all, most, or many members of a group or set.

**General form:** in an analogical argument, inductive generalization, and causal argument, the formal analysis of the argument showing its universal pattern.

**| H |**

**Hasty generalization:** in an inductive generalization, a mistake in reasoning in which the sample is too small to offer even minimal support for the conclusion.

**Hypothetical:** see **conditional claim**.

**| I |**

**Implication:** see **conditional claim**.

**Implied claim:** a conclusion or premise of an argument that is implied by a non-claim, typically a command or rhetorical question.

**Inclusive disjunction:** a disjunction in which, in order for the compound claim to be true, at least one of the disjuncts is true.

**Indirect truth table method:** see **shortcut method**.

**Inductive argument:** an argument in which the arguer attempts to demonstrate that the truth of the conclusion probably follows from the premises.

**Inductive generalization:** an inductive argument that concludes that some, most, or all of a particular group has some feature based on evidence that a portion of that group has the feature.

**Inference indicators:** words or phrases that signal the structure of an argument.

**Intermediate conclusion:** in a chain argument, a claim that serves as both the conclusion of a subargument and a premise of the main argument.

**Issue:** the matter that is up for debate or being questioned.

**| L |**

**Linked premises:** premises that depend on each other to support a conclusion.

**Logical operator:** see **operator**.

**| M |**

**Main operator:** the operator that applies to an entire truth-functional claim.

**Major term:** in a categorical syllogism, the predicate term of the conclusion, which is also present in one of the premises.

**Material implication:** see **conditional claim**.

**Method of agreement:** in a causal argument, a method of reasoning in which the arguer concludes that an event in common among every known instance of the resulting event is the cause of that event.

**Method of difference:** in a causal argument, a method of reasoning in which the arguer concludes that the factor that is different between the occurrence and non-occurrence of the resulting event is the cause of that event.

**Middle term:** in a categorical syllogism, the term that occurs in both premises but is absent from the conclusion.

**Minor term:** in a categorical syllogism, the subject term of the conclusion, which is also present in one of the premises.

**Modus ponens:** a valid, truth-functional argument, which affirms the antecedent of a conditional claim.

**Modus tollens:** a valid, truth-functional argument, which denies the consequent of a conditional claim.

**Multiple argument:** either a chain argument or argument with multiple conclusions, so called because it may seem to violate the rule that an argument has only one conclusion.

**| N |**

**Necessary condition:** in a true conditional claim, the part (*consequent*) that must be true for the other part (*antecedent*) to be true.

**Negation:** a compound claim that combines a claim with the word *not* or its equivalent.

**| O |**

**Operator:** a word or phrase combined with one or more truth-functional claims to create a new, compound claim.

**| P |**

**Particular affirmative:** a type of categorical claim expressing an inclusive relation between a portion of a category of things and another category of things.

**Particular negative:** a type of categorical claim expressing an exclusive relation between a portion of a category of things and another category of things.

**Peer review:** having a classmate or friend read your paper to provide advice for improvement.

**Plagiarism:** using the ideas or words of another person without providing a proper citation.

**Post hoc ergo propter hoc:** in a causal argument, a mistake in reasoning in which the arguer concludes that one event was caused by another simply because one preceded the other.

**Precipitating event:** in a causal argument, the event that an arguer knows has occurred prior to the resulting event, and that he or she suspects is the cause of that resulting event.

**Predicate term:** in a standard form categorical claim, the second plural noun identifying a class, group, or set.

**Premise:** a claim intended as support for an argument's conclusion.

**Premise indicator:** a word or phrase signaling that the claim following it is a premise.

### | Q |

**Quality:** a feature of a categorical claim, which is determined by whether the members of the subject class are included or excluded from the predicate class.

**Quantifier:** the term beginning a standard form categorical claim, which indicates the quantity and quality of the claim.

**Quantity:** a feature of a categorical claim, which is determined by whether all or some members of the subject class are referred to by the claim.

### | R |

**Random sample:** in an inductive generalization, a sample that accurately represents the target because all members of the target had an equal opportunity to be part of the sample.

**Red herring:** a fallacious argument in which the arguer distracts the reader from the main issue by using irrelevant premises.

**Resulting event:** in a causal argument, the event that the arguer knows has occurred.

### | S |

**Sample:** in an analogical argument, the analogue given only among the premises; in an inductive generalization, a portion of an entire class or group referred to in the premise.

**Shortcut method:** a method to determine whether a deductive argument is valid or invalid by considering only the conditions under which the argument would be invalid, without determining all possible truth conditions.

**Simple claim:** a truth-functional claim that does not contain any other claim as a component.

**Sound deductive argument:** a deductive argument that is both valid and has all true premises.

**Standard form:** the form of presenting categorical claims following the formal rules of their expression.

**Strawman:** a fallacious argument that mischaracterizes the conclusion of an opponent's argument, and then attacks the argument in its distorted form.

**Strong inductive argument:** an inductive argument in which, if the premises are true, the conclusion is probably true.

**Subargument:** in a chain argument, the intermediate conclusion and the premise(s) that support it.

**Subject term:** in a standard form categorical claim, the first plural noun identifying a class, group, or set.

**Sufficient condition:** in a true conditional claim, the part (*antecedent*) that, when true, guarantees that the other part (*consequent*) is true.

**Syllogism:** a deductive argument containing two premises and a conclusion.

### | T |

**Target:** in an analogical argument, the analogue that the arguer is drawing a conclusion about; in an inductive generalization, the entire group or class represented by the sample and found in the conclusion.

**Truth-functional argument:** a deductive argument that contains truth-functional claims.

**Truth-functional claim:** a claim that is either a simple claim or a compound claim.

**Truth-functional definition:** a table listing all the conditions under which a compound claim is true or false.

**Truth table method:** a method to determine whether a deductive argument is valid or invalid by listing all possible truth-values for the claims in an argument.

**Truth-value:** the truth or falsity of a claim.

### | U |

**Universal affirmative:** a type of categorical claim expressing an inclusive relation between an entire category of things and another category of things.

**Universal negative:** a type of categorical claim expressing an exclusive relation between an entire category of things and another category of things.

**Unstated conclusion:** a conclusion that is not stated explicitly, but is supported by given premises.

### | V |

**Valid deductive argument:** a deductive argument in which, if the premises are true, the conclusion must be true.

**Venn diagram:** a diagram of overlapping circles used to represent the relationship between categorical claims.

# Answers to Selected Exercises

## Chapter 1

### EXERCISE 1.5

- 3. c
- 6. c
- 9. b

### EXERCISE 1.8

Student answers will vary.

### EXERCISE 1.9

- 3. This advertisement plays on your vanity by portraying an image of stereotypical masculinity.
- 6. This advertisement equates love with material excess.
- 9. This advertisement makes you feel guilty for being privileged.

### EXERCISE 1.11

Student answers will vary.

## Chapter 2

### EXERCISE 2.3

- 3. Claim
- 6. Claim
- 9. Not a claim
- 12. Claim
- 15. Not a claim
- 18. Claim
- 21. Not a claim

- 24. Not a claim
- 27. Not a claim
- 30. Claim

### EXERCISE 2.9

- 3. 0
- 6. 2
- 9. 1
- 12. 3
- 15. 3
- 18. 1
- 21. 2
- 24. 1
- 27. 2
- 30. 2
- 33. 2

### EXERCISE 2.11

- 3. Argument
- 6. Explanation
- 9. Explanation
- 12. Explanation
- 15. Explanation
- 18. Argument

### EXERCISE 2.14

- 3. Neither
- 6. Explanation
- 9. Neither
- 12. Argument
- 15. Argument
- 18. Neither
- 21. Argument
- 24. Argument

27. Neither  
 30. Argument  
 33. Neither

## Chapter 3

### EXERCISE 3.6

3. Since premise, conclusion.  
 6. Premise. In conclusion, conclusion.  
 9. Premise. As a result conclusion, inasmuch as premise.  
 12. Premise and premise. This shows that conclusion.  
 15. Conclusion in that premise and premise.  
 18. Conclusion may be derived from premise.  
 21. Premise. This demonstrates that conclusion.  
 24. Conclusion, as premise and premise.

### EXERCISE 3.8

3. **P:** Figs are sweet. \_\_\_\_\_  
 ∴ Janie is sure to like figs.  
**Issue:** Whether Janie is sure to like figs
6. **P:** Cash is inconvenient. \_\_\_\_\_  
 ∴ Cash may be in the process of becoming obsolete.  
**Issue:** Whether cash may be in the process of becoming obsolete
9. **P:** Mosquitoes spread disease. \_\_\_\_\_  
 ∴ We should categorize mosquitoes as pests.  
**Issue:** Whether we should categorize mosquitoes as pests
12. **P1:** The university trustees voted to raise fees again.  
**P2:** Many students cannot afford even a small increase in college costs. \_\_\_\_\_  
 ∴ We can expect enrollment to drop.  
**Issue:** Whether we can expect enrollment to drop
15. **P1:** School sponsorship of a religious message sends the ancillary message to members of the audience who are nonadherents that they are outsiders, not full members of the political community.

**P2:** School sponsorship of a religious message sends the ancillary message to members of the audience who are adherents that they are insiders, favored members of the political community.

- ∴ School sponsorship of a religious message is impermissible.

**Issue:** Whether school sponsorship of a religious message is permissible

18. **P1:** The majority of students who responded to a campus survey said our fraternity would have been their number one pick.

**P2:** The students who responded in favor of our fraternity cannot be wrong.

- ∴ Our fraternity is the best on campus.

**Issue:** Whether our fraternity is the best on campus

### EXERCISE 3.10

3. **P:** Conrad is a visionary. \_\_\_\_\_  
 ∴ You should vote for Conrad.  
**Issue:** Whether you should vote for Conrad
6. **P1:** Increasing troop levels puts more of our troops at risk.  
**P2:** Increasing troop levels increases the possibility of civilian casualties.  
**P3:** Putting more of our troops at risk and increasing the possibility of civilian casualties both work against us in the long run. \_\_\_\_\_  
 ∴ An increase in troop levels is not the best means for fighting an insurgency.  
**Issue:** Whether an increase in troop levels is the best means for fighting an insurgency
9. **P:** Tropical oceans are warming. \_\_\_\_\_  
 ∴ This year will be rainier than most.  
**Issue:** Whether this year will be rainier than most

### EXERCISE 3.12

3. **P1:** If you want to pass your Chemistry class, you really have to do your homework.  
**P2:** You are not doing any of your homework. \_\_\_\_\_  
 ∴ You do not want to pass your Chemistry class.  
**Issue:** Whether you want to pass your Chemistry class

6. **P1:** That bird is a red-tailed hawk only if it has a red tail.

**P2:** That bird has a brown tail.

∴ That bird is not a red-tailed hawk.

**Issue:** Whether that bird is a red-tailed hawk

9. **P:** Student fees have been raised every year for the past decade.

∴ Student fees will be raised next year.

**Issue:** Whether student fees will be raised next year

### EXERCISE 3.15

3. **P:** The best man for the job is a woman.

∴ You should vote for Councilwoman Hagen for mayor.

**Issue:** Whether you should vote for Councilwoman Hagen for mayor

6. **P:** The university is trying to encourage all students to apply at the same time as it is limiting enrollment.

∴ The university is sending a mixed message to the community.

**Issue:** Whether the university is sending a mixed message to the community

9. **P:** No amount of money will make up for a boring, unsatisfying career.

∴ You should choose the program that will make you happiest over the long haul.

**Issue:** Whether you should choose the program that will make you happiest over the long haul

### EXERCISE 3.16

3. **P:** You may need to use a cell phone to report a drunk driver on the highway.

∴ We should not ban all cell-phone use when driving.

**Issue:** Whether we should ban all cell-phone use when driving

6. **P:** Driving over the speed limit will lead you to break other laws.

∴ You should not drive over the speed limit.

**Issue:** Whether you should drive over the speed limit

9. **P:** You wouldn't want someone to disparage your race.  
∴ We must pass laws to curtail hate speech.

**Issue:** Whether we must pass laws to curtail hate speech

12. **P1:** You have seen blood before.

**P2:** You're wearing gloves.

∴ You should stop being so squeamish.

**Issue:** Whether you should stop being so squeamish

15. **P:** Staying up late studying is ruining your health.

∴ You should stop staying up late studying.

**Issue:** Whether you should stop staying up late studying

18. **P:** Dizziness is not a medical emergency.

∴ You should stop whining.

**Issue:** Whether you should stop whining

### EXERCISE 3.22

3. Chain argument

**P:** Maria tore up all her credit cards.

∴ Maria will again be living within her means.

**P:** Maria will again be living within her means.

∴ Maria should be able to earn back an excellent credit rating.

**Issue:** Whether Maria should be able to earn back an excellent credit rating

6. Argument with multiple conclusions

**P:** Prohibition of alcohol didn't work.

∴ It's pointless to try to prohibit recreational drug use.

**Issue:** Whether it's pointless to try to prohibit recreational drug use

**P:** Prohibition of alcohol didn't work.

∴ It's pointless to try to prohibit steroids and other performance enhancers.

**Issue:** Whether it's pointless to try to prohibit steroids and other performance enhancers

9. Chain argument

**P:** You and your family have paid a great deal of money for your college education.

∴ You really must take your studies more seriously.



**P:** You really must take your studies more seriously.  
 ∴ You should quit working 40 hours a week.

**Issue:** Whether you should quit working 40 hours a week

12. Argument with multiple conclusions

**P1:** The economy is awful.

**P2:** There's little hope for economic improvement anytime soon.

∴ You should be frugal with your paycheck.

**Issue:** Whether you should be frugal with your paycheck

**P1:** The economy is awful.

**P2:** There's little hope for economic improvement anytime soon.

∴ You should put more money in savings.

**Issue:** Whether you should put more money in savings

15. Argument with multiple conclusions

**P1:** The military has had an increasingly difficult time meeting recruitment goals.

**P2:** Veteran soldiers are retiring at an unusually high rate.

∴ The military will soon be much smaller than it was five years ago.

**Issue:** Whether the military will soon be much smaller than it was five years ago

**P1:** The military has had an increasingly difficult time meeting recruitment goals.

**P2:** Veteran soldiers are retiring at an unusually high rate.

∴ The military will remain smaller for years to come.

**Issue:** Whether the military will remain smaller for years to come

18. Chain argument

**P1:** The city zoo is heavily in debt.

**P2:** The city zoo is poorly managed.

∴ Extreme measures must be taken.

**P:** Extreme measures must be taken.

∴ The town council should take charge of the zoo right away.

**Issue:** Whether the town council should take charge of the zoo right away

### EXERCISE 3.23

3. This passage contains neither an argument nor an explanation. It has only one claim, and arguments and explanations each need a minimum of two claims.

6. This passage from Immanuel Kant's *Critique of Pure Reason* contains an argument. The issue is whether time must be something real. The conclusion is that time must be something real. The premises are that changes are real, and that changes are only possible in time.

9. This passage contains an argument. The issue is whether we need to enforce the death penalty for all murders without exception. The conclusion is that we need to enforce the death penalty for all murders without exception. The implied premise is that murderers deserve death after what they've done.

12. This passage from C. Donald Ahrens's *Essentials of Meteorology* contains an explanation. The explanandum is that in the stratosphere the air temperature begins to increase with height, producing a temperature inversion. The explanans is that the gas ozone plays a major part in heating the air at a stratospheric altitude.

15. This passage contains an argument. The issue is whether the process of urbanization itself will inevitably lead to lower mortality rates. The conclusion is that the process of urbanization itself will inevitably lead to lower mortality rates. The premise is that mortality rates are lower in urban areas than in rural areas.

18. This passage from The National Conference of Catholic Bishops, Committee for Pro-Life Activities, contains an argument. The issue is whether there is a need for a legal definition of death. The conclusion is that there is no need for a legal definition of death. The first premise is that there is no assurance that a legal definition of death would accomplish its intended purpose. The second premise is that a legal definition of death would lead directly to euthanasia.

## Chapter 4

### EXERCISE 4.10

3. ①



②

6. ①  
↓  
②

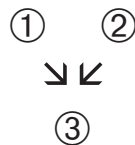
9. ① + ②      ①      ②  
↓                  ↘ ↙  
③                  ③

**EXERCISE 4.11**

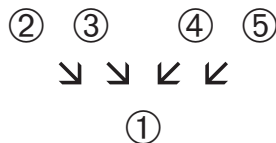
3. Because ① implanting a computer chip in the brain could vastly increase anyone's knowledge, ② cyborgs may be a reality in the not-so-distant future.



6. Inasmuch as ① the military has had an increasingly difficult time meeting recruitment goals, and ② veteran soldiers are retiring at an unusually high rate, it is likely that ③ the military will soon be much smaller than it was five years ago.

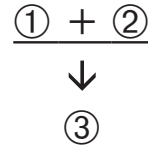


9. There are several reasons why ① you should stop smoking cigarettes. First, ② cigarette smoking causes serious health problems. Second, ③ cigarette smoke makes you stink, and ④ it also makes your teeth yellow. Finally, ⑤ cigarettes are very expensive.

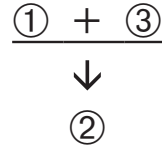


12. ① If the defendant has an alibi, then you should vote not guilty. Since ② the defense has not

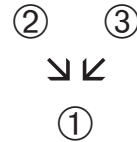
provided an alibi for the defendant, ③ you must vote guilty.



15. ① The university trustees voted to raise student fees yet again. It follows that ② we can expect enrollment to drop, since ③ many students cannot afford even a small increase in college costs.



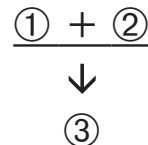
18. ① The First Amendment must not be seen as allowing total freedom to act. After all, ② violent protestors can be arrested. Furthermore, ③ hate speech is against the law.

**EXERCISE 4.15**

3. ① Francisco is most likely good at math because ② he has an analytical mind.



6. ① All sailboats are expensive to buy, and ② a Hobie Cat is a sailboat. ③ You know what follows from that, right?  
③ A Hobie Cat is expensive to buy.



9. Obviously ① we don't want felons to have the right to vote: ② Would you want a convicted murderer to choose the next president?

② You wouldn't want a convicted murderer to choose the next president.

②

↓

①

12. ① We hope you agree that our fraternity is the best on campus. ② The majority of students who responded to a campus survey said our fraternity would be their number one pick. ③ How could they be wrong?  
③ The students who responded in favor of our fraternity cannot be wrong.

② + ③

↓

①

15. ① Video game players shouldn't become surgeons. ② Haven't you seen how many gamers have jittery nerves?  
② Many gamers have jittery nerves.

②

↓

①

18. ① Don't get your children vaccinated! After all, I read on the Internet that ② some vaccines contain mercury, and ③ mercury has been linked to autism. ④ You surely don't want your child to develop autism, do you?  
① You should not vaccinate your children.  
④ You don't want your child to develop autism.

② + ③ + ④

↓

①

#### EXERCISE 4.18

3. ①

↓

②

↓

③

6. ② ③ ④      ② + ③ ④  
    ↘ ↓ ↙      ↘ ↙  
          ①            ①

9. ③ ②      ③ + ②  
    ↘ ↙      ↓  
          ①            ①  
          ↓            ↓  
          ④            ④

#### EXERCISE 4.19

3. ① It is important for university students to use their education to help people who never had the opportunity to go to school, since ② they have benefited from others who came before them. Also, ③ making their community better will help students develop the wisdom necessary to apply their knowledge.

② ③  
    ↘ ↙  
          ①

6. ① We should raise the speed limit on I-5 to 80 mph. ② The highway was designed for high-speed travel, and ③ cars get better gas mileage at high speed. Besides, ④ everyone drives that fast anyway. So, ① let's raise the limit.

② ③ ④  
    ↘ ↓ ↙  
          ①

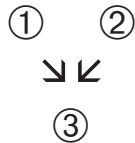
9. ① More and more people are becoming infected with HIV in underdeveloped countries, and ② the cost of the only effective drugs rises each year. Hence, ③ the war on HIV/AIDS is unlikely to be won in the near future.

① ②  
    ↘ ↙  
          ③

12. ① You should consider working fewer hours while attending college full-time. Since ② you and your family have paid a great deal of money for your college education, ③ you really must take your studies more seriously. Therefore, ① you should stop working so much.



15. ① I do more work than anybody else in the shipping department, and ② I haven't gotten a raise in five years. Thus, ③ I should get a raise this year.

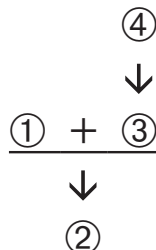


18. ① The European Union has a bloated bureaucracy, so ② it needs to resist the urge to add new member states. Hence, ③ the vote on adding the Ukraine should be postponed.

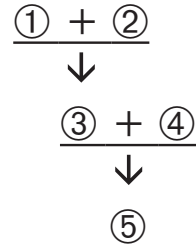


### EXERCISE 4.31

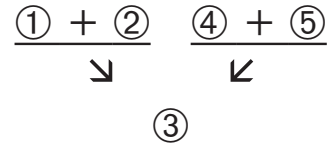
3. ① You won't graduate this year unless you complete senior seminar. Accordingly, ② you won't graduate since ③ you can't complete senior seminar. After all, ④ you didn't even enroll in it!



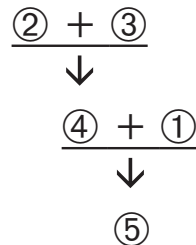
6. ① Portugal is a country, and ② all countries are on a map. Hence, ③ Portugal is on a map. Assuming that ④ all things on a map can be identified by satellite, ⑤ Portugal can be identified by satellite.



9. ① Tomas will be left behind if he forgets to make reservations, and ② he probably will forget to make reservations. As a result, it's very likely ③ Tomas will be left behind. Besides, ④ he is always spacing out, and ⑤ people who space out usually get left behind.

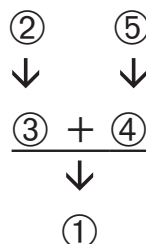


12. ① If George marries Sally, he will be ecstatic. ② George will marry either Sally or Sue. But ③ there is no way he is going to marry Sue. As a result, ④ he will marry Sally, and we can conclude that ⑤ he will be ecstatic.

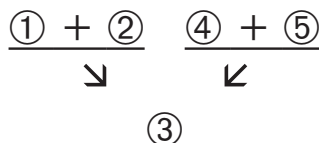


15. Good afternoon, ladies and gentlemen of the jury. It is evident that ① my client, Janie Jacobson, is not guilty of kidnapping Prince Michael Jackson. Since ② Prince Michael was taken from his mansion in the Hamptons on December 20, 2010, ③ Ms. Jacobson could not be guilty of kidnapping him if she was in Las Vegas at that time. And ④ she was in Las Vegas on that day, as ⑤ is evidenced by the casino surveillance footage.

⑤ Casino surveillance footage shows that Janie Jacobson was in Las Vegas on December 20, 2010.

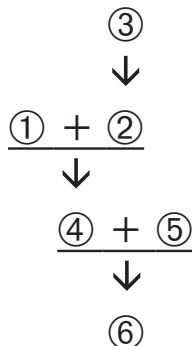


18. ① If your children watch a lot of television, then they are more likely to believe in racial and gender stereotypes. ② You don't want your children to believe these harmful stereotypes, so ③ you should turn off the television more often. Besides, ④ if you limit the amount of TV your children watch, then they are more likely to engage in constructive activities, and I know ⑤ you want your children to engage in more constructive activities.

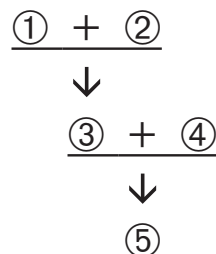


#### EXERCISE 4.32

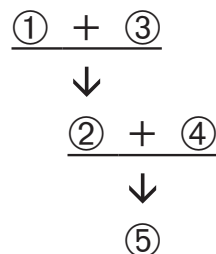
3. ① George won't be happy unless Peabody is elected. But ② Peabody won't get elected, since ③ he is not on the ballot; so ④ you can see for yourself what will follow from that. Now ⑤ if George is unhappy, then Grace will be unhappy, too. Thus, it is clear that ⑥ Grace will be unhappy. ④ George won't be happy.



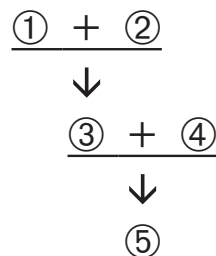
6. ① Benzene is a hydrocarbon, and ② all hydrocarbons are volatile organic compounds. Therefore, ③ benzene is a volatile organic compound. Because ④ all volatile organic compounds can be harmful to human health when released into the atmosphere, ⑤ benzene can be harmful to human health when released into the atmosphere.



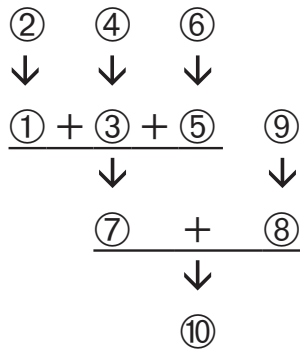
9. ① Infants may be programmed for fear. Thus, ② they will feel fear even without being taught about what is dangerous, because ③ a programmed emotional response requires no teaching. And ④ if infants feel fear even without being taught about what is dangerous, then parents need not be surprised when children express separation anxiety. Consequently, ⑤ parents need not be surprised by children's separation anxiety.



12. ① If both parents carry a gene for a serious hereditary disorder, then it is likely that the child will develop that disorder. Since ② both my husband and I carry the gene for a serious hereditary disorder, ③ our child is likely to develop this disorder. Given that ④ genetic counseling helps people make decisions about what to do in cases where children are likely to inherit serious genetic disorders, ⑤ we should consider getting genetic counseling.



15. Who ate the last slice of cheesecake from the office workroom? Well, there's no doubt that ① it had to be one of the office workers, since ② only they have keys to the workroom. But, ③ it couldn't have been any of the secretaries. After all, ④ they are all on low-fat diets. ⑤ It also couldn't have been any of the custodians, because ⑥ they are on vacation this week. This all proves that ⑦ the last slice of cheesecake must have been eaten by one of the members of the management team—CEO Jackson or President Gamboa. But ⑧ there's no way President Gamboa would have eaten the cheesecake, since ⑨ he's diabetic. We can conclude that ⑩ it had to be CEO Jackson.



### EXERCISE 4.33

3. This passage from Vaughn, Bos, and Schumm's *Teaching Exceptional, Diverse, and At-Risk Students* contains an explanation. The explanandum is that the number of children born with severe disabilities is on the rise. The explanans are that the number of children being born exposed to drugs and alcohol is increasing, and that medical advances have also resulted in more high-risk and low-birth-weight babies surviving and living longer.
6. I've noticed that ① Michael is becoming quite brawny. Clearly ② he is taking steroids again.



This passage contains an argument. The issue is whether Michael is taking steroids again. The conclusion is that Michael is taking steroids again. The premise is that Michael is becoming quite brawny.

9. ① Many people say they aren't very good with shape or that they have poor spatial sense. The typical belief is that ② you are either born with spatial sense or you are not. ③ This simply is not true! We now know that ④ rich experiences with shape and spatial relationships, when provided consistently over time, can and do develop spatial sense.



This passage from John A. Van De Walle's *Elementary and Middle School Mathematics* contains an argument. The issue is whether you are either born with spatial sense or not. The conclusion is that it is not true that you are either born with spatial sense or not. The premise is that rich experiences with shape and spatial relationships, when provided consistently over time, can and do develop spatial sense.

12. This passage from Sisela Bok's *Lying* contains neither an argument nor an explanation. It has only one claim, and both arguments and explanations need a minimum of two claims.
15. This passage from Schaffer and Kipp's *Developmental Psychology: Children and Adolescents* contains an explanation. The explanandum is that some students are called 'mastery oriented.' The explanans is that 'mastery oriented' students persist in the face of failure, believing that their increased effort will allow them to succeed.

## Chapter 5

### EXERCISE 5.2

3. Begging the question

**P:** Anyone who kills lots of people has lost the right to live.

∴ Serial killers have forfeited their right to live.

**Issue:** Whether serial killers have forfeited their right to live

## 6. Not a fallacy

**P1:** James had motive, opportunity, and no alibi for the time when the murder took place.

**P2:** James' fingerprints are all over the murder weapon.  
 ∴ James is a murderer.

**Issue:** Whether James is a murderer

## 9. Begging the question

**P:** Every university student should have to take at least one course in psychology.

∴ A psychology course should be required of all college students.

**Issue:** Whether a psychology course should be required of all college students

## EXERCISE 5.5

## 3. The arguer has the burden of proof, so this commits the fallacy of appeal to ignorance.

**P:** No one has shown why the Ten Commandments should not be engraved onto the courthouse.

∴ The Ten Commandments should be engraved onto the courthouse.

**Issue:** Whether the Ten Commandments should be engraved onto the courthouse

## 6. The arguer has the burden of proof, so this commits the fallacy of appeal to ignorance.

**P:** No one has presented evidence that rape wasn't reported in the American West in the nineteenth century.

∴ Rape was extraordinarily rare in the American West in the nineteenth century.

**Issue:** Whether rape was extraordinarily rare in the American West in the nineteenth century

## 9. The arguer has the burden of proof, so this commits the fallacy of appeal to ignorance.

**P:** Not once has the governor shown that he was telling the truth to his constituents about providing high paying jobs for his cronies.

∴ The governor lied to his constituents about providing high paying government jobs for his cronies.

**Issue:** Whether the governor lied to his constituents about providing high paying government jobs for his cronies

## EXERCISE 5.6

## 3. Appeal to ignorance

**P:** No one has ever shown that another kind of dog is easier to train than an Australian shepherd.

∴ Australian shepherds are the easiest dogs to train.

**Issue:** Whether Australian shepherds are the easiest dogs to train

## 6. Begging the question

**P:** My child is so intelligent.

∴ My child is smart.

**Issue:** Whether my child is smart

## 9. Appeal to ignorance

**P:** No one has ever shown that the palm reader's readings aren't accurate.

∴ You should believe what the palm reader tells you.

**Issue:** Whether you should believe what the palm reader tells you

## EXERCISE 5.9

## 3. Appeal to illegitimate authority

**P:** Dow Constantine was publicly endorsed by the rock band Pearl Jam.

∴ Dow Constantine is the best candidate for the job of King County Executive.

**Issue:** Whether Dow Constantine is the best candidate for the job of King County Executive

## 6. Appeal to illegitimate authority

**P:** Aldous Huxley was convinced that wearing eye glasses makes the eyes weaker.

∴ We should not get corrective glasses to improve our sight.

**Issue:** Whether we should get corrective glasses to improve our sight

## 9. Appeal to illegitimate authority

**P:** Madonna claims that heart disease can be avoided by meditation.

∴ Taking up meditation should be your New Year's resolution.

**Issue:** Whether taking up meditation should be your New Year's resolution

### EXERCISE 5.12

3. Ad hominem

**P1:** Mr. Johnson argues that oil deposits in Warren County will last another 100 years.

**P2:** Mr. Johnson is the president of Lone Star Oil Company.

∴ The oil deposits in Warren County will not last another 100 years.

**Issue:** Whether the oil deposits in Warren County will last another 100 years

6. Ad hominem

**P1:** The economist John Flamingo argues that we should all invest in the stock market.

**P2:** The economist John Flamingo hasn't invested any of his money in the stock market.

∴ We should not invest in the stock market.

**Issue:** Whether we should all invest in the stock market

9. Ad hominem

**P1:** Frank has argued that planting trees near your home will reduce summertime energy use.

**P2:** Frank is just looking to increase his landscaping business.

∴ Planting trees near your home will not reduce summertime energy use.

**Issue:** Whether planting trees near your home will reduce summertime energy use

### EXERCISE 5.13

3. Ad hominem

**P1:** The Russian government recently argued that the West should not set up a missile defense system in Eastern Europe.

**P2:** Russia is still locked into a Cold War mentality.  
∴ The West should set up a missile defense system in Eastern Europe.

**Issue:** Whether the West should set up a missile defense system in Eastern Europe

6. Ad hominem

**P1:** The National Dairy Board has argued that milk producers must be granted subsidies.

**P2:** The Dairy Board just wants its members to make more money while you pay more for groceries.

∴ Milk producers should not be granted subsidies.

**Issue:** Whether milk producers should be granted subsidies

9. Appeal to illegitimate authority

**P:** The quarterback of our university's football team says that athlete's foot can be cured by not washing your feet more than twice a week.

∴ Athlete's foot can be cured by not washing your feet more than twice a week.

**Issue:** Whether athlete's foot can be cured by not washing your feet more than twice a week

### EXERCISE 5.15

3. This argument commits the strawman fallacy. The conclusion this arguer supports is an exaggerated version of the abortion opponent's stance. They do not call for the elimination of all birth control.

**P1:** Not everyone can afford to have a child.

**P2:** Legal birth control allows families to plan their pregnancies.

∴ Outlawing every form of birth control is a bad idea.

**Issue:** Whether abortion should be opposed

6. This argument commits a strawman fallacy, because the arguer distorts the view of those favoring a multicultural curriculum. They do not say they favored teaching nothing but multicultural "dogma."

**P:** Teaching nothing but multicultural dogma will leave our students deficient in the basic skills they need to learn such as math, reading, and science.

∴ We should reject teaching nothing but multicultural dogma.

**Issue:** Whether a multicultural curriculum in elementary school will lead to more tolerance and fewer biases toward those perceived as "different"

9. This argument commits the strawman fallacy, because the arguer distorts the view of the



employers. They do not say that they want to spy on the private lives of their employees and learn everything about them.

**P:** No one supports Big Brother spying on employees' private lives to learn everything about them

∴ Employers should not be allowed to spy on the private lives of their employees and learn everything about them.

**Issue:** Whether employers have the right to monitor employee Internet use

### EXERCISE 5.17

#### 3. Red herring fallacy

**P1:** Texting is a great way to stay in touch with family and friends.

**P2:** Texting allows you to send someone a message whenever you want.

**P3:** Texting is fun.

∴ Texting while driving is not as dangerous as drinking and driving.

**Issue:** Whether texting while driving is as dangerous as drinking and driving

#### 6. Red herring fallacy

**P1:** Pianos cost a lot of money.

**P2:** Piano lessons are difficult to arrange.

**P3:** Most people lack sufficient room for such a large instrument as a piano.

∴ Learning to play the piano does not help children do better at math.

**Issue:** Whether learning to play the piano helps children do better at math

#### 9. Red herring fallacy

**P1:** Without nations we would be living in tribal groups, fighting with other tribes over hunting territories.

**P2:** Nationalism has allowed the human race to make progress in combating disease, malnutrition, superstition, and many other evils people experience in tribal culture.

∴ Nationalism was not a volatile force in the mid-nineteenth century.

**Issue:** Whether nationalism was a volatile force in the mid-nineteenth century

### EXERCISE 5.18

#### 3. Strawman fallacy

**P1:** We need to pay for additional inventory.

**P2:** We need to pay our suppliers.

**P3:** We need to put money away for a rainy day.

∴ Using all the company savings just to enrich the employees is a bad idea.

**Issue:** Whether the new contract should include a raise that keeps employee wages in line with inflation

#### 6. Strawman fallacy

**P:** Competition is unfair if athletes are allowed to cheat without consequences.

∴ The integrity of sports cannot be maintained if we just let athletes who use performance enhancers off with no penalties at all.

**Issue:** Whether we should suspend athletes who use performance enhancers

#### 9. No fallacy

**P1:** The leg bones of young horses are not very strong.

**P2:** If the leg bones of young horses are not strong, then injury can easily result.

∴ Racing a horse before it is fully mature can result in life-threatening leg injuries.

**Issue:** Whether racing a horse before it is fully mature can result in life-threatening leg injuries

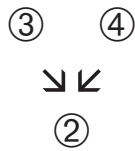
### EXERCISE 5.19

3. This passage from A. L. Hinton's *Annihilating Difference* contains neither an argument nor an explanation. Both arguments and explanations require a minimum of two claims, and this passage contains only one claim.

6. This passage contains an argument. The issue is whether Iraq had WMDs. The conclusion is that Iraq did have WMDs. The premise is that no one ever showed Iraq did not have WMDs.

This argument commits the fallacy of appeal to ignorance, because the arguer illegitimately shifts the burden of proof.

9. ① Some say that only losers who don't know how to have a good time save for retirement. ② This attitude is just false. The reality is that ③ if you manage your finances efficiently and start working towards your goals sooner, you can spend more in the long run. Besides, ④ who says spending all your money is the only way to have fun?  
④ Spending all your money is not the only way to have fun.



This passage from Eric Tyson's *Personal Finances for Dummies* contains an argument. This issue is whether only losers who don't know how to have a good time save for retirement. The conclusion is that it is not true that only losers who don't know how to have a good time save for retirement. The first premise is that if you manage your finances efficiently and start working towards your goals sooner, you can spend more in the long run. The second premise is that spending all your money is not the only way to have fun.

12. ① A team of engineers found that Hurricane Katrina damaged the structural integrity of the Lake Pontchartrain bridge. Therefore, ② the bridge will have to be closed until its safety can be assured.

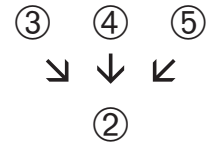


This passage contains an argument. This issue is whether the Lake Pontchartrain bridge will have to be closed until its safety can be assured. The conclusion is that the Lake Pontchartrain bridge will have to be closed until its safety can be assured. The premise is that a team of engineers found that Hurricane Katrina damaged the structural integrity of the Lake Pontchartrain bridge.

15. ① Some people argue that we should increase foreign aid to Pakistan. But ② this is a terrible idea!

- ③ Pakistan is currently too unstable and  
④ their regime is corrupt. Furthermore, ⑤ they may use the money to attack neighboring countries like India.

- ② We should not increase foreign aid to Pakistan.



This passage contains an argument. The issue is whether we should increase foreign aid to Pakistan. The conclusion is that we should not increase foreign aid to Pakistan. The first premise is that Pakistan is unstable. The second premise is that Pakistan's regime is corrupt. The third premise is that Pakistan may use foreign aid to attack neighboring countries like India.

18. This passage contains an argument. The issue is whether money spent on space exploration could be better spent here on Earth. The conclusion is that money spent on space exploration could not be better spent here on Earth. The first premise is that people are natural explorers. The second premise is that space offers the last frontier for us to explore. The third premise is that the technology that will result from the space program will have many uses in satellite and missile defense systems.

This argument commits the red herring fallacy because the premises given distract the reader from the issue. None of the premises addresses whether the money could be better spent for other projects.

## Chapter 6

### EXERCISE 6.4

3. Deductive argument

**P1:** Mitchell's roommate has seen the *Lord of the Rings* trilogy four times.

**P2:** Rita has never seen the *Lord of the Rings* trilogy.

∴ Rita cannot be Mitchell's roommate.

**Issue:** Whether Rita can be Mitchell's roommate

## 6. Deductive argument

**P1:** A dolphin is smaller than an elephant.

**P2:** An elephant is smaller than a flea.

∴ A dolphin is smaller than a flea.

**Issue:** Whether a dolphin is smaller than a flea

## 9. Inductive argument

**P:** Recent opinion polling done by the *New York Times* showed that 75% of university students under the age of 25 work at least 20 hours per week.

∴ About three-quarters of my students work at least 20 hours per week.

**Issue:** Whether about three-quarters of my students work at least 20 hours per week

**EXERCISE 6.8**

- 3. Truth-functional argument
- 6. Truth-functional argument
- 9. Truth-functional argument

**EXERCISE 6.9**

- 3. Inductive generalization
- 6. Inductive generalization
- 9. Inductive generalization
- 12. Analogical argument
- 15. Causal argument

**EXERCISE 6.13**

- 3. Causal argument; strong/weak; cogent/uncogent
- 6. Truth-functional argument; valid/invalid; sound/unsound
- 9. Analogical argument; strong/weak; cogent/uncogent
- 12. Truth-functional argument; valid/invalid; sound/unsound
- 15. Analogical argument; strong/weak; cogent/uncogent
- 18. Inductive generalization; strong/weak; cogent/uncogent

**EXERCISE 6.14**

- 3. ① People who have computer addictions will likely benefit from psychological counseling services. This is because ② computer addictions are

like drug addictions, and ③ people with drug addictions often benefit from psychological counseling.

$$\begin{array}{c} \textcircled{2} + \textcircled{3} \\ \downarrow \\ \textcircled{1} \end{array}$$

This passage contains an argument. The issue is whether people who have computer addictions will likely benefit from psychological counseling services. The conclusion is that people who have computer addictions will likely benefit from psychological counseling services. The first premise is that computer addictions are like drug addictions. The second premise is that people with drug addictions often benefit from psychological counseling.

The argument is an inductive analogical argument.

- 6. ① Any society ruled by philosophers is a just one.
- ② No society is ruled by philosophers. Therefore,
- ③ no societies are just.

$$\begin{array}{c} \textcircled{1} + \textcircled{2} \\ \downarrow \\ \textcircled{3} \end{array}$$

This passage contains an argument. The issue is whether any societies are just. The conclusion is that no societies are just. The premises are that any society ruled by philosophers is a just one, and no society is ruled by philosophers.

This argument is a deductive categorical argument.

- 9. ① An "online affair" is just like an affair in person because ② they both devalue their primary partners. Since ③ divorce is the appropriate response to an affair in person, ④ it is also an appropriate response to an online affair.

$$\begin{array}{c} \textcircled{2} \\ \downarrow \\ \textcircled{1} + \textcircled{3} \\ \downarrow \\ \textcircled{4} \end{array}$$

This passage contains an argument. The issue is whether divorce is an appropriate response to an online affair. The conclusion is that divorce is an appropriate response to an online affair. The first premise is that an online affair is just like an affair in person. The second premise is that divorce is the appropriate response to an affair in person.

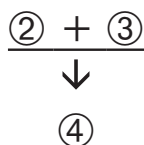
This passage contains a subargument. The intermediate conclusion is that an online affair is like an affair in person. The premise is that both online affairs and affairs in person devalue their primary partners.

The argument is an inductive analogical argument.

12. This passage is an argument. The issue is whether poverty causes crime. The conclusion is that poverty does not cause crime. The premises are that crimes such as domestic violence and sexual assault are underreported, and that we will not know how prevalent crime is unless the stigma attached to being victimized is overcome.

The argument commits the red herring fallacy because the premises given distract the reader from the issue. Neither premise addresses whether poverty causes crime.

15. ① In 2010, an oil drilling rig leased by British Petroleum (BP) was damaged from an explosion, and oil began gushing out of a broken pipe into the Gulf of Mexico. ② Less than one month after the accident, 156 sea turtles have been found dead or debilitated along the Gulf Coast. Since ③ this is a much higher amount than what is typical for the season, it is reasonable to conclude that ④ the sea turtle deaths are a result of the oil spill.



This passage contains an argument. The issue is whether the higher number of sea turtle deaths in 2010 was caused by the British Petroleum oil spill. The conclusion is that the higher number of sea turtle deaths in 2010 was caused by the British Petroleum oil spill. The first premise is that less than one month after oil began gushing out of a broken pipe into the Gulf of Mexico, 156 sea turtles have been found dead or debilitated along the Gulf Coast. The second premise is that 156 dead or

debilitated sea turtles is a much higher amount than what is typical for the season.

The argument is an inductive causal argument.

## Chapter 7

### EXERCISE 7.2

3. Some S are P.
6. No S are P.
9. Some S are not P.
12. Some fleas are not insects.
15. Some oranges are not vegetables.
18. Some rhinos are not pterodactyls.

### EXERCISE 7.5

3. Some violins are expensive instruments.
6. All physicians are people in the military.
9. In standard form.
12. All stagehands are people in the cast.
15. In standard form.

### EXERCISE 7.7

3. All people identical to Theodore Roosevelt are people who fought in the Spanish-American War.
6. All people who die young are good people.
9. All people identical to my biology professor are cousins of mine.
12. All mammals are cows.
15. All people who enter the movie theater are people over the age of 17.

### EXERCISE 7.8

3. Some bears are not mammals.
6. All objects made of wood are flammable objects.
9. No children are people in class.
12. All places there is a bull are places there is a cow.
15. All universal tools are duct tapes.
18. No navigators are people in the clouds.
21. Some shirts are clothes.
24. Some calves are not Holsteins.

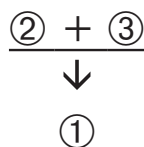
### EXERCISE 7.10

3. Major: barn owls  
Minor: animals  
Middle: pets

6. Major: people who can relax  
 Minor: executives  
 Middle: workaholics
9. Major: bread slices  
 Minor: crusts  
 Middle: heels

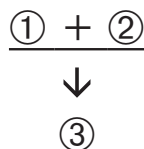
**EXERCISE 7.12**

3. ① Jack-o-lanterns are pumpkins, for ② jack-o-lanterns are Halloween objects, and ③ some Halloween objects are pumpkins.



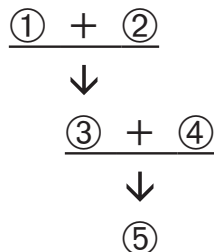
All jack-o-lanterns are Halloween objects.  
Some Halloween objects are pumpkins.  
 All jack-o-lanterns are pumpkins.

6. ① Not every calf is a Holstein. Since ② every Holstein lives in a barnyard, ③ some calves do not live in barnyards.

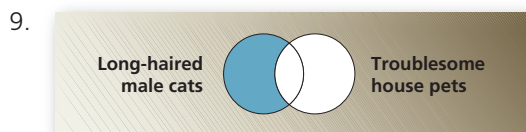
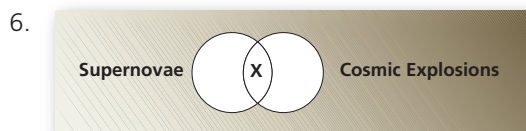
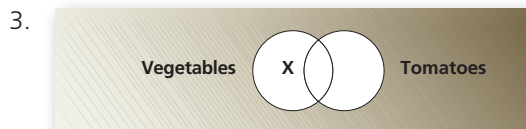


Some calves are not Holsteins.  
All Holsteins are animals that live in a barnyard.  
 Some calves are not animals that live in a barnyard.

9. ① All languages that are not spoken regularly are dead languages, and ② Latin is not spoken regularly. Consequently, ③ Latin is a dead language. Given that ④ Greek is also a dead language, ⑤ Greek is Latin.



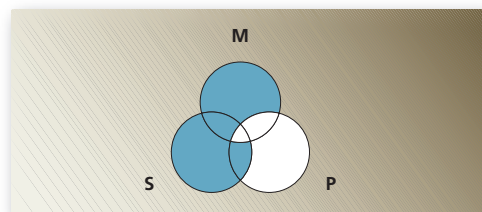
All languages identical to Latin are dead languages.  
All languages identical to Greek are dead languages.  
All languages identical to Greek are languages identical to Latin.

**EXERCISE 7.16****EXERCISE 7.17**

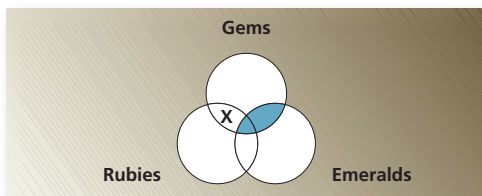
3. All cosmic explosions are supernovae.  
 6. All charter boat captains are Navy Seals.

**EXERCISE 7.20**

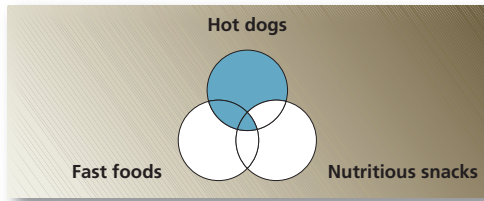
3. Valid



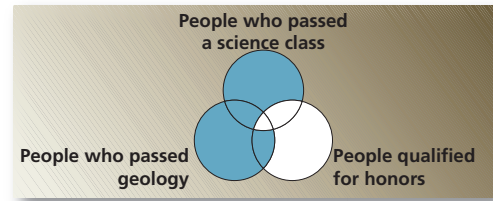
6. Valid



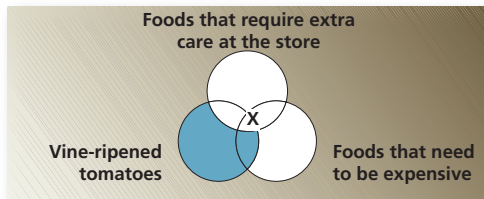
9. Invalid



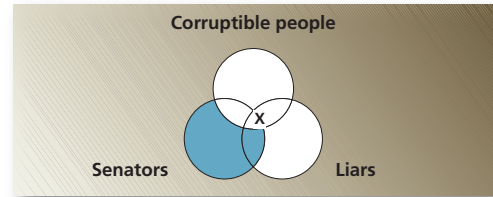
6. Valid



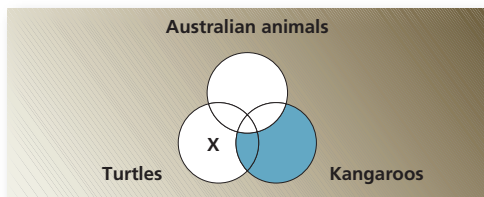
12. Invalid



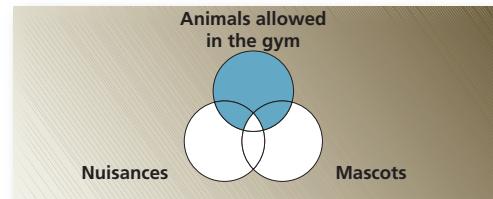
9. Invalid



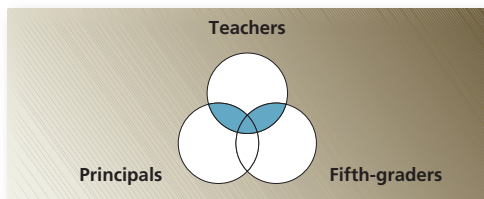
15. Valid



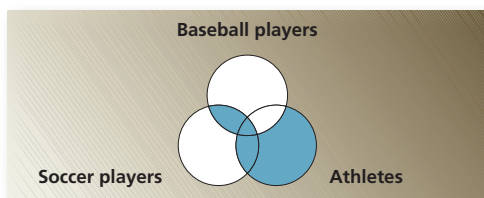
12. Invalid



18. Invalid

**EXERCISE 7.21**

3. Invalid

**EXERCISE 7.24**

- 3. Some M are not S.
- 6. Some kangaroo rats are members of an endangered species.
- 9. All good ice creams are chocolate ice creams.

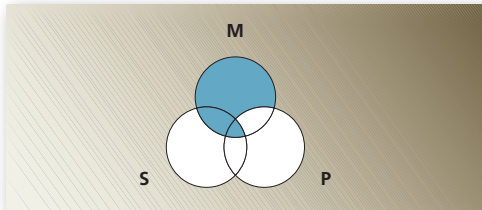
**EXERCISE 7.25**

- 3. Invalid. The middle term is not distributed.
- 6. Invalid. A valid argument cannot have two universal premises and a particular conclusion; if a premise is negative, the conclusion must be negative.
- 9. Invalid. A term (*nutritious snacks*) is distributed in the conclusion but not in a premise.
- 12. Invalid. The middle term is not distributed.
- 15. Valid.
- 18. Invalid. A valid argument cannot have two negative premises.
- 21. Invalid. The middle term is not distributed; *legumes* is distributed in the conclusion but not in the premise.

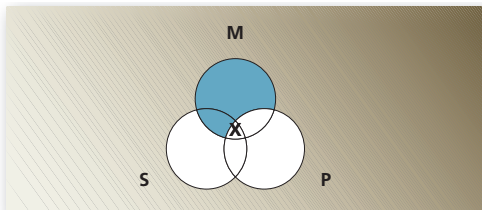


**EXERCISE 7.26**

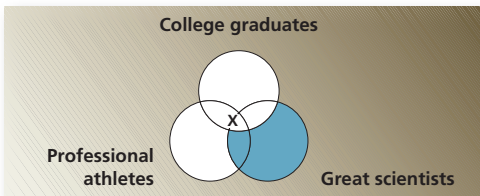
3. Invalid. A term ( $P$ ) is distributed in the conclusion but not in a premise.



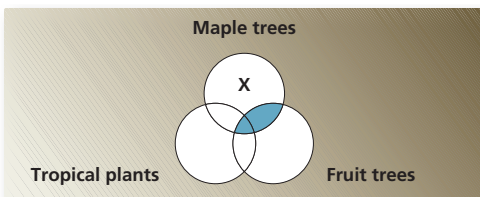
6. Valid.



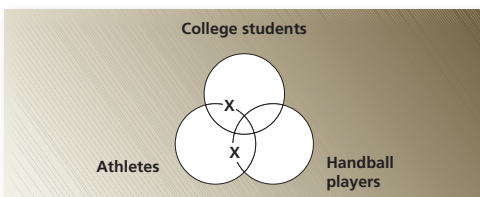
9. Invalid. The middle term is not distributed.



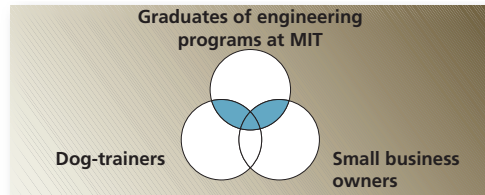
12. Invalid. The argument has two negative premises.



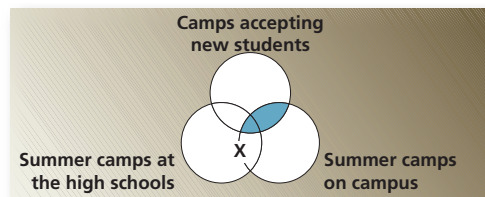
15. Invalid. The argument has two negative premises.

**EXERCISE 7.27**

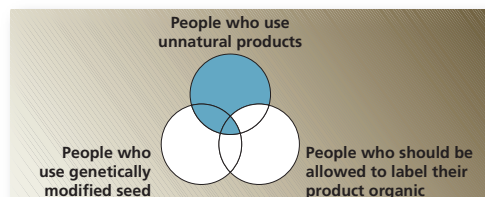
3. Invalid. A valid syllogism cannot have two negative premises.



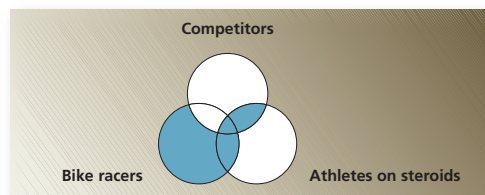
6. Invalid. A valid syllogism cannot have two negative premises; if a premise is negative, the conclusion must be negative.



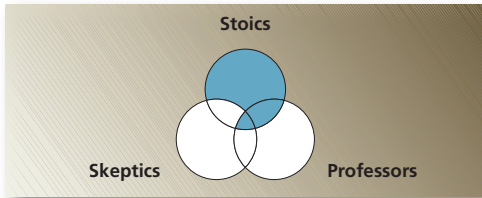
9. Invalid. A term (*people who should be allowed to label their crops as organic*) is distributed in the conclusion but not distributed in a premise.



12. Valid.



15. Invalid. A term (*skeptics*) is distributed in the conclusion but not distributed in a premise.

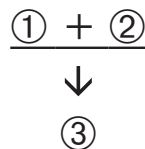


**EXERCISE 7.31** (\*indicates the missing claim)

3. \*All Y are Z.  
 All X are Y.  
 All X are Z.
6. All good things to eat are things low in calories.  
 \*No things low in calories are mature lobsters.  
 No mature lobsters are good things to eat.
9. \*Some elephants are not tangerines.  
 All elephants are calliopes.  
 Some calliopes are not tangerines.
12. All true sailors are pirates.  
 \*Some true sailors are tank commanders.  
 Some tank commanders are pirates.
15. \*Some places the sun shines are places in the shade.  
 No places plants will grow are places in the shade.  
 Some places the sun shines are not places plants will grow.

**EXERCISE 7.32**

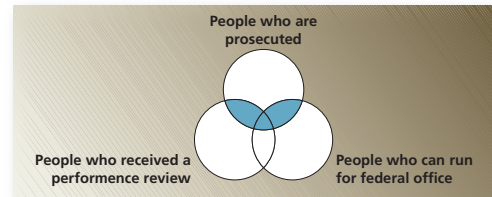
3. ① Nobody who received a performance bonus will be prosecuted, and ② nobody who is prosecuted can run for federal office. Hence, ③ nobody who received a performance bonus can run for federal office.



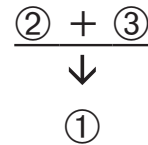
This passage contains an argument. The issue is whether anybody who received a performance bonus can run for federal office. The conclusion is that nobody who received a performance bonus can run for federal office. The premises are that nobody who received a performance bonus will be prosecuted, and that nobody who is prosecuted can run for federal office.

This argument is a deductive categorical syllogism. It is invalid because it has two negative premises, as shown in standard form below. Alternatively, it is invalid, as shown in the Venn diagram below.

No people who received a performance bonus are people who are prosecuted.  
 No people who are prosecuted are people who can run for federal office.  
 No people who received a performance bonus are people who can run for federal office.



6. ① A platypus is really a mammal. This is because  
 ② a platypus gives birth to live young, and  
 ③ only mammals give birth to live young.



This passage contains an argument. The issue is whether a platypus is really a mammal. The conclusion is that a platypus is really a mammal. The premises are that a platypus gives birth to live young, and only mammals give birth to live young.

This passage is a deductive categorical syllogism. It is valid because all rules of valid syllogisms are

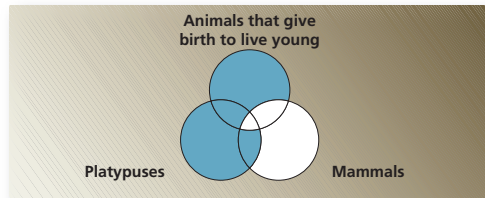


followed, as shown in the standard form below. Alternatively, it is valid, as shown in the Venn diagram below.

All platypuses are animals that give birth to live young.

All animals that give birth to live young are mammals.

All platypuses are mammals.



9. This passage contains an explanation. The explanandum is that many commercials on late at night are called "infomercials." The explanans is that infomercials purport to give information but are really just long commercials.
12. This passage from Shelby Foote in *Conversations with Shelby Foote*, edited by William C. Carter, contains an explanation. The explanandum is that I use a dip pen. The explanans is that using a dip pen slows me down and keeps me from rushing the writing.
15. ① When a 1989 Gallup Poll asked 1,249 adults to compare contemporary youth to those of 20 years ago, topping the list were the words "Selfish" (81 percent), "Materialistic" (79 percent), and "Reckless" (73 percent). ② These descriptors and the other data cited in the study are diametrically opposed to how teens actually view themselves. ③ A survey of 1,015 high school students cited in the study found that the values teens hold dear are "being honest" (8.6 on a 10-point scale), "working hard" (8.4), "being a good student" (7.9), and "giving time to help others" (7.6).

③



②

This passage from Kent Baxter's "(Re)inventing Adolescence," in *The Hedgehog Review* contains an argument. The issue is whether the results of a 1989 Gallup Poll survey of adults who

tended to view contemporary youth as "selfish," "materialistic," and "reckless" are diametrically opposed to how teens actually view themselves. The conclusion is that the results of a 1989 Gallup Poll survey of adults who tended to view contemporary youth as "selfish," "materialistic," and "reckless" are diametrically opposed to how teens actually view themselves. The premise is that a survey of 1,015 high school students cited in the 1989 Gallup Poll found that the values teens hold dear are "being honest" (8.6 on a 10-point scale), "working hard" (8.4), "being a good student" (7.9), and "giving time to help others" (7.6).

This argument is an inductive generalization.

## Chapter 8

### EXERCISE 8.9

3. I • D

I = The player on the field appears to be injured.

D = The team doctor has been called to the scene.

6. C • T

C = Loose clothing is more comfortable in hot weather.

T = I have trouble finding loose clothing that is attractive.

9. B  $\supset$  C

B = A bear is in the house.

C = A crocodile is in the yard.

12.  $\sim$  B

B = You definitely have a bronchial infection.

15. H  $\supset$  P

H = Primroses are hearty in our climate.

P = Primroses are protected from the gophers.

18. S  $\supset$  F

S = The regiment is split into two battalions.

F = The regiment will be more flexible.

**EXERCISE 8.12**

- 3. Disjunction
- 6. Conditional
- 9. Conjunction

**EXERCISE 8.13**

- 3. Conditional  $\sim C \supset D$

C = The pet owner is extremely consistent.  
 D = Housebreaking a new kitten can be difficult.

- 6. Conditional  $\sim P \supset \sim R$

R = You can register your car.  
 P = You pass the smog inspection.

- 9. Conditional  $O \supset (D \vee M)$

D = We can go out to dinner.  
 M = We can go to the movies.  
 O = You want to go out tonight.

**EXERCISE 8.15**

- 3. Denying the antecedent
- 6. Modus ponens
- 9. Affirming the consequent

**EXERCISE 8.16**

- 3. Affirming the consequent

**EXERCISE 8.17**

- 3. Valid, modus ponens

① The movie will be too gruesome to watch if it has a lot of violence. ② It does have a lot of violence; therefore ③ it will be too gruesome to watch.

$$\begin{array}{c} \textcircled{1} + \textcircled{2} \\ \hline \downarrow \\ \textcircled{3} \end{array}$$

V = The movie has a lot of violence.  
 G = The movie will be too gruesome to watch.

$$\begin{array}{c} V \supset G \\ V \\ \hline G \end{array}$$

- 6. Valid, modus tollens

① The story you wrote is not a fairy tale.  
 Accordingly, ② it is not for children, because  
 ③ if a story is for children, then it is a fairy tale.

$$\begin{array}{c} \textcircled{1} + \textcircled{3} \\ \hline \downarrow \\ \textcircled{2} \end{array}$$

C = The story you wrote is for children.

F = The story you wrote is a fairy tale.

$C \supset F$

$$\begin{array}{c} \sim F \\ \hline \sim C \end{array}$$

- 9. Invalid, affirming the consequent

① The mail carrier is the one who stole my package! ② I never received my package, and ③ if the mail carrier stole my package, then I wouldn't have received it.

$$\begin{array}{c} \textcircled{2} + \textcircled{3} \\ \hline \downarrow \\ \textcircled{1} \end{array}$$

S = The mail carrier stole my package.

R = I received my package.

$S \supset \sim R$

$$\begin{array}{c} \sim R \\ \hline S \end{array}$$

- 12. Valid, modus ponens

① You are going to end up on academic probation. Why? Because ② you are going to the party tonight, and ③ if you go to the party tonight, you will end up on academic probation because ④ you won't have time to finish your term paper.

$$\begin{array}{c} \textcircled{4} \\ \downarrow \\ \textcircled{2} + \textcircled{3} \\ \hline \downarrow \\ \textcircled{1} \end{array}$$

P = You go to the party tonight.

A = You will end up on academic probation.

$P \supset A$

$\frac{P}{A}$

15. Valid, modus ponens

① Gay marriage? Why not? ② If we allow infertile heterosexual couples to marry, then we should allow same-sex couples to marry, and, of course, ③ we should allow infertile heterosexual couples to marry.

① Gay marriage should be allowed.

$\frac{\textcircled{2} + \textcircled{3}}{\downarrow}$

$\downarrow$

①

I = We should allow infertile heterosexual couples to marry.

G = We should allow same-sex couples to marry.

$I \supset G$

$\frac{I}{G}$

18. Valid, modus tollens

① If Paula is a grandmother, then either her son or her daughter has a child. ② Paula is not a grandmother, since ③ neither her son nor her daughter has a child.

$\frac{\textcircled{1} + \textcircled{3}}{\downarrow}$

$\downarrow$

②

P = Paula is a grandmother.

S = Paula's son has a child.

D = Paula's daughter has a child.

$P \supset (S \vee D)$

$\frac{\sim (S \vee D)}{\sim P}$

### EXERCISE 8.21

3. The conjunction is false.

A = Africa is a country.

K = Ketchup is a vegetable.

$\frac{A \bullet K}{F \quad F \quad F}$

6. The negation is true.

A = Apples are purple.

C = Carrots are green.

$\frac{\sim (A \vee C)}{T \quad F \quad F \quad F}$

9. The disjunction is false.

A = Africa is a country.

L = Lima is the capital of Peru.

$\frac{A \vee \sim L}{F \quad F \quad F \quad T}$

12. The negation is true.

H = Horses have hooves.

P = Puppies can fly.

$\frac{\sim (H \bullet P)}{T \quad T \quad F \quad F}$

15. The disjunction is true.

G = Golf is a sport.

S = Cowboys wear ballet slippers.

C = Christmas is in July.

$\frac{(S \supset G) \vee C}{F \quad T \quad T \quad T \quad F}$

18. The conditional is true.

Q = Queen Latifah has visited the Grand Canyon.

A = Africa is a country.

$\frac{Q \supset \sim A}{? \quad T \quad T \quad F}$

### EXERCISE 8.23

3. The argument is valid.

E	$\supset$	F	/	F	$\supset$	G	//	E	$\supset$	G
T	T	T		T	T	T		T	T	T
T	T	T		T	F	F		T	F	F
T	F	F		F	T	T		T	T	T
T	F	F		F	T	F		T	F	F
F	T	T		T	T	T		F	T	T
F	T	T		T	F	F		F	T	F
F	T	F		F	T	T		F	T	T
F	T	F		F	T	F		F	T	F

6. The argument is valid.

N	•	~	O	//	N
T	F	F	T		T
T	T	T	F		T
F	F	F	T		F
F	F	T	F		F

9. The argument is invalid.

Z	∨	W	/	W	•	~	X	//	Z	⊃	(W	•	X)
T	T	T		T	F	F	T		T	T	T	T	T
T	T	T		T	T	T	F		T	F	T	F	F
T	T	F		F	F	F	T		T	F	F	F	T
T	T	F		F	F	T	F		T	F	F	F	F
F	T	T		T	F	F	T		F	T	T	T	T
F	T	T		T	T	T	F		F	T	T	F	F
F	F	F		F	F	F	T		F	T	F	F	T
F	F	F		F	F	T	F		F	T	F	F	F

### EXERCISE 8.24

3. The argument is invalid.

W = Federal prosecutors are convinced they can win a criminal case against AIG (American International Group, Inc.).

D = Federal prosecutors will drop the criminal case against AIG (American International Group, Inc.).

~	W	⊃	D	/	~	(W	•	D)	//	~	W
F	T	T	T		F	T	T	T		F	T
F	T	T	F		T	T	F	F		F	T
T	F	T	T		T	F	F	T		T	F
T	F	F	F		T	F	F	F		T	F

6. The argument is invalid.

R = The judge should remove herself from the case.

C = The judge has a conflict of interest.

I = The judge is ill.

R	⊃	(C	∨	I)	/	C	•	I	//	~	R
T	T	T	T	T		T	T	T		F	T
T	T	T	T	F		T	F	F		F	T
T	T	F	T	T		F	F	T		F	T
T	F	F	F	F		F	F	F		F	T
F	T	T	T	T		T	T	T		T	F
F	T	T	T	F		T	F	F		T	F
F	T	F	T	T		F	F	T		T	F
F	T	F	F	F		F	F	F		T	F

9. The argument is valid.

C = The criminal justice major prepares graduates to work as CSIs.

P = The criminal justice major prepares graduates to work as prison guards.

E = The number of criminal justice majors exceeds the number of job openings.

(C	•	P)	⊃	E	/	~	E	//	~	C	∨	~	P
T	T	T	T	T		F	T		F	T	F	F	T
T	T	T	F	F		T	F		F	T	F	F	T
T	F	F	T	T		F	T		F	T	T	T	F
T	F	F	T	F		T	F		F	T	T	T	F
F	F	T	T	T		F	T		T	F	T	F	T
F	F	T	T	F		T	F		T	F	T	F	T
F	F	F	T	T		F	T		T	F	T	T	F
F	F	F	T	F		T	F		T	F	T	F	F

### EXERCISE 8.27

3. The argument is invalid.

G	⊃	J	/	~	J	⊃	I	//	~	I	⊃	G
F	T	T		F	T	T	F		T	F	F	F

6. The argument is invalid.

~	A	⊃	(B	∨	C)	/	~	B	//	C	⊃	A
T	F	T		F	T		T	F		T	F	F

9. The argument is invalid.

~	A	⊃	B	/	C	⊃	A	/	~	B	//	A	∨	~	B
T	F	T	T		F	T	F		F	T	F	T	F	F	F

### EXERCISE 8.28

3. The argument is valid.

A = We will avoid further catastrophic bridge collapses like the I-35 Mississippi River bridge collapse in Minnesota in 2007.

S = Congress will authorize massive spending for retrofitting the aging bridges in this country.

R = Congress will be responsible for the loss of life in future bridge collapses.

O = Congress will do something to outrage the voters.

S	∨	R	/	R	⊃	O	/	~	O	//	A	⊃	S
F	F	F		F	T	F		T	F		T	F	F

OR

$$\frac{S \vee R / R \supset O / \sim O // A \supset S}{\text{FTT TFF TF TFF}}$$

OR

$$\frac{S \vee R / R \supset O / \sim O // A \supset S}{\text{FTT TTT FT TFF}}$$

6. The argument is valid.

S = Your car will start.

O = Your car is out of gas.

B = Your car's battery is dead.

$$\frac{\sim S \supset (O \vee B) / \sim O // S \vee B}{\text{TFF FFF TF FFF}}$$

OR

$$\frac{\sim S \supset (O \vee B) / \sim O // S \vee B}{\text{TFT TTF FT FFF}}$$

9. The argument is invalid.

R = Proposition 8 is a constitutional revision.

B = Proposition 8 is quantitatively broad.

D = Proposition 8 is qualitatively deep.

P = Proposition 8 was properly introduced.

V = Proposition 8 is a valid law.

$$\frac{R \supset (B \vee D) / (R \supset \sim P) \bullet (\sim P \supset \sim V) / \sim B \bullet \sim D // \sim V}{\text{FTFFF FTFTT FTTFT TFTTF FT}}$$

**EXERCISE 8.30**

3. This passage contains neither an argument nor an explanation. It has at least two claims, but neither of them gives a reason for any other, as is required in arguments and explanations.
6. ① African Americans are similar to other groups of people who have a country of origin outside the United States. ② We routinely refer to Irish Americans, Polish Americans, and Chinese Americans, for instance, using the country of origin as the primary descriptor. Therefore, ③ we should designate people whose country of origin is in Africa as African Americans.

$$\frac{\text{①} + \text{②}}{\downarrow}$$

③

This passage from Walker, Spohn, and DeLeone's *The Color of Justice* contains an argument. The issue is whether we should refer to people whose country

of origin is in Africa as African Americans. The conclusion is that we should refer to people whose country of origin is in Africa as African Americans. The first premise is that African Americans are similar to any other group of people who have a country of origin outside the United States. The second premise is that we refer to Irish Americans, Polish Americans, and Chinese Americans using the country of origin as the primary descriptor.

The argument is an inductive analogical argument.

9. This passage from Kaibara Ekken in Peter Duus's *Modern Japan*, contains neither an argument nor an explanation. It contains only one claim, and both arguments and explanations contain at least two claims.
12. ① Either profits for home sellers will increase or additional fees will be assessed on homebuyers. This is because ② if profits for home sellers increase, then realtors will have fewer customers and additional fees will be assessed on homebuyers. It turns out that ③ realtors will not have fewer customers and additional fees will not be assessed on home buyers.

$$\frac{\text{②} + \text{③}}{\downarrow}$$

①

This passage contains an argument. The issue is whether profits for home sellers will increase or additional fees will be assessed on homebuyers. The conclusion is that either profits for home sellers will increase or additional fees will be assessed on homebuyers. The first premise is that if profits for home sellers increase, then realtors will have fewer customers and additional fees will be assessed on homebuyers. The second premise is that realtors will not have fewer customers and additional fees will not be assessed on home buyers.

This argument is a deductive truth-functional argument. It is invalid, as shown by the shortcut method below.

I = Profits for home sellers increase.

F = Realtors will have fewer customers.

A = Additional fees will be assessed on homebuyers.

$$\frac{I \supset (F \bullet A) / \sim F \bullet \sim A // I \vee A}{\text{FTFFF TFTTF FFF}}$$

15. This passage contains an explanation. The explanandum is that a promissory note is widely used

as evidence in bankruptcy proceedings. The explanation is that a promissory note is a signed written promise to repay a debt.

## Chapter 9

### EXERCISE 9.3

3. **P1:** Beefsteak tomatoes are very juicy.

**P2:** Roma tomatoes are like Beefsteak tomatoes.  
 $\therefore$  Roma tomatoes are juicy.

**Issue:** Whether Roma tomatoes are juicy

① Beefsteak tomatoes are very juicy. ② Roma tomatoes are like Beefsteak tomatoes. Thus,  
 ③ Roma tomatoes are likely to be juicy.

$$\begin{array}{c} \textcircled{1} + \textcircled{2} \\ \hline \downarrow \\ \textcircled{3} \end{array}$$

6. **P1:** The second chemistry exam is similar to the first chemistry exam.

**P2:** You did well on the first chemistry exam.  
 $\therefore$  You will do well on the second chemistry exam.

**Issue:** Whether you will do well on the second chemistry exam

① The second chemistry exam is similar to the first chemistry exam. Because ② you did well on the first exam, it's likely that ③ you will do well on the second exam.

$$\begin{array}{c} \textcircled{1} + \textcircled{2} \\ \hline \downarrow \\ \textcircled{3} \end{array}$$

9. **P1:** The Hudson River is like the James River.

**P2:** The James River is less polluted than it was a couple of decades ago.  
 $\therefore$  The Hudson River is less polluted than it was a couple of decades ago.

**Issue:** Whether the Hudson River is less polluted than it was a couple of decades ago

The reason that ① the Hudson River is probably less polluted than it was a couple of decades ago

is that ② the Hudson River is like the James River, and ③ the James River is less polluted than it was a couple of decades ago.

$$\begin{array}{c} \textcircled{2} + \textcircled{3} \\ \hline \downarrow \\ \textcircled{1} \end{array}$$

### EXERCISE 9.7

3. **P1:** A prince is the child of a king.

**P2:** A princess is the child of a king.  
 $\therefore$  A prince is like a princess.

**P1:** A prince is like a princess.

**P2:** A princess leads a sheltered life.  
 $\therefore$  A prince leads a sheltered life.

**Issue:** Whether a prince leads a sheltered life

**S:** a princess

**T:** a prince

**F:** leads a sheltered life

① A prince is the child of a king. ② A princess, too, is the child of a king. So ③ a prince is like a princess. Also, ④ a princess leads a sheltered life. Thus, ⑤ a prince most likely leads a sheltered life.

$$\begin{array}{c} \textcircled{1} + \textcircled{2} \\ \hline \downarrow \\ \textcircled{3} + \textcircled{4} \\ \hline \downarrow \\ \textcircled{5} \end{array}$$

6. **P1:** Astrology studies the stars and has been around for hundreds of years.

**P2:** Astronomy studies the stars and has been around for hundreds of years.  
 $\therefore$  Astrology is like astronomy.

**P1:** Astrology is like astronomy.

**P2:** Astronomy is worthy of being called a science.  
 $\therefore$  Astrology is worthy of being called a science.

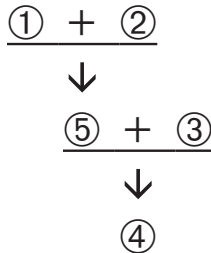
**Issue:** Whether astrology is worthy of being called a science

**S:** astronomy

**T:** astrology

**F:** worthy of being called a science

- ① Astrology studies the stars and has been around for hundreds of years. ② Astronomy also studies the stars and has been around for hundreds of years. We know that ③ astronomy is worthy of being called a science. Therefore, ④ astrology is likewise worthy of being called a science.  
⑤ Astrology is like astronomy.



9. **P1:** The Nile River is like the Mississippi River, Potomac River, and Hudson River.  
**P2:** The Mississippi River, the Potomac River, and the Hudson River all flow toward the ocean.  
 $\therefore$  The Nile River flows toward the ocean.

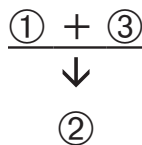
**Issue:** Whether the Nile River flows toward the ocean

**S:** the Mississippi River, the Potomac River, and the Hudson River

**T:** the Nile River

**F:** flows toward the ocean

- ① The Mississippi River, the Potomac River, and the Hudson River all flow toward the ocean. So, ② the Nile River probably flows toward the ocean.  
③ The Nile River is like the Mississippi River, Potomac River, and Hudson River.



12. **P1:** Utah is dry, mountainous, and dependent on water from other states.  
**P2:** California is dry, mountainous, and dependent on water from other states.  
 $\therefore$  Utah is like California.  
**P1:** Utah is like California.  
**P2:** California has profited from large-scale drip irrigation of agricultural land.  
 $\therefore$  Utah would profit from large-scale drip irrigation of agricultural land.

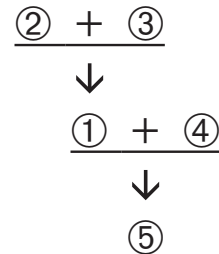
**Issue:** Whether Utah would profit from large-scale drip irrigation of agricultural land

**S:** California

**T:** Utah

**F:** profit from large-scale drip irrigation of agricultural land

We can infer that ① Utah is much like California because ② Utah is dry, mountainous, and dependent on water from other states and ③ California is dry, mountainous, and dependent on water from other states. Because ④ California has profited from large-scale drip irrigation of agricultural land, ⑤ Utah would probably also profit from large-scale drip irrigation of agricultural land.



15. **P:** Comedies and musicals are both theatrical performances.  
 $\therefore$  Comedies are like musicals.

**P1:** Comedies are like musicals.

**P2:** Musicals incorporate dancing.

$\therefore$  Comedies incorporate dancing.

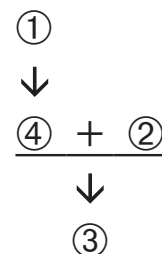
**Issue:** Whether comedies incorporate dancing

**S:** musicals

**T:** comedies

**F:** incorporate dancing

- ① Comedies and musicals are both theatrical performances. Given that ② musicals incorporate dancing, ③ comedies are likely to incorporate dancing also.  
④ Comedies are like musicals.



**EXERCISE 9.9**

3. B: more similarities  
6. A: more similarities  
9. B: more similarities

**EXERCISE 9.10**

3. The similarity (directed by Tim Burton) is relevant to the feature (stars Johnny Depp).

**S:** *Charlie and the Chocolate Factory*, *Corpse Bride*, *Sweeney Todd*, and *Alice in Wonderland*

**T:** *Maleficent*

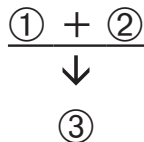
**F:** stars Johnny Depp

**EXERCISE 9.11**

3. a. stronger because sample is larger  
b. weaker because difference is relevant  
c. weaker because difference is possibly relevant  
d. no change because difference is irrelevant

**EXERCISE 9.12**

3. ① All swimmers are athletes, and ② all athletes need lots of training and practice. Therefore, ③ all swimmers require lots of training and practice.



This passage contains an argument. The issue is whether all swimmers require lots of training and practice. The conclusion is that all swimmers require lots of training and practice. The first premise is that all swimmers are athletes. The second premise is that all athletes need lots of training and practice.

This argument is a deductive categorical syllogism. It is valid since the standard form syllogism below does not break any of the rules for a valid syllogism.

All swimmers are athletes.

All athletes are people who need lots of training and practice.

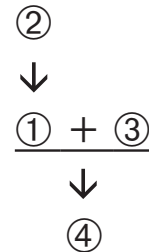
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All swimmers are people who need lots of training and practice.

6. This passage contains neither an argument nor an explanation, because it only contains one claim,

and both arguments and explanations need a minimum of two claims.

9. ① Potters are a lot like typists in that ② they both predominantly use their hands to perform their jobs. Given that ③ typists often develop carpal tunnel syndrome, I'd expect that ④ potters also often develop carpal tunnel syndrome.

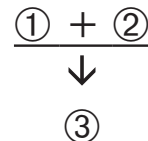


This passage contains an argument. The issue is whether potters develop carpal tunnel syndrome. The conclusion is that potters develop carpal tunnel syndrome. The premises are that potters are like typists, and that typists develop carpal tunnel syndrome.

This passage contains a subargument. The intermediate conclusion is that potters are like typists. The premise is that both potters and typists predominantly use their hands to perform their jobs.

This argument is an inductive analogical argument. It is weak because it offers only one similarity and this similarity is too vague to be clearly relevant to having the feature.

12. ① Many women who develop diabetes as adults are obese, and ② many women who develop diabetes are pregnant. We must conclude, therefore, that ③ pregnant women are obese.



This passage contains an argument. The issue is whether pregnant women are obese. The conclusion is that pregnant women are obese. The first premise is that many women who develop diabetes as adults are obese. The second premise is that many women who develop diabetes are pregnant.

This argument is a deductive categorical syllogism. It is invalid since the standard form syllogism below shows that the argument breaks two rules of a valid syllogism: the middle term is not distributed, and a term (*pregnant women*) is distributed in the conclusion but not in a premise.



Some women who develop diabetes as adults are obese people.

Some women who develop diabetes as adults are pregnant women.

All pregnant women are obese people.

15. This passage contains an argument. The issue is whether prostitution is immoral. The conclusion is that prostitution is immoral. The premise is that it is always wrong to be sexually intimate with someone for money.

This argument commits the fallacy of begging the question. The premise uses other words to merely assert what the conclusion is trying to establish.

**Issue:** Whether a slight majority of Americans believe the war in Afghanistan has turned into another Vietnam

① In a CNN opinion poll about the war in Afghanistan, 52% of the respondents said the war has turned into another Vietnam. Thus, it is reasonable to accept that ② a slight majority of Americans believe the war in Afghanistan has turned into another Vietnam.

①



②

## Chapter 10

### EXERCISE 10.3

3. **P:** Serrano chili peppers are very hot.  
∴ Chili peppers are very hot.

**Issue:** Whether chili peppers are very hot

① Chili peppers are very hot. This is because

② Serrano chili peppers are very hot.

②



①

6. **P:** Motorcycles, cars, and trucks need to be insured.  
∴ All motorized vehicles must need to be insured.

**Issue:** Whether all motorized vehicles must need to be insured

① All motorized vehicles must need to be insured, since ② motorcycles, cars, and trucks need to be insured.

②



①

9. **P:** In a CNN opinion poll about the war in Afghanistan, 52% of the respondents said the war has turned into another Vietnam.  
∴ A slight majority of Americans believe the war in Afghanistan has turned into another Vietnam.

### EXERCISE 10.7

3. **P:** When 30,000 people in an online survey of English usage conducted by Professor Bert Vaux of Harvard University were asked how they addressed a group of two or more people, the largest number (42.5%) said they used *you guys*.  
∴ Most Americans refer to a group of two or more people as *you guys*.

**Issue:** Whether most Americans refer to a group of two or more people as *you guys*

How do most Americans refer to a group of two or more people? ① They use the words *you guys*. ② This is the conclusion of an online survey of English usage conducted by Professor Bert Vaux of Harvard University that has had over 30,000 participants. ③ When people were asked how they addressed a group of two or more people, the largest number (42.5%) said they used *you guys*. Interestingly, ④ *y'all* was given by 14% of the respondents.

③



①

**S:** 30,000 respondents to an online survey of English pronunciation conducted by Professor Bert Vaux of Harvard University

**T:** all Americans

**F:** refer to a group of two or more people as *you guys*

6. **P:** Neither trout nor catfish can live very long out of water.

∴ No freshwater fish can live very long out of water.

**Issue:** Whether freshwater fish can live very long out of water

① A catfish is a freshwater fish, and ② a trout is also a freshwater fish. ③ Neither trout nor catfish can live very long out of water. Consequently, ④ it's unlikely that any freshwater fish can live very long out of water.



**S:** catfish and trout

**T:** all freshwater fish

**F:** unable to live very long out of water

9. **P:** Five of the hunting implements found at the previously undiscovered Native American campsite in Michigan were shown by carbon dating to be over 2,000 years old.
- ∴ The vast majority of the hunting implements that were discovered at the Native American campsite in Michigan are a couple of thousand years old.

**Issue:** Whether the vast majority of the hunting implements that were discovered at the Native American campsite in Michigan are a couple of thousand years old

① Recently a team of archaeologists found a previously undiscovered Native American campsite in Michigan that contained hundreds of hunting implements. ② Five of the several hundred arrowheads and other hunting implements found at the site were carbon dated. ③ They were shown to be over 2,000 years old. So, it's likely that ④ the vast majority of those tools that were discovered at the site are a couple of thousand years old.



**S:** five of the hunting implements found at the Native American campsite in Michigan

**T:** all of the hunting implements that were discovered at the Native American campsite in Michigan

**F:** a couple of thousand years old

### EXERCISE 10.9

3. A: the sample is more representative of the target

### EXERCISE 10.11

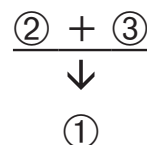
3. B: the sample is larger

### EXERCISE 10.12

3. a. stronger because although this sample is no more representative of the target than the sample in the original argument, this sample is less likely to have the feature  
b. stronger because the sample is more representative of the target  
c. stronger because the sample is more representative of the target  
d. weaker because the sample is biased toward the feature
6. a. stronger because the sample size is larger  
b. weaker because the sample is self-selected  
c. weaker because the sample is biased toward the feature  
d. weaker because the sample is biased toward the feature
9. a. stronger because the sample size is larger  
b. stronger because the sample is more varied  
c. stronger because the sample is more varied  
d. no change because the more varied sample is not relevant to the target

### EXERCISE 10.13

3. ① No moral principle can be proved *a priori* because ② there can be no *a priori* proof that anything moves anything to act. And ③ morals must move us to act.



This passage from David Hume's *A Treatise of Human Nature* contains an argument. The issue is

whether a moral principle can be proved *a priori*. The conclusion is that no moral principle can be proved *a priori*. The premises are that there can be no *a priori* proof that anything moves anything to act, and that morals must move us to act.

The argument is a deductive categorical syllogism. It is valid because it does not break any of the rules for valid syllogisms, as shown in its standard form below:

No *a priori* proofs are things that move us to act.  
All moral principles are things that move us to act.

No moral principles are *a priori* proofs.

6. ① Infants can recognize human voices as early as 7 months of age. ② Researchers studied brain activity in 32 infants, half of whom were 4 months of age and the other half 7 months old. ③ Researchers played different sounds, including human voices speaking nonsense languages, and ④ brain activity suggested the 7-month-olds could distinguish the human voice from the other sounds, and ⑤ the 4-month-olds could not.



This passage from *Neuron* contains an argument. The issue is whether infants can recognize human voices as early as 7 months of age. The conclusion is that infants can recognize human voices as early as 7 months of age. The premise is that in a research study, the brain activity of sixteen 7-month-olds shows that they could distinguish the human voice from other sounds.

The argument is an inductive generalization. It is weak because the sample size is small and there is no indication that the sample is representative of the target. (Because the argument's source is given, you can investigate whether information about the sample's representativeness is presented in the full article.)

9. ① Among people who use multiple dietary supplements, fish oil/omega-3 supplements now top multivitamins in popularity, according to a recent survey by ConsumerLab.com. ② The survey is based on 6,012 responses collected in November

from a sampling of subscribers to the ConsumerLab.com free e-newsletter. ③ Fish oil/omega-3 supplements were used by 74% of respondents, followed in popularity by multivitamins, which were used by 72%.



This passage from *ConsumerLab.com* contains an argument. The issue is whether fish oil/omega-3 supplements are more popular than multivitamins among those who use multiple dietary supplements. The conclusion is that fish oil/omega-3 supplements are more popular than multivitamins among those who use multiple dietary supplements. The premise is that in a November *ConsumerLab.com* survey, 74% of 6,012 respondents report using fish oil/omega-3 supplements while 72% report using multivitamins.

This argument is an inductive generalization. It is strong because the sample size is large and appears unbiased.

12. This passage from Coffin and Stacey's *Western Civilizations* contains an explanation. The explanandum is that opium became crucial to the balance of East-West trade. The explanans is that opium was one of the very few commodities that Europeans could sell in China.
15. This passage from Henry David Thoreau's *Walden* is neither an argument nor an explanation. It contains at least two claims, but none of its claims is proven or explained by any other, as is required in arguments and explanations.

## Chapter 11

### EXERCISE 11.2

3. Not a causal claim.  
6. Causal claim. Being homeless is caused by being poor.  
9. Not a causal claim.

**EXERCISE 11.4**

3. **P1:** The bugs that were eating the spinach in my garden have disappeared.

**P2:** I surrounded my garden with marigolds.

∴ The bugs disappearing was caused by my surrounding my garden with marigolds.

**Issue:** Whether the bugs disappearing was caused by my surrounding my garden with marigolds

① The bugs that were eating the spinach in my garden have disappeared. Given that ② I surrounded my garden with marigolds, ③ the marigolds must have caused the bugs to disappear.

$$\begin{array}{c} \textcircled{1} + \textcircled{2} \\ \downarrow \\ \textcircled{3} \end{array}$$

6. **P1:** My two friends and I got sick after eating dinner together.

**P2:** My two friends and I ate the clam chowder.

∴ My two friends and I getting sick last night was caused by our eating the clam chowder.

**Issue:** Whether my two friends and I getting sick last night was caused by our eating the clam chowder

It's likely that ① the clam chowder caused my two friends and I to get sick last night. This is because ② we all got sick after eating dinner together, and ③ we all ate the clam chowder.

$$\begin{array}{c} \textcircled{2} + \textcircled{3} \\ \downarrow \\ \textcircled{1} \end{array}$$

9. **P1:** The IRS reported a higher-than-usual number of people not paying their taxes last year.

**P2:** Last year was the first year in a decade that taxes were increased.

∴ An increased number of scofflaws who don't pay taxes was caused by taxes being increased last year.

**Issue:** Whether an increased number of scofflaws who don't pay taxes was caused by taxes being increased last year

① Tax increases last year led to an increased number of scofflaws, who don't pay taxes.  
 ② The IRS reported a higher-than-usual number of people not paying their taxes last year, and  
 ③ this was the first year in a decade that taxes were increased.

$$\begin{array}{c} \textcircled{2} + \textcircled{3} \\ \downarrow \\ \textcircled{1} \end{array}$$

**EXERCISE 11.9**

3. **P1:** Traffic is heavier on Milton Avenue since the beginning of the month.

**P2:** The road department finished widening Milton Avenue at the beginning of the month.

∴ The road being widened caused the traffic to become heavier on Milton Avenue.

**Issue:** Whether the road being widened caused the traffic to become heavier on Milton Avenue

**R:** the traffic becoming heavier on Milton Avenue

**P:** the road being widened

**M:** difference

① Traffic is heavier on Milton Avenue since the beginning of the month. Since ② the road department finished widening the road right about that time, ③ it's probably responsible for the extra traffic.

$$\begin{array}{c} \textcircled{1} + \textcircled{2} \\ \downarrow \\ \textcircled{3} \end{array}$$

6. **P1:** In three major metropolitan areas in the Northeast, mandatory waiting periods for handgun purchases were signed into law last year.

**P2:** Homicide rates in three major metropolitan areas in the Northeast dropped by an average of 15% last year.

∴ The homicide rates in three major metropolitan areas in the Northeast dropping by an average of 15% was caused by mandatory waiting periods for handgun purchases being signed into law.

**P:** The homicide rates in three major metropolitan areas in the Northeast dropping by an average of 15% was caused by mandatory waiting periods for handgun purchases being signed into law.

∴ Waiting periods for handgun purchases reduce homicides in any city.

**Issue:** Whether waiting periods for handgun purchases reduce homicides in any city

**R:** the homicide rates in three major metropolitan areas in the Northeast dropping by an average of 15% last year

**P:** mandatory waiting periods for handgun purchases were signed into law last year in three major metropolitan areas in the Northeast

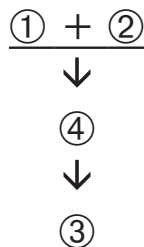
**M:** difference

① In three major metropolitan areas in the Northeast, mandatory waiting periods for handgun purchases were signed into law last year.

② Since then, homicide rates dropped by an average of 15%. It is reasonable to conclude that

③ waiting periods for handgun purchases reduce homicides.

④ The homicide rates in three major metropolitan areas in the Northeast dropping by an average of 15% was caused by mandatory waiting periods for handgun purchases being signed into law.



9. **P1:** While hiking yesterday, you brushed up against some poison oak.

**P2:** Your blisters have shrunk considerably since you began putting on the acorn paste.

∴ Your blisters shrinking was caused by using acorn paste.

**P:** Your blisters shrinking was caused by using acorn paste.

∴ Covering the blistered area in a paste made from soaked and cooked acorns is an effective treatment for poison oak.

**Issue:** Whether covering the blistered area in a paste made from soaked and cooked acorns is an effective treatment for poison oak

**R:** your blisters shrinking

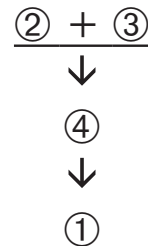
**P:** using acorn paste

**M:** difference

① That old Native American cure for poison oak—covering the blistered area in a paste made from soaked and cooked acorns—is clearly effective.

② While hiking yesterday, you brushed up against some poison oak, and ③ your blisters have shrunk considerably since you began putting on the acorn paste.

④ Your blisters shrinking was caused by using acorn paste.



### EXERCISE 11.10

3. A: it provides evidence that the flu shots were the only possible cause.
6. B: it states that advertisers' complaints are the only possible cause.
9. B: it states that chipped lead paint is the only possible cause.

### EXERCISE 11.11

3. a. weaker because another difference is introduced
- b. stronger because it provides evidence that the installation is the only difference
- c. weaker because another difference is introduced
- d. no change because the new difference is not a reasonable cause of the resulting event

### EXERCISE 11.12

3. This passage from Christakis and Fowler's *Connected* contains an explanation. The explanandum is that

shows like *Survivor* are alluring. The explanans is that shows like *Survivor* mirror the ancient struggles within our minds and among our peers.

6. This passage contains an argument. The issue is whether obesity is a major cause of premature death. The conclusion is that obesity is not a major cause of premature death. The premise is that no one can live forever.

The argument commits the red herring fallacy because the premise distracts the reader from the issue.

9. This passage from John Weeks's *Population: An Introduction to Concepts and Issues* contains an explanation. The explanandum is that in India, the dowry is in essence an "up front" payment of a potential inheritance. The explanans is that Indian girls traditionally do not receive an inheritance on the death of their parents.
12. ① The "two meals for the price of one" program we tried out in two of our restaurants this spring has been a huge success. Therefore, ② this is bound to be a great success when we launch the program for all restaurants this fall.

①



②

This passage contains an argument. The issue is whether the "two meals for the price of one" program will be a great success when we launch the program for all restaurants this fall. The conclusion is that the "two meals for the price of one" program will be a great success when we launch the program for all restaurants this fall. The premise is that the "two meals for the price of one" program

we tried out in two of our restaurants this spring has been a huge success.

The argument is an inductive generalization. It is weak because the sample size is very small.

15. ① Rising unemployment is resulting in a crime wave in our county. ② The police department reported that violent crime has risen 6% since last year, whereas property crimes are up nearly 12%. ③ The only thing different is that unemployment is up by two full percentage points over last year.

② + ③



①

This passage contains an argument. The issue is whether rising unemployment is resulting in a crime wave in our county. The conclusion is that rising unemployment is resulting in a crime wave in our county. The first premise is that the police department reported that violent crime has risen 6% since last year, whereas property crimes are up nearly 12%. The second premise is that the only thing different is that unemployment is up by two full percentage points over last year.

This argument is an inductive causal argument. It is somewhat strong because it identifies the precipitating event as the only difference that could cause the resulting event.

## Chapter 12

### EXERCISE 12.3

Student answers will vary.

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