CRITICAL THINKING, LOGIC, AND ARGUMENT

AN INTRODUCTION

Eric Dayton and Kristin Rodier

Critical Thinking, Logic, *and* Argument

The Walk. Painting by Eric Dayton

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Preface

Am I a Critical Thinker?

This book introduces the idea of what an argument is and its importance for critical thinking. Analyzing how arguments work helps us develop critical thinking skills because it is a way of organizing and making explicit what is happening in our minds when we reason. We introduce patterns of argumentation that are good by virtue of their form, crucial validity, and soundness.

This book also spends significant time explaining **relevance**. Relevance is critical for good critical thinking—do your ideas relate to one another properly? Is your argument on topic? Specifically, with arguments, premises and conclusions have to be relevant to each other. But an argument also needs to be relevant to the audience being appealed to. An argument will not be successful if it does not make some kind of connection with the hearer's tendency to believe. The truth of premises should, if possible, be uncontroversial, or at least worth taking seriously.

We also look at ideas of *classification and definition*, since sorting ideas and understanding words are basic building blocks of clear and critical thinking. Fundamentally, we have to note that words in a language have meanings that connect to the meanings of other words and so on. *Good definitions* will connect the meaning of a word with a set of **necessary** and **sufficient conditions**, which produces a kind of web of meanings in the language. Language is not just a web of meaning, but it also reflects how things are in the world. In this way, language is also a knowledge system. Because an important part of critical thinking is being careful, in order to evaluate arguments, we need to be explicit about the meanings of words.

These considerations impose burdens on our conception of what a good critical thinker is like. They also help us understand the ways thinkers can fail at being properly critical. In the first two parts of the book, we focus on tools for making arguments explicit and evaluating them. In the third part, we focus on a variety of ways that thinking can be more critical and ways in which it can

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fail. Before we turn to the specifics of this task, let us start by collecting some facts about what an *ideal critical thinker* will be like—a thinker who is guided by canons of good reasoning and responsible argumentation.

Ideal Critical Thinkers

Thinking critically is a complicated but important endeavour. It involves acquiring a variety of problem-solving skills, learning how to think clearly, and applying these skills in real-life contexts. Children are great at asking "Why?" and this makes them natural critical thinkers, but they often ask "Why?" when it isn't helpful. It is an unprincipled questioning. **Critical thinking** involves learning where and when to ask the right questions about what is reasonable to believe. Critical thinking is applicable to a broad range of contexts, but often, how it is *applied* depends on the subject matter. This book primarily focuses on skills that can be transferred between contexts or subject matter. These skills are helpful for reasoning well, understanding arguments, and approaching one's beliefs in ways that reduce error and increase understanding.

Ideally, a critical thinker will have a *good mastery of the language they are arguing in*, with a large vocabulary and a clear and explicit understanding of what each word they use means. Having a good dictionary on hand or an expert language user you can ask can help you clarify a word's meaning and select the proper words when offering an argument. A great deal of knowledge can be garnered just by having a good vocabulary, which helps you be better informed. Because what is commonly believed is not always true, a critical thinker will have contextual resources for *evaluating the testimony* of others and distinguishing reasonable claims from less reasonable ones. These recourses will include skills for evaluating claims on the basis of argument and also skills for evaluating the reliability and knowledgeableness of other speakers, including reflecting on our own biases and taking steps to correct them.

> A critical thinker will be *good at reconstructing arguments*, filling in assumptions, identifying the patterns of reasoning to which the arguments appeal, and paying attention to factors that are being left out.

This often means asking good questions: What does a particular claim *mean*? What follows? Is this justified? Since we have a finite ability to pay attention to the relevant features of an argument, part of being a good critical thinker will be having the diligence to know that focusing on one aspect of an argument isn't distracting us from other relevant information. The best way to guard against such

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possibilities is to be methodological and thorough, such as when we write out arguments in **standard form** as discussed in Chapter 3 or talk through them with a more knowledgeable elder. In order for critical thinkers to form clear conceptions of ideas, it is essential to have skills in analyzing claims for clarity and plausibility.

> Critical thinkers will have a *certain kind of attitude toward belief*: both open-minded and sceptical.

What does it mean to be open-minded? This is perhaps hard to gauge. Don't we all think of ourselves as open-minded? Maybe we are in some areas. But we have to be open-minded to the idea that we might not always be open-minded when we should be. This doesn't mean that we open the floodgates to any set of ideas whatsoever. Scepticism is also important. Scepticism is an approach characterized by doubt and questioning. It is a way of approaching claims that always asks about the foundation or justification of the claims. These two things work together—would you say you are both open-minded and sceptical? How do you choose where to be one or the other?

This is what is so frustrating about whatever it means to be a "devil's advocate."[1] This seems to mean taking the position of a heavy-handed sceptic as an exercise, not because one has deliberately judged the topic at hand as requiring heavy scepticism. This is different than genuine curiosity or inquisitiveness or earnestness for finding reliable information. If you find yourself wanting to play "devil's advocate," it is good to ask yourself a few questions: Is it appropriate in this instance to take on a view I don't support? Will it make the argument stronger? How do I know? If you can't answer those questions fairly easily, then it might be that playing devil's advocate introduces a *derailing* and inappropriate scepticism—scepticism that is aimed at making the argument interesting or entertaining rather than gaining more reasons for our beliefs.

Above all, the ideal critical thinker should have the *motivation* to improve their thinking.

What Should I Believe?

Have you ever seen the bumper sticker "Don't believe everything you think"? The idea here is that just because you *think* something doesn't mean you should *believe* it to be true. To *believe* something is to take it to be true. For example, to believe it is raining is to take it to be true that it is raining. The natural

1 https://idioms.thefreedictionary.com/play+devil%27s+advocate

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expression of belief is thus just the assertion of what is believed, so we typically express the belief that it is raining by saying, "It is raining." Normally, if we tell you it is raining, then you also take us to believe what we just said. In addition, if you have no prior reason to think that we are mistaken or liars, if we tell you that it is raining, then we have given *you* a reason to believe it too. We are always engaged in some process of giving each other reasons to believe.

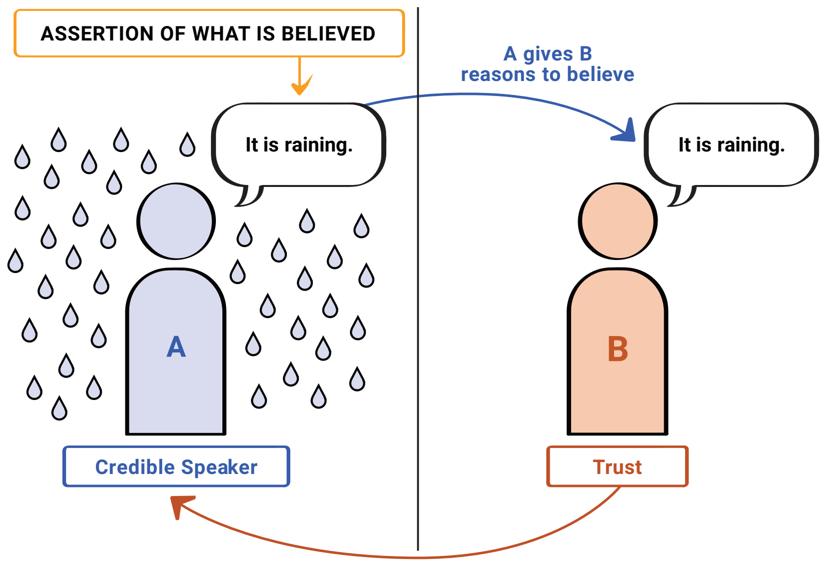

Figure i.1 Giving each other reasons to believe. Artwork by Jessica Tang.

Of course, the mere fact that we believe something isn't all by itself a reason for us to continue to believe it—it is instead a *sign* that we *probably* have reasons to believe it (since, after all, we *do* believe it). So when you come to believe that it is raining *because we tell you it is*, the reasons you have are grounded in *trust*: you take us to have reasons, and in the absence of counterevidence, that is good enough for you. That gives you a reason (a different reason than we have) to believe it too. Despite the occasional liars, con artists, and spies among us, for the most part when we speak frankly, *we say what we believe*, and so human conversation is from the very beginning the business of offering reasons to each other.

Would communication even work if we didn't have a moral prohibition against lying? Philosopher Immanuel Kant[2] was

2 https://plato.stanford.edu/entries/kant/

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so firmly against lying that he believed that you should tell the truth no matter what. Part of his reason for this is that you cannot universalize lying,[3] thus the duty to tell the truth *has no exception*.

The fundamental question for a method of good critical thinking is, “What should I believe?” Answering that question directs us to two fundamental rules.

First, *I should believe what is true.*

Since belief is taking something to be true, a belief gets things right—it is materially correct—if what we believe is true. On the other hand, our belief is not made true by wishing or hoping; rather, it is made true by *the way the world is*. For example, our belief that it is raining is made true, if it is true, by the fact that it is raining. Since our beliefs can be wrong, merely having a belief is not good enough. We need reasons for thinking that we have the belief that we do *because* what we believe is true.

So the second rule that the fundamental question for method directs us to can be put like this:

I should believe what I have reason to believe.

What counts as a reason to believe is worth arguing about. Because truth is the target at which belief aims, we need to aim at the truth, but our aim also needs to be guided by skill if we are to hit the target reliably. The very nature of belief demands that it be guided by *good* reasons, by *evidence*.

A critical thinker must be moved to form beliefs by evidence: Believe what is true. Believe what you have reason to believe.

Belief aims at the truth about the world, and so in most cases, our beliefs must defer to the way the world is. But a lot of the claims we want to make about the world are much more complicated than “it is raining.” We want to have reasoned beliefs about more complex phenomena, and this is where arguments come in. This points us to two domains: one, formal argumentation as laid out in words and

3 https://www.youtube.com/watch?v=8bIys6JoEDw

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symbols, and two, **inferences**, which occur within our minds among the beliefs we hold. Our own belief-making processes are notoriously difficult to perceive!

And because the inferences we make are situated in the midst of the rest of the things we believe, the question of whether they make sense to us or not depends on, in part, *what we already believe*. Our beliefs are a network of references that relate to and support each other. When we think about what to believe, we attempt to increase the overall *coherence* and *explanatory power* of our beliefs, but part of what makes our beliefs appear more coherent to us depends on what we believe already. When we make inferences, we also aim to increase the overall likelihood that our beliefs are true, and that attempt will also depend in part on what we believe already. Among the things we believe already, there will be views about what is true, there will be views about what makes things more coherent, there will be methodological principles, and there will be models of how the world hangs together. All these factors will affect what makes for an overall coherence of belief for us (see Fig. i.2).

Of course, our beliefs have not been formed in isolation from the influence of others. While inference, being a mental process, is private, the beliefs that we form are deeply influenced by the beliefs of others and our backgrounds, upbringings, and cultures. As a *general* rule, another person's beliefs are just as likely to be well considered or true as your own, and on many topics, they will

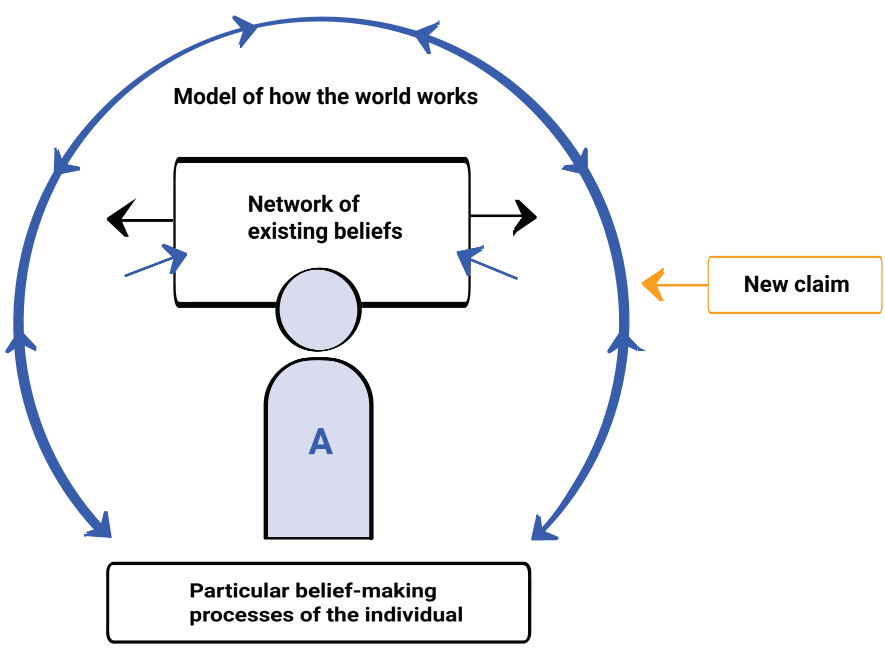

Figure i.2 Introducing new claims to our belief-making system. Artwork by Jessica Tang.

be much more likely than your own, especially if the person has place-based, local, or ecological knowledge. We are always exchanging stories and influencing each other's inferences. The testimony of others together with our direct experiences and our memory (when it is reliable) are the three great sources of reasons for belief.

Language

The capacity that human beings have to take complex instruction from each other through speech may well be the most important thing that sets human beings apart from other creatures in the world. Like us, other animals have sense organs, so they can perceive the world around them by immediate experience; they have memories so that they can use past perceptions and learn more about what the world is like. What they do not have is robust language, including, for example, storytelling and the ability to pass down oral histories. To have language requires both a specific kind of intellectual capacity—the power to process and thus understand grammar—and a characteristic social nature that makes the members of a community. This is not to say that animals are not part of our community, or that we are not all interdependent! But part of how a community operates is through shared knowledge and understanding about how we can take and give instructions to each other, make meaning, and construct value. Humans alone in the animal world have a particular *culture*—a great repository of shared beliefs and practices.

While having specific language and culture does make human beings distinct in some ways from other animals, this is not to say that there is a fundamental *separation* between humans, animals, and the earth. The point here is to talk about how language and culture influences our point of view, not to enforce an ontology of separation. For example, some Indigenous knowledges and worldviews begin from a fundamental *living interdependence* of all beings. Mi'kmaw educator and scholar Marie Battiste emphasizes that these worldviews are inextricably linked to land and the whole way of life, including "landscapes, landforms, and biomes where ceremonies are properly held, stories properly recited, medicines properly gathered, and transfers of knowledge properly authenticated" (Marie Battiste, "Indigenous Knowledge: Foundations for First Nations,"[4] WINHEC: International Journal of Indigenous Education Scholarship, no. 1 [2005]: 1–17).

4 https://journals.uvic.ca/index.php/winhec/article/view/19251

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Human beings begin the journey into language as infants by imitating the sounds that their caregivers and elders make and by connecting these sounds with meanings that have a kind of currency. Learning how to use a word like "table," for example, is not simply learning how to make a certain sound; it is learning *what a table is* and *how to tell tables from non-tables*. Children learn words at the same time as they learn the correct *conditions* of their use, which requires a sophisticated set of skills. Children need an implicit understanding of how what they respond to is directly experienced, which demonstrates where they are and when they are there. They also learn that other people know things about where they are that are specific to their environment. The child can talk to them about what was happening where they were. This may seem like a simple thing, but to be able to do this, the child needs a sense of time and space and to possess a "theory of mind"; to understand that everyone has a mind and that different people know different things.

For a detailed explanation of "theory of mind," see this article[5] from *Simple Psychology*. It goes over various tasks and tests used to understand how different aspects of a theory of mind are developed.

By the age of three, children typically develop the capacity to attribute minds to *others*—they come to realize that others have beliefs about the world that may be either true or false, and more importantly, they come to see others as possessing *a point of view* of the world that is guided by reasons and that they can take up in imagination. They come to be able to put themselves in the place of someone else and understand what it is like to be where that other person is and thus to have the beliefs that the other person has—beliefs different than one's own. For example, if only you and your parent are home and you hear the fridge open and after your parent yells, "We are out of ketchup!" You can imagine that they were looking in the fridge for ketchup. You have put together the speech and sounds and spatial arrangements, as well as the motive to look for ketchup to construct a story that your parent opened a fridge and looked for ketchup and found no ketchup at all. It is possible that secretly someone else entered the house (unbeknownst to you) and opened the fridge (which you heard) at the same time as your parent called out, "We are out of ketchup!" because it was the answer to

5 https://www.simplypsychology.org/theory-of-mind.html

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a trivia game they were playing. So we can be wrong. But the point is that all this requires the *understanding of other people's minds as holding perspectives and beliefs*. Our ability to put ourselves "in the shoes" of others also makes possible our moral sense. We see how actions affect or harm others and we begin to grasp what is fair, the value of community, and many other necessary social skills.

But the focus here is *belief*. The point is that children come into a capacity for understanding what a belief is, which involves its connection with correctness and the giving and taking—sharing—of reasons for belief, and they do this early in their journey into language use. These developmental powers are not simply grounded in raw intelligence but in the fact that humans take a deep interest in each other's minds, give each other instruction, and defer to each other's knowledge. Human beings live in a world of right and wrong even simply with regard to belief.

Grammar

How do human beings communicate and understand information by speaking a language? Because the words in a language are only accidentally or conventionally correlated with the things to which they refer, the cognitive (mental) content of statements must be largely conveyed by the compositional structure of the sentences used to express them. This structure is *grammar*. Although we live immersed in a sea of language, most of us have only the haziest conception of what this structure is. This is not particularly surprising, since we grow up inside of our individual languages and learn how to speak before we gain explicit conceptual skills. There is an air of paradox about this. Language is essentially a rule-governed activity, and it is hard to understand how we can follow rules without knowing what they are. Yet it seems that we do exactly that. In speaking a language, we obey a vast system of rules that allows us to distinguish grammatical from ungrammatical utterances, to correct both ourselves and others in both grammar and pronunciation, and to know what is meant by what is said. This *system of rules* is grammar. Thus grammar is far more than a set of maxims of correct usage; it is an enabling condition of our understanding of language.

Grammar consists in the structural features that distinguish sentences that can be understood from those that cannot.

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A large part of what makes a statement intelligible to a hearer is the **context** in which it is made, and that context consists in *knowledge*—knowledge about the topic or situation being discussed and a vast store of background knowledge that is shared by the speaker and hearer. In short, language is a *knowledge-based* process of communication in which grammar is a crucial enabling feature. Speakers and hearers rely on their joint possession of grammatical rules that make the context of their speech to the other intelligible; they rely on broadly shared systems of classification and shared definitions of terms. They rely on being members of a community, which consists primarily in a shared language.

Check out this video[6] from Rogan Shannon about grammar and different versions of ASL in the deaf community. It highlights the role of shared understanding, context, and community in using ASL and grammatical differences. (Also available as a blog[7] post.)

We have discussed these facts because they impose important constraints on the critical thinker. Beyond the obvious ones like *speaking the truth*, *not exaggerating*, and *answering requests for clarification*, critical thinkers should always attempt to provide those with whom they are making claims enough information so that what they are saying can be understood.

The Role of Evaluating Arguments

In examining our inferences with the tool of argument analysis, what we do is extract and formalize premises and conclusions and apply rules of **logic**. In an **argument**, we attempt to support claims by referencing other claims to which it is reasonable for others to assent, and the clearer and more explicit we can make evidential relations, the stronger our arguments are likely to be. If we are examining inferences in terms of what we should believe, then we are getting into questions of truth and reliability. Philosophers use the term "epistemology"[8] to refer to the study of belief and knowledge and how truth, reliability, and justification relate to each other.

Part 3 of this book covers *informal patterns of reasoning*, looking both at the strengths of those patterns and the ways they can be misused. So what makes

6 https://www.youtube.com/watch?v=dvpqNA8jJ6o
7 https://roganshannon.com/2019/05/16/asl-grammar-and-the-deaf-community/
8 https://plato.stanford.edu/entries/epistemology/

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something a fallacy? The term "fallacy" is often used rather broadly to indicate any kind of error in inference or belief, but we will use the term somewhat more narrowly. We will use the term not to refer to mistaken beliefs (or "falsity") but only to refer to some kind of *mistake in reasoning or inference*.

A **fallacy**, in the strict sense, is a form of argument that is invalid or else violates a relevance condition.

Fallacy is thus different from simple *falsity*. A statement or set of statements may be false, but an argument is the *transition from a set of premises to a conclusion* (which can contain fallacies).

We couldn't tell you the number of informal fallacies. There are many that go by more than one name, and they often develop out of trends in media and communication. Here's one list of fallacies with examples[9] from Information Is Beautiful. And here's a video[10] introducing a few fallacies.

What is fallacious in a fallacious argument is that one or more of the criteria of *good* arguments are violated. There are many, many ways that arguments can fail compared to the fairly narrow criteria through which they can succeed. This book outlines numerous ways in which the criteria for being a good argument are violated.

There are three fundamental ways in which fallacies can occur, and there are a number of ways that each condition can fail. Formal fallacies, like *affirming the consequent* (discussed in Chapters 2 and 3), are argument patterns whose *form* is logically invalid. But arguments can go wrong in many *informal* ways—for example, by violating important criteria, such as that of relevance, clarity, consistency, and so on. Some are used deliberately to mislead or influence others, but most are simply the result of an incautious use of language or slapdash thinking. They are exceedingly common. In the third part of the book, we will examine and analyze a number of common informal fallacies and discuss ways critical thinkers can avoid them. Fallacies usually have a deceptive appearance and pass for good arguments. In large part, this is due to the fact that they are

9 https://www.informationisbeautiful.net/visualizations/rhetological-fallacies/
10 https://www.youtube.com/watch?v=4CtofTCXcYI

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usually distortions or failed versions of argument forms that *are* good. So we will not look at fallacies in isolation, but we will also examine the good patterns of reasoning that fallacies distort.

As a matter of fact, we all use fallacious forms of argument many times every day. These fallacies frequently cause no damage because we could, if we were more careful, reformulate our arguments in cogent terms. However, often the very thinking *behind* our arguments is at fault, and the fallaciousness of our arguments can only be removed by rethinking our opinions and correcting our tendencies for poor critical thinking.

The study of fallacies and informal patterns of reasoning is valuable not simply because it shows us what to *avoid*, but because it provides us with tools for thinking more coherently and increasing our ability to discover the truth.

Thus careful critical thinking requires that we make implicit information explicit when reconstructing arguments.

These and other considerations impose burdens on our conception of what an ideal critical thinker is like. Let us therefore start by collecting some characteristics of an ideal critical thinker:

1. Guided by canons of good reasoning and responsible argument
2. Mastery of the language they need to use to build arguments and an explicit understanding of each word in their vocabulary
3. Well informed about what can be taken to be common knowledge
4. Skilled at evaluating claims on the basis of argument and reliability and knowledgeableness of other speakers
5. Skilled at reconstructing arguments, filling in the implicit premises, identifying the patterns of reasoning to which the arguments appeal, and paying attention to factors that are being left out

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KEY TAKEAWAYS

- The fundamental question is, What should I believe? First, believe what is true. Believe what you have reason to believe.
- Features of a good critical thinker:
    - Good mastery of the language they are arguing in
    - Provides enough information for others to understand what they are claiming
    - Has resources for evaluating the testimony of others (sorting reasonable claims from less reasonable ones)
    - Good at reconstructing and analyzing arguments
    - Good at asking questions
    - Holds an open and sceptical mind toward belief
    - Genuine curiosity and inquisitiveness
    - Motivation to improve their thinking
- Language is a knowledge-based system, and grammar is the vehicle of communication.
- A fallacy is a form of argument that is invalid or violates a relevance condition.

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PART I

Arguments and Language

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Critical Thinking and Belief

This whole book is meant to prompt you into thinking about not only how you come to have beliefs but also what justifies them. This is an important part of human life no matter how you fill your days—we have to be guided by beliefs.

1.1 Are We Responsible for Beliefs?

Perhaps you've heard people say that they have the freedom to believe whatever they want. This might be true in the sense of having the political right not to have our thinking interfered with by the government. But this is a question of social organization and political right. Here, we are concerned with the best methods of thinking, aimed at true belief. We might begin by considering, "When is a person *responsible* for what they believe?" If we reflect on this question, certain difficulties present themselves. For one thing, it suggests that you have *choice* about what to believe. But let's consider whether you have choice about what you believe. If that is the case, then how can we make sure we are choosing what is *most reasonable* to believe? You might think that if you knew what was true, then you could choose to believe *that*, but this just obscures what is at issue. If you know something to be true, then you already believe what you are apparently choosing, so you don't really have any choice after all (you already believe it, and since you know it, you cannot reasonably give it up). This is what is so frustrating about so-called alternative facts.[1] If it is a fact, then it seems like we shouldn't have alternatives to choose *from*.

1 https://en.wikipedia.org/wiki/Alternative_facts

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The term "alternative facts" is considered by many to demonstrate "doublethink,"[2] which is a concept from George Orwell's novel *Nineteen Eighty-Four*, published in 1949. To doublethink is to have two versions of the same fact in one's mind, causing confusion. Examples from the novel are "War is peace," "Freedom is slavery," and "Ignorance is strength."

Let's consider a different tack. Imagine a case where you *don't know* what is true. Then, on what basis do you choose whether to believe or not? On the evidence? Well, in one sense, evidence is just further belief, and so one might ask whether you should believe the evidence and thus end up back where we started. Maybe we should focus on the kind of evidence we have for what we believe to be true. Suppose the evidence is sufficiently strong and that it *dictates* what to believe; in that case, it seems that you have no *real* choice. The idea would be that if there's sufficient evidence, then how can you think otherwise unless you are deliberately going against what is clear? For example, if all the evidence points to rain but you really want to have a picnic so you *decide to believe* that it will be sunny, you have only yourself to blame when you get wet at the beach. In cases like this, talk of *choosing* what to believe just sounds silly.

Oftentimes the evidence isn't that strong, and it doesn't fully dictate what to believe. Then, maybe you do have a choice about what to *believe* (as opposed to hoping or wishing something to be true). Suppose that you have bet on a horse at the track, and you want it to win, but the evidence you possess doesn't dictate what you should believe about which horse will win.

Socrates (ca. 470–399 BC)[3] is arguably the most well-known and influential philosopher in the Western tradition. He's quoted as having said that "the unexamined life is not worth living" (Plato's *Apology*, 38a). For Socrates, examining oneself and one's beliefs is valuable beyond making sure your beliefs are true; it is part of a meaningful life.

2 https://en.wikipedia.org/wiki/Doublethink
3 https://plato.stanford.edu/entries/socrates/

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If you *choose* to believe that your horse will win when the evidence doesn't support the belief, it appears that you would be misguided. This is because the evidence available to you doesn't provide enough *grounds* for belief. Further, if you were to borrow the family rent money to bet on the horse, you are even worse than misguided—you've acted irresponsibly on insufficient evidence. Believing without evidence or in spite of the evidence or in just plain inadequate evidence leads to bad consequences. In this case, it is more like self-deception that you are using as grounds for belief because you truly *did* know that the belief wasn't justified. It appears then that you never have a choice about what to believe.

Then we come back again to the question, How can you be responsible for what you believe if you don't choose it? But it seems like we *do* hold people responsible for what they believe, and we demand good reasons from them. We can also be taken in by false or misleading evidence, which will be addressed throughout this book. This underscores the need for each of us to be self-examining: *Why do I believe what I believe? What is my evidence?*

1.2 The Causal Character of Belief

One way to approach these issues is by thinking of ourselves as part of the causal fabric of the universe. This means considering how we are sensing, moving, material beings connected to all living and nonliving beings. You have a body and sense organs, which are sensitive to certain phenomena in the world and not others—for example, many of us can tell what colour a thing is just by looking at it (at least if there is light available and so on), but you cannot smell carbon monoxide even if it is present in quantities sufficient to kill you. These are just facts about how most bodies work. Whatever the causal story is about how your eyes and brain work, you are by and large stuck just trusting that your eyes are working normally the majority of the time. It is not as though your eyes give you evidence and then you make a *judgment* to believe them—typically, you *just see* how things look or sense how things feel. Your beliefs about the colours of things are caused in you by processes. These processes work whether you know anything about them or not—we get beliefs from a process we might not have beliefs about! The general *reliability* of those causal processes and the *predictability* of the environment in which you find yourself, and not the choices that you make, by and large dictate what you believe. If you can see red and thus have beliefs about what things are red, it's because a part of you is, in effect, a functioning red detector.

So far, we have been considering beliefs generally on a *perceptual model*—beliefs about how we perceive (see, hear, taste, smell, touch). More general beliefs are of course a different story. A lot of our beliefs are not solely or even primarily based on sense perception. Nonetheless, what we have seen here is

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that you have at least *some* of your beliefs because they are caused in you by processes that you have no access to. And isn't this true of all your beliefs, at least to some degree? So what's the point of a course about critical thinking if we are just *caused to believe what we believe*? And doesn't this make the idea that you choose what to believe (and are thus responsible for what you believe) an absurd thought?

We have just looked at two arguments that conclude the idea of *choosing what to believe is absurd*. First, because we can't just believe anything we want, and second, because beliefs are caused in us by our belief-forming processes and the predictability of our environments.

Let's spend a moment thinking about where these arguments lead. First of all, if you were not, indeed could not be, responsible for what you believe, then it wouldn't be any kind of mistake to believe things without evidence or to believe things merely because you wanted to. But as we have already said, we *are* committed to the idea that believing without adequate evidence is irrational (recall betting on the horse race with insufficient evidence). And so, we do seem committed to the idea that *some beliefs are better than others*—that's why they merit belief. Again, without that, the whole idea of a critical thinking course wouldn't make much sense; to take this even further, the whole idea of *education* wouldn't make much sense.

In order to give any usefulness to the idea of critical thinking, we need to think of thinking as *a process that can be evaluated for reasonableness*.

In other words, we need to be able to imagine different courses of thought that would end in different beliefs. As well, we need to see belief as *aiming at truth*. Let us return to the vision example for a minute. You are caused to see things as having the colours you see; you look at a red piece of paper and believe it is red. But if you notice that a red light is shining on the paper, realizing this will just block you from forming the belief that the that the paper is red—your sense organs did all the work! If you have taken a piece of white paper and placed it in the red light, the case will be even clearer, since *you already know that the paper is white*.

If you are near-sighted and without your glasses things look fuzzy, you won't be caused to believe that the things you see *really are fuzzy*. Similarly, if looking over the edge of your glasses at someone shows you they have two heads, you are not led to believe that the person actually has two heads! Examples like these show that even though vision is an *automatic process* that causes visual beliefs, the visual beliefs that are formed are almost always automatically *adjusted to cohere with other beliefs you already have*. There is an important lesson in this. There is no

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necessary conflict between the *causal* character of belief-forming processes and what a person believes because it is *rational* to do so given other beliefs. This underscores how important other beliefs are in helping us know what is true at any given moment.

Let us make the following assumptions as we work on developing critical thinking skills:

1. Let us think of beliefs as the outcomes of pieces of reasoning or as the products of thought processes.
2. If different thought processes or pieces of reasoning can be evaluated for *successfulness in aiming at the truth*, and if they can be analyzed for the *principles* that guide them in that aim, then we can compare those different principles with each other and determine which aim more successfully at the truth.
3. In comparing those principles with each other, we should not only evaluate which principles aim more successfully at the truth, but we should find meaningful ways of implementing these principles.

Not every creature can reason. Chickens and dogs can learn from experience, but they cannot abstract general principles from their learning successes and failures and then apply them to new situations. But human beings, and quite possibly only human beings, can, at least to a limited degree. Thus we have a definition of what we are doing in trying to improve our thinking.

Critical thinking is thinking that is *disciplined* by being *guided by principles of good method*.

Human beings are capable of critical thinking. Not only can human beings learn from experience; human beings can learn to learn more effectively. Critical thinking rests on the search for good methodological principles, something that both student and teacher need to be equally engaged in. So in this text, we will need to direct our attention to questions about what beliefs are, how thinking can be disciplined by reasonable methods, what makes methods good, and what makes arguments successful vehicles for disciplining thought.

1.3 The Functional Model of Belief

Let us now look more closely at our concept of belief by way of a *functional model of belief*. We have already referred to belief in two ways: (1) as a thought or

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mental state expressible by a sentence and (2) as *behaving* as though a sentence is true. How do these two characterizations fit together, and what does it mean to act as though something is true? Clearly how an agent will act given a certain belief will depend on the other things that the agent believes as well as upon the agent's *values*. In describing beliefs in terms of the actions of an agent, we want to highlight several important facts about beliefs:

1. that the primary significance of belief lies in the *guidance of action*
2. that action is rooted in *evaluation*
3. that for a being that did not experience comparative values—who did not experience some things as more worthwhile than others—the very idea of deliberate action would be pointless

The *functional model of belief* allows us to explain and understand the actions of rational animals in terms of their needs and the way they represent the world. Every organism exists in an environment upon which it is substantially dependent for the satisfaction of its needs. Although many organisms are incapable of learning as individuals—trees and other plants are largely at the mercy of their environments—they nonetheless depend on a *natural fit* between their needs and what their environment can provide. Organisms that are capable of learning as individuals and thus acting upon their environments, as most animals are, must develop stable habits of behaviour that are successful in leading to need satisfaction. Such animals implicitly *represent the world* as being one way rather than another. Their consciousness of the surrounding environment is a representation of opportunities and dangers—a kind of *map* of the world *as it impinges on the life of the organism*.

Knowledge is thus an instrument used by the organism to satisfy its needs.

That map in effect represents knowledge regarding what the world is like (or at least belief regarding what the world is like). The belief that an animal has measure suggests not so much the ultimately real nature of the environment in which that animal exists as much as it measures a set of ways and means of successful life-for-such-an-organism within the environment. For creatures capable of representing their environment, belief, valuing, and doing are internally connected.

From a functional point of view, beliefs ensure the organism's survival by showing it how to satisfy its needs in its environment. An animal's beliefs about its environment simply consist in the set of stable habits of behaviour

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that enable the animal to navigate its world safely. When an animal's settled habits fail, when the animal meets with the unexpected, the animal will strive to revise its habits to more adequately thrive. There are of course limits to this. The animal may meet with bad luck. Its environment may change in ways that exceed its capacity for adaptation. The ways in which an animal of a particular type can learn are limited by its cognitive capacities.

Because human beings have language and can express their beliefs linguistically, they are capable of rich and complex forms of adaptation. Putting our beliefs into words allows us to stand back from our beliefs and evaluate them. We learn not only from the pressure that the environment exerts on us but by seeing the consequences of our beliefs and what they imply for our other beliefs. This means that we are able to envision alternatives to the things we actually believe; we live not just in the real world but in a wider sea of possibilities. Thus, we must find reasons for what we believe in order to justify and take responsibility for what we believe. Still, all the possibilities that we can envision come down to possible differences in behaviour and the outcomes of behaving in those ways.

1.4 Evaluating Belief

When we reason about what to believe, we employ strategies or methods that are themselves beliefs—beliefs about how to reason successfully, beliefs that we can subject to testing and evaluation and that we presently take to be justified, or to be correct, or at least to work. This raises the question of how we can rationally evaluate our beliefs.

> Watch this CrashCourse video on epistemic responsibility.[4] It discusses the case of beliefs about vaccines.

We have a tendency to ask whether beliefs are true or false. While this is an important question in its own way, it is not the most important question for the evaluation of belief. Our beliefs taken as a whole constitute a kind of *model* or *map* of what the world is like. This model or map is likely to be widely inaccurate in some places and almost completely blank in others. Yet we manage to function adequately in the world. Our map of the world is also likely to be contradictory in places. But the principal measure of the

4 https://www.youtube.com/watch?v=AYkhlXronNk&list=PL8dPuuaLjXtNgK6MZucdYldNkMybYIHKR&index=16

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adequacy of our beliefs, of our map, is just this: *How well does it allow us to get along in the world?* The primary function of our beliefs is thus the *guidance of action*. For this reason, the primary evaluative measure of our beliefs is their success in guiding our actions, solving problems, and answering questions. Deliberate thinking is a kind of acting, so the guidance of action includes the guidance of deliberate thinking. The main way we have of telling whether our beliefs are adequate is whether they allow us to get along. As we gain new beliefs, these beliefs change the map or model we have of the world. As the map changes, stresses and strains appear between different parts of the map, and we are forced to make internal adjustments in the attempt to make it more coherent. Some methods of reasoning are better than others at this task, but in any case, it is important to see that the immediate object of this task *cannot* simply be to arrive at truth. Instead, it is to arrive at increased *coherence or better explanations* in order to satisfy our doubts and our sense of order. The direct object of reasoning is the settlement of opinion and the increased adequacy of our maps. But neither adequacy nor settled opinion is the same thing as truth. Adequacy is a measure of the successfulness of our maps in guiding our actions.

Still, we do wish to say that some successful maps are more adequate than others. We want to say this roughly in the sense in which we wish to say that contemporary science has a more adequate view of things than sixteenth-century science did. This sense of "more adequate" is often leveraged against science, since science will always be prone to error at the same time as it roots out error. How can we do this? Can we say that more adequate maps are truer, or more likely to be true? The problem with this answer is that the science of fifty years from now will contradict much of today's science.

EXAMPLE

For example, people will say, "Science was wrong about *X*, therefore how do we know it isn't currently wrong about *Y*?" The point here is that science is a method that is in some part aimed at rooting out errors, so the fact that it has made mistakes is not itself evidence against the method.

One thing we can say though is that contemporary science is capable of dealing successfully with a wider range of situations and problems. So we can say that one map is more adequate than another if it is capable of successfully modelling a wider range of phenomena. This view too has certain problems, but it is good enough for now. In order to be in the critical thinking business, we have to be invested in and willing to improve our map of the world by practicing and adopting accurate methods of belief adoption.

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2

Inference and Argument

In this chapter, we introduce the important distinction between inference or reasoning on the one hand and argument on the other. We then turn our attention to various kinds of arguments broadly taken and distinguish them from argument in a narrower sense that we will call *logical argument*. Let us start by considering what reasoning is and how it differs from mere thinking.

Human beings think a great deal. We do it all the time, in the sense that we think whenever we are conscious or aware of things. Thoughts constantly run through our minds. But the word "think" is ambiguous. On the one hand, it simply means to be in a conscious state; on the other hand, we use the word to refer to mental processes consisting of connected thoughts that fit together to form a piece of reasoning.

To tell someone what you are thinking in this second sense is to tell a story that has some kind of point or outcome. Sometimes the point of the story is entertainment, but often enough, the point is to give another person reasons for believing something. In such cases, the point of the body of the story is that it bears on the truth or reasonableness of the outcome. The thinking reported in stories of this sort can be evaluated or criticized according to how well the body of the story bears on its outcome. This text is about how to evaluate thinking in this sense. The stories we tell about our reasoning, particularly the stories we call "arguments," are crucial in that evaluation. In spite of the fact that much reasoning is performed consciously and for a purpose, not all reasoning is conscious. Some, perhaps most, reasoning is *unconscious reasoning*. We know this because we sometimes find that we have worked out what we think about some matter without being aware of having done so. In such a case, we have to reconstruct what our reasoning must have been like. In the process of reconstructing our thinking, we also often reflect on what our reasoning *ought* to have been like.

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We will use the word "inference" to refer to a piece of reasoning, and when we say that a person infers something *X*, we mean that they have performed a piece of reasoning with that thing, *X*, as a conclusion.

When we talk about reasoning in that way, we assume that the piece of reasoning was *guided by rules* and that in virtue of that guidance, it succeeded (or failed, as the case might be) in a certain *aim*.

Inferences and arguments are not at all the same kind of thing, although they are related in an important way. An inference, or a piece of **reasoning**, is a kind of mental process. As such, reasoning and the inferences involved in reasoning happen in the privacy of the minds of the agents engaging in the reasoning. Reasoning is in this sense not public. Whether or not an agent's thought processes are disciplined by truth-conducive rules cannot be determined just by the conclusion an agent reaches. Consider the following example about how the conclusion someone reaches is separate from the rules they applied to reach that conclusion:

EXAMPLE OF RULES AS SEPARATE FROM OUTCOMES

When a child is trying to add 3 and 4 on the blackboard in grade one and writes 7 on the board, they get the right answer. But if they wrote 7 because it is their favourite number, or because they just guessed and were lucky, then their choice of 7 wasn't the right answer *in the sense of it being the product of the rules of addition*—the appropriate method to use.

This example illustrates that it is important to distinguish thinking that reaches a conclusion for the *right* reasons from cases of thinking guided by personal or private rules, such as "write your favourite number as the answer."

How can we invite you to engage in a piece of reasoning in hopes you will reason according to appropriate methods? We may do this by *offering you an argument*. If we do this, we engage you in a *public* interpersonal process. An argument in this sense is not a mental process but a social exchange between two or more persons. Because inferences happen in the privacy of our own minds and may be largely unconscious or intuitive, they are hard to evaluate directly.

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Argument	Inference
public	private
social exchange	unconscious or intuitive
evaluate with rules	difficult to evaluate
may have participants/collaborative	individual process

Others have no access to our inferences, and our own access is limited by the unreliability of memory, cognitive biases, and the limits of our self-analytical skills. Even though we have direct access to our thoughts, we typically need to dedicate time and practice to developing the methodological skills necessary to evaluate the processes producing thoughts. In contrast to inferences, arguments are *public* events typically involving a number of participants. The participants in an argument present claims as premises in support of other claims or conclusions, which can be "concluded" from the premises on the strength of a set of rules or principles.

The participants in an argument and any observers who are present are all positioned to make judgments about how well the argument goes—for example, about whether the offered conclusions really do follow from the premises offered by the rules of inference in question.

2.1 Context for Critical Thinking

In specific contexts, when we give verbal expression to our thoughts, they become open to others. Once a thought is spoken, anyone hearing could criticize it. Sometimes in ordinary speech, "criticize" can mean "to express disapproval or flat out contradict" someone. This is not how we mean it in Western philosophical traditions. In that tradition, we use "criticize" to mean "to evaluate by offering reasons." Criticizing just means bringing rules to bear on the verbal expression of a thought. To put this all together, an argument is not only a public event; it is crucially a *process that is governed by rules*. This includes the ability to criticize this text and the claims it makes. We assume when you are taking in information that you are asking yourselves questions about its reasonableness throughout. This book aims to teach you techniques and methods that you can evaluate for reasonableness as you learn them!

It is important to understand that critical thinking as described thus far is not an appropriate method for *all truth claims*. There are reasons to adapt methods to context, for example in the case of Indigenous knowledges:

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> Traditional Indigenous knowledge is produced, owned, and distributed quite differently from the way it is done in Western tradition. Knowledge in many Indigenous cultures is not "open" in the same way as it is in the Western context, but instead is guarded by particular individuals, and the handing over of such knowledge is often safeguarded by strict cultural protocol. This is quite different from the Western academic context, which is fundamentally characterized by the ideas of openness to scrutiny and knowledge as situated in the "public domain." (Sharon K. Chirgwin and Henk Huijser, "Cultural Variance, Critical Thinking, and Indigenous Knowledges: Exploring a Both-Ways Approach," in *The Palgrave Handbook of Critical Thinking in Higher Education*, edited by Martin Davies and Ronald Barnett, p. 336, New York: Palgrave Macmillan, 2015)

While we might value critical thinking, which aims at deciphering truth, it is not itself a *value above all other values*, such as respect, tolerance, diversity, culture, land, and so on.

> [Western forms of critical thinking] is not the approach in some Indigenous contexts, where knowledge is seen as communal, and questioning that knowledge, or sharing it beyond the community, is in some cases considered inappropriate and can lead to sanctions for the individual. (Chirgwin and Huijser, "Cultural Variance," 339)

Indigenous knowledges are a specific context in which some critical thinking methods are inappropriate, for example in terms of an objective standard of reasonableness where all knowledge is available to public scrutiny by any individual. This threatens whole worldviews, goes against cultural protocols, and is not appropriate.

Critical thinking then can also mean carefully selecting rules for finding truth that are appropriate for a context, place, and time. It also means demonstrating flexibility in approach so that we can apply rules that scrutinize beliefs in proper contexts. We also need to distinguish between the aim or purpose of argument *as such* from the purely private aims a person may have for *engaging* in an argument.

2.2 Arguments

A person might make an argument because they are motivated out of pride or pity, but we can still evaluate the argument apart from the personal motivations

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of the arguer. Some people pick arguments with others to annoy them or to show off or to express hostility (i.e., "Don't read the comments"). But none of these purposes have anything to do with *what arguments are supposed to do*. There's a big difference between how people *actually argue* versus how they *should argue*.

Preview: In our upcoming chapters on fallacies, you will encounter the difference between addressing a *person* and addressing their argument. If an arguer shifts the topic to the person rather than their argument, it is an *ad hominem* (appeal to the person) argument.

We will consider an **argument** to be a kind of exchange or collaboration between an arguer or arguers and an audience. It is also possible to engage in an argument with oneself—is this what it means to be "on the fence"?[1] A good argument *ought to be persuasive* in the sense that it *would persuade a rational agent* who heard it.

Arguments are a kind of performance and are used in ordinary contexts to do a great number of different things, but as they bear on the task of critical thinking, *they have a structure* in which the in which the arguer:

1. *asserts* the premises (claims them to be true or acceptable, if only hypothetically or for the sake of the argument);
2. *asserts* that *if* the premises are true (or acceptable), *then* the conclusion is true (or acceptable); and thus
3. *asserts* the conclusion.

In what follows, we will abstract somewhat from arguments as public happenings and focus on the essential features that such happenings must be *logical arguments*. A cogent[2] or *good* argument must meet three conditions:

1. A cogent argument must be grounded in premises that are accepted or *rationally acceptable to a reasonable audience*. The arguer's assertion of the premises cannot therefore be silly or arbitrary.
2. The premises must be *genuinely relevant to the conclusion*. They need to have a relevant link to the conclusion.

1 https://www.theidioms.com/sit-on-the-fence/
2 https://www.oxfordlearnersdictionaries.com/definition/english/cogent

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3. The premises must provide *sufficient or strong grounds for asserting the conclusion*.

These three conditions are essential to clearly identify when evaluating arguments. We will work on one of the most important skills necessary for critical thinking with arguments: identifying premises from conclusions.

2.3 Relevance and Dialectic Acceptability

We use arguments to do many things: to show, suggest, convince, persuade, and explore ideas with others. When we introduce information directed toward influencing other people's beliefs and opinions, the information we use to prove a point should be *relevant* to the point we are making.

A premise in an argument is relevant to the conclusion if accepting it provides the recipient of the argument with some reason to believe the conclusion.

Most of the informal fallacies[3] we deal with in part 3 of this book demonstrate arguments where there is a failure of relevance. In effect, information that has nothing to do with the argument is used to distract or shift the focus of a discussion. It offers the appearance, but not the substance, of a reasonable argument. Of course, we can use arguments to deceive, humiliate, and dominate others. In short, we can use arguments in ways that are not aimed at truth. We will not consider these uses in detail in this course. Instead, our interest is directed toward methods that are good in the sense of aiming at appropriate truth.

If an argument is to be rationally convincing to its audience, it needs to have a reasonable form and its premises must be *dialectically acceptable*.

To be *dialectically acceptable*, premises must be able to survive a dialogue about their acceptability; they must be able to meet reasonable counterarguments.

3 https://en.wikipedia.org/wiki/Fallacy

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We formulate arguments both to clarify our own thinking about a matter and to convince others to accept our thinking as reasonable or true. Sometimes, we try to convince others of the incorrectness of an opinion that they hold dear. To do this, we must get them to believe something inconsistent with what they presently believe—that is, to change their minds. This means we cannot always appeal to premises that they already believe. Instead, we need to suggest to them that *they ought to accept new premises* (in hopes they will be reasonable). In an ideal world, if they accept the premises and the argument is good, then they will be moved to accept the conclusion.

It is difficult to state precisely when a premise is acceptable. It certainly does not mean that a person actually does accept it. Many of us can think of unacceptable premises that are accepted (by others or maybe by us)! To say a premise is *acceptable* is to mean something like *what a rational person ought to accept . . . on the evidence, if they are reasonable, and so on*. Spelling out what ". . . and so on" comes to is very difficult. This relies on good methods of thinking, pre-established authoritative knowledge, good methods of science and statistics, and so on. On the other hand, there are uncontroversial examples of acceptable premises that can offer us some guidelines. Here are some examples of types of premises that are *almost always* acceptable:

EXAMPLES OF ACCEPTABLE PREMISES

1. Claims that report our uncontested experience (what we see and hear, for example)
2. Claims that reflect widely accepted and uncontroversial common knowledge (roughly "what everyone knows" or what is generally accepted; e.g., humans need to eat food to survive)
3. Uncontroverted claims that are made by a consensus of recognized experts in a given area (e.g., smoking raises your probability of getting cancer so much so that it can be said to cause it)
4. Any premise that is the result of a cogent argument that is itself constructed of acceptable premises (e.g., relying on previously established claims)

For a premise to be acceptable is for it to be able to pass certain tests and to survive controversy. This is why we use the term *dialectically acceptable*. If a reasonable person using reasonable premises can question a statement, the person putting it forward must be able to meet those arguments with an adequate defence appealing to premises that are just as reasonable.

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When we look at fallacies, we will see that some fallacies violate the criterion of dialectical acceptability, because they appeal to illegitimate authorities or depend on inadequately defended premises.

Notice that even though the idea of dialectical acceptability is vague, it is vague because there are many ways that arguers can interact reasonably, and it is impossible to state exactly when reasonable people will find a premise or conclusion to pass or fail the test of dialectical reasonableness. This does not mean that reasonableness is just a matter of *personal opinion*—quite the opposite is true; determining dialectical reasonableness, and relevance generally, requires careful consideration of alternatives and openness to the views of others as well as openness to their good arguments, and it may require a developed imagination.

Goodness in inference is more subtle and difficult to evaluate than goodness in argument. We have just seen that the criteria of relevance and dialectical acceptability appeal to the relationship that premises in an argument have to other arguments and stories that establish them as acceptable premises. This appeal takes us beyond the question of the formal goodness of the argument itself to the larger question of goodness of inference. To evaluate the formal goodness of an argument, it is merely necessary to analyze the *relationship* between the premises and conclusion. But when we attempt to evaluate goodness in inference, many more things need to be taken into account. Inference is something that happens inside a particular person's belief set. This means that an agent has only her own beliefs as resources when she reasons.

The main difficulty is this: because the inferences we make are situated in the midst of the rest of the things that we believe, the question of whether they make sense or not depends on what we already believe. When we make inferences, we attempt to increase the overall *coherence* and *explanatory power* of our beliefs, but what makes our beliefs more coherent depends in large part on what we believe already. Also, when we make inferences, we attempt to increase the overall likelihood that our beliefs are true, and that attempt will also in large part depend on what we believe already. Among the things we believe already, there will be views about what is true, there will be views about what makes things more coherent, there will be methodological principles, and there will be models of how the world works in general. All these factors will

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affect what makes for overall coherence of belief for us. And our beliefs have not been formed in isolation from the influence of others.

While inference, being a mental process, is private, the beliefs that we form are influenced by the beliefs of others. Remember that we are always acting within a context of taking other people's beliefs as likely to be true—just as they must act according to the likelihood that ours are true.

> How sceptical should we be about our beliefs versus the beliefs of others? Our own belief set is vulnerable to confirmation bias.[4] At the same time, others are vulnerable to confirmation bias. We are all vulnerable, but we are more likely to be sceptical of others. Should we be?

As a result of what other people tell us, it is often reasonable for us to change our minds. The fact that we sometimes infer that our past beliefs were mistaken provides another difficulty for evaluating goodness of inference. Since it is always possible for us to infer that our past beliefs are wrong in our attempts to increase the coherence of our overall view, it is *in principle impossible to predict the best inference to make given a set of beliefs*. Inference is thus *creative* and introduces genuine novelty into our conceptual scheme. Moreover, what will appear to us to be plausible is partly a function of our imaginative skills—our ability to envision and consider alternatives to what we presently believe.

2.4 Selecting a Method

We started out distinguishing inference from argument and examining the fact that because we cannot observe our inferences, they are difficult to evaluate for reasonableness. However, we can indirectly understand our inferences by attempting to reconstruct them and explain why we inferred what we did by *presenting an argument justifying the inference*. The danger is that it is possible that along the way you might change your mind! Analysis and evaluation of an argument are valuable not only for its own sake but for the insight it gives us into our own abilities to reason. Self-criticism can enable us to reduce the errors in our beliefs—both our own and those caused by the influence of others. Completely untrained reason is not, by itself, a particularly good guide to truth, but reason is trainable in a variety of ways. Dialogue, traditional teachings,

4 https://en.wikipedia.org/wiki/Confirmation_bias

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learning languages, informed discussion, the (so-called) scientific method: these are all, if nothing else, exercises of reason. There is actually no such thing as the scientific method, or at least no *single* thing that is the scientific method. What exists is a manifold of methods of reasoning, some more powerful than others, some widely applicable, and others narrowly directed toward certain kinds of intellectual problems. We now need to talk a bit about method.

The question of what makes a method good has no simple answer, because we use many different kinds of methods for different purposes. To answer the question in a concrete case, we need, among other things, to know the following:

1. What purposes does the person using the method have?
2. Is the method well suited to meeting those purposes?
3. What alternative methods are available to that person?
4. What costs are associated with using those methods?

We normally assume that a *desire for the truth* is among the purposes of a person who is trying to solve a problem. While this may usually be so, it is not always, and in any case, there may be other motives operating in the person as well (the desire for prestige, money, or power, saving face, the obedience of others, and so on). As a result, methods that maximize the likelihood of truth may not necessarily be the methods sought after. Methods unsuitable for acquiring truth may be well suited to meeting other purposes. However, because we are interested in critical thinking in this course, we will assume that *truth is the dominant goal of method*, although we will need to qualify this in an important way in a moment.

The methods available to a person are roughly those that a person is capable of adopting or learning at a given time with acceptable cost to the person. When a person learns new methods of thinking, the spontaneous causal processes by which their thinking naturally occurs undergo change. As a person acquires increasingly powerful intellectual methods and as their mind becomes more disciplined, these methods and discipline enable the person to learn yet more powerful methods. There is no such thing as a *best* method—there are only increasingly better or more appropriate ones. The cost of acquiring a method is relevant in two ways.

First, there is the question of the cost of learning or applying a given method to a given problem. A problem that is trivial in the life of the person will not merit a costly method, but an important problem will be worth considerable expenditure of energy. Similarly, a problem that does not need to be answered exactly will not require an exact method; an approximate method will be good enough.

Second, there is the question of the person's long-term goals in life. Not everyone seeks knowledge for its own sake. Most people are interested in having

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a reasonably happy and fulfilling life, and their conception of the happy and fulfilling may not include much in the way of highly specific forms of problem solving. As a result, many powerful methods (e.g., calculus or statistical mechanics) may not be worth the cost it would take for a particular person to learn them. For the most part, in this book, we will not deal with difficult and costly methodologies. Instead, we will focus on foundational analytical tools that will, among other skills, enhance one's intellectual abilities.

2.5 Language Matters

Human beings are language users. This fact is central to the possibility of articulate thinking. Human beings, like other creatures, live in the actual world. When it rains, we get wet, and when our bodies are damaged, we are injured. But because we are *conscious*, we can *know* when these things happen to us; in fact, we are aware of a whole world of things around us. But the actual world is not the same thing as our awareness of it. Our consciousness of the world is *not outside the world* but is itself part of it, and a small part at that. This is, of course, not to say that the things we see around us are really just inside our heads (unless we are hallucinating or dreaming, what we see is really there).

But there is much that is there that we do not see. And what we do see and are conscious of, we do not *just* see. Rather, we see things *as* this or that. When you see a table, what you see is the very same thing as your cat sees when she looks at the table—namely, the table. But unlike your cat, you not only see the table; you see *it as a table* (and *that it is a table*). You not only see the brown colour of the table, but you see it *as brown* and *that it is brown*, and so on. This is something your cat is unable to do, because she lacks language (or what philosophers have traditionally called "reason"). Our beliefs about the world are not just transcripts of reality; they involve *conceptual commitments*, and those conceptual commitments are lodged in the language we speak.

> **EXAMPLE**
>
> It is part of the *meaning* of the word "brown" that it is a colour. Accordingly, if you see *that the table is brown*, you also see *that it is coloured*. You can infer from the fact that the table is brown and what "brown" means that the table is coloured.

The fact that you can (and do) make these inferences is part of what it means to have *linguistic mastery* or competence. A great deal of reasoning is

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simply tracing the consequences that our mastery of language, in the form of our knowledge of what words mean, makes possible.

The pervasiveness of language in our lives is so overwhelming that it is largely invisible to us. We think of the world as full of facts and truths. We conceptualize reality by way of our linguistic competence, and as a consequence, we live in a world filled with significance and meaning and consequence. We grasp reality with a linguistic net, which makes it appear that reality is structured the way our language is.

We will spend some time in this course talking about language and how it shapes thought. We will see that *linguistic competency is a knowledge-based transaction with the world*.

Here are some general distinctions: People often use the terms "sentence," "belief," "statement" (or "utterance"), "assertion," "proposition," "state of affairs," "fact," and "truth," as though they mean more or less the same things. But it takes only a moment to realize that even though the very same set of words can be used to refer to all these things, they are very different from each other.

A *sentence* is a grammatically complete string of words ending in a full stop. Thus "Bill is a good cook" is a sentence but "Bill is a good . . ." is not. Let us leave open what a word is, but note that the word "cook" could be made of black dots on a page, puffs of air coming out of someone's mouth, white chalk dust on a blackboard, and so on. Each *token* (individual instance) of the word "cook" is different than any other, but all of them are *tokens of the same type*. A word is a type. It is, if you like, a kind of job.

Types versus tokens is a metaphysical distinction[5] that philosophers use to differentiate a general category and instances of particular things. "Cook" appears many times in this book, each time as a token instance, which at some points is referring to a type (rather than merely demonstrating the kind of thing a token is).

The individual tokens of the word "cook" all do the same job, which is to refer to *cooks* when it is used as a noun. Sentences are also types. This token of the sentence "Bill is a good cook" is different from the one provided just above, but they are both tokens of the *same* sentence. They both have the same job.

5 https://plato.stanford.edu/entries/types-tokens/

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Sentences can be used to express *beliefs*, which are the mental state of a person (i.e., a thought). If Mary *believes* that Bill is a good cook, we use the sentence "Bill is a good cook" to refer to what she believes. We could consider several accounts of what makes a mental state a belief, but here we can come up with a provisional definition of what a belief is.

A *belief* is a mental state of a person (a thought), expressible by a sentence, such that if the person has it, they act as though the sentence that expresses the belief is *true*.

Thus if Mary *believes* that Bill is a good cook, then Mary is in a mental state such that Mary acts as though it is true that Bill is a good cook. There is another free-floating sense of belief that does not pick out the mental state of a person, but rather that refers to a belief in general. Thus we can talk about the belief that the economy is in a recession without talking about any particular person that holds it. Note that while particular mental states are tokens (individual instances) of beliefs, beliefs themselves are types (general kinds of things). Fred and Mary can both believe that Bill is a good cook, but their individual mental states will be numerically different (non-identical).

A **statement** or *utterance* is the *event* of someone saying (uttering) a sentence. Events happen at particular times. Mary might have stated that Bill is a good cook seven times on Friday; each of these events would consist in the production by Mary of a token of the sentence "Bill is a good cook."

A statement is the use of a sentence to make a claim that can be true or false.

Earlier, we said that in an argument a claim is made or asserted (the conclusion) on the basis of other claims or assertions (the premises). When you use a sentence to make a claim or assertion, you say that some state of affairs is true, and you make a truth claim or statement. Not every sentence can be used to make a statement. For example, the sentence "What is your name?" doesn't make a claim. But the answer, "My name is Keith" is a statement because the sentence is **indicative**. This indicative sentence makes a statement because it is true if my name is Keith and false if it is not. Our language contains many different kinds of sentences that are used for a great variety of different purposes.

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An *assertion* is a statement that expresses a *belief* of the speaker. If Mary asserts that Bill is a good cook, then her statement expresses her belief that Bill is a good cook.

A *proposition* is the *meaning* of a sentence or a belief. We express a proposition by using the sentence or a *that*-clause (e.g., "that Bill is a good cook"). We need to distinguish between sentences and propositions because sentences can be ambiguous. Thus the sentence "Bill is a good cook" could in one context mean that Bill is good at cooking and in another context mean that Bill is a cook who is a good man. Of course, we cannot identify a proposition without using a sentence; it is just that when we talk of propositions, we assume that the context is fixed so as to rule out ambiguity.

A *state of affairs* is what must obtain for a *sentence* or *belief* to be *true*. Thus if Mary's belief that Bill is a good cook is true, the state of affairs of Bill's being a good cook obtains (or happens). In that case, the state of affairs of Bill's being a bad cook doesn't obtain, and the sentence "Bill is a bad cook" isn't true.

A *fact* is a *state of affairs* that obtains (is happening). Thus if Bill is a good cook, then Bill's being a good cook is a fact. You might want to say that *facts* are what make propositions or beliefs true, but there would obviously be something circular about this.

A *truth* is a fact about the world. Thus if Bill's being a good cook is a fact, then it is true that Bill is a good cook. If it is true that Bill is a good cook, then Bill is a good cook. We can think of truth as an agreement between a *thought* and the *world*: a thought is true if the state of affairs picked out by the sentence that expresses that thought is a *fact*.

We see that our understanding of propositions, beliefs, sentences, states of affairs, and truth are all *interrelated*. To say that we live inside of language in part means that the world we live in is a world of facts as much as a world of things. We can think of the world as being fully described by a book (we might call it "the universe's book of all the facts") in which every fact is written down and every sentence is true.

KEY TAKEAWAYS

- Belief can have a causal character (belief-forming processes) at the same time as it can be true that beliefs can be evaluated for their reasonableness.
- Inferences are different from arguments in four key ways: arguments are what we are able to explicitly construct, rehearse, justify, and evaluate, whereas our access to inferences is limited by the unreliability of memory, cognitive biases, and the limits of our self-analytical skills.

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- Critical thinking is not a universal method for acquiring truth that is appropriate in all contexts.
- Arguments have three main components: asserted premises; a relationship that if the premises are true, then the conclusion is true; and an asserted conclusion.
- A cogent argument has the added features of reasonableness and relevance.
- Premises need to be dialectically acceptable, meaning they can withstand specific forms of scrutiny.
- In order to evaluate an argument properly, it must be clear what kinds of statements are being used and whether they make a claim.
- A statement is the use of a sentence to make a claim that can be true or false.
- A proposition is the meaning of a sentence. Sentences can have multiple meanings, but propositions each have a fixed meaning.
- A state of affairs is what must be the case for a belief to be true. A fact is a state of affairs that is happening. A truth is a fact about the world.

EXERCISES

Part I. Identifying Statements

For each of the following, identify whether the *sentence* is making a *statement*. If it is a statement, is it the kind that makes a claim that can be true or false?

1. It is nine o'clock.
2. What time is it?
3. Please come to dinner at seven.
4. I hate you.
5. Tell me when you can come to dinner.
6. Either Rome is the capital of Italy, or it isn't.
7. The Pope is an old man.
8. Pay attention, you lazy lout!
9. Hippopotami are ferocious.

Part II. Identifying Arguments

Determine whether these are arguments. If they are arguments, try to identify the conclusion from the premises.

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1. God can perform miracles but not contradictions—not because his power is limited, but because contradictions are not genuine possibilities.
2. The moral law demands that we pursue, and ultimately attain, moral perfection. But we can't reasonably expect to reach moral perfection in this life. Therefore, we must postulate, or suppose, that there is another life in which this demand of the moral law can be met.
3. I read a book that was full of errors. I think I will call the company to tell them about the errors.
4. Pain is pain wherever it occurs. If your neighbour causing you pain is wrong because the pain hurts and hurting is bad, then the pain a dog feels when you mistreat it is wrong as well.
5. Martha bought vodka, and Frank bought wieners. Between them, they bought vodka and wieners.
6. No scientific hypothesis can be conclusively confirmed because no evidence we could ever find could rule out the possibility of contrary evidence in the future.
7. I followed the directions when cooking tortellini, and it worked for me.

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3

Standard Form and Validity

3.1 Logical Arguments

Defining "arguments" as public social exchanges is too broad for our purposes here. We are specifically concerned with logical arguments. In making a logical argument, a claim is put together with a presentation of reasons that support the truth of that claim. The objective of a logical argument is to show some statement or position to be true or reasonable. We call what is to be shown the **conclusion** of the argument. Typically, the conclusion is based on its logical relationship to certain statements or sentences in the body of the argument; we call these the **premises**. One way to visualize an argument is by thinking of the premises as the legs of a table and the surface as the conclusion. The premises provide support for the conclusion.

> **EXAMPLE OF AN ARGUMENT**
>
> Premise 1: I am hungry.
> Premise 2: Hungry people should eat.
> Conclusion: I will eat some food.

Often there are certain intermediate steps, which may add no new information to the premises but show the logical relationships between the premises and the conclusion. We will call these intermediate steps. The intermediate steps are not essential to the logical quality of the argument; they are simply devices for helping one see the relationship between the premises and the conclusion. So we may define a logical argument for our purposes as a sequence of

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sentences or statements (P1, P2, . . . Pn, C), where the sentences or statements P1 to Pn are the premises and C is the conclusion.

In order to make clear the structure of a logical argument, we put it in a **standard form**. To do this, we identify the premises and the conclusion, list the premises in a vertical stack with a line below it, and place the conclusion below the line.

The standard form of a logical argument:
Premise 1
Premise 2
. . .
Premise n
____
Conclusion

In order to differentiate the premises from the conclusion, it helps to ask "why" and find the "because." We might ask, "Why the conclusion?" Because the premises. Consider: "I got sick last time I drank coffee, so I will pass on coffee today." Try both directions on the "why" question to identify the conclusion: Why did you pass on coffee today? Because you got sick last time. It is quite different to say, "Why did you get sick on coffee last time? Because you passed on coffee today?" This second version doesn't work. But if you try the reversal test using "why" and "because," it will help to identify the premises from the conclusion. Keep in mind that people will use words like "why" and "because" improperly in everyday language, so when you are looking for logic, you should not necessarily trust the way the statements are presented at first blush.

Pulling arguments out of paragraphs can be difficult. One reliable but imperfect shortcut can be to try to identify the use of indicator words. Indicator words are words that signal the logical relationship between claims. We use them all the time! Consider words and phrases such as "because," "therefore," "since," "so," "thus," "and," "but," "or," "in conclusion," "consequently," and so on. However, please note that sometimes an argument doesn't use any indicator words!

Indicator words are words used to signify the logical structure of an argument.

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Premise indicators	Conclusion indicators
since because given that owing to	thus therefore in conclusion as a result hence

These words occur in language, but they are not always used correctly. When determining if a claim is a conclusion or a premise, we can use indicator words as guides but not guarantees. We still need to be asking ourselves what the speaker intends to be in support of the conclusion (the premises) and what the speaker intends to convince their audience of (the conclusion).

3.2 Deductive Versus Inductive Arguments

There are two major types of arguments: deductive arguments and inductive arguments. The conclusion of a good **deductive** argument may be quite independent of what is true because these arguments depend on their logical structure. Before we understand what makes a *good* deductive or inductive argument, we need to identify whether an argument is inductive or deductive in the first place. We focus on deductive arguments because we can study their forms without paying attention to the specific facts. We don't have to worry about new information with a deductive argument, but with an inductive argument, the conclusion can be overturned by new information about the world.

> For a philosophical discussion of the difference between the two kinds of arguments, please read Timothy Shanahan's encyclopedia article[1] on deductive and inductive arguments.

In a *good deductive argument*, the conclusion follows *inescapably* from the premises.

In a *good inductive argument*, the premises make the conclusion *probable or likely*.

1 https://iep.utm.edu/deductive-inductive-arguments/

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Arguments try to prove or convince. Just as indicator words can help identify a logical structure, the kinds of words used in an argument can help you identify whether it is inductive or deductive. Inductive arguments will have words like "likely" or "is probable" within their conclusions. A deductive argument will be more conclusive. It will contain words indicating a necessary conclusion (one that cannot be overturned by new evidence) using words such as "this proves that" and "necessarily."

Inductive arguments depend in complex ways on empirical facts about the world. **Inductive** arguments take facts about the world and "induce" or bring forth a conclusion that is likely, often introducing new information. *Inductive arguments* provide reason to think a conclusion probable or likely, and a *strong* inductive argument is one in which, given the assumption that the premises are true, the truth of the conclusion is very probable or highly likely. Like coffee, inductive arguments come in different strengths, and depending on the context, an inductive argument can be a good argument even if it is rather weak. Inductive reasoning is harder to study than deductive reasoning because it is messier, but the vast majority of our ordinary inferences are inductive, and most of our knowledge of the world—whether scientific or common sense—is merely probable rather than demonstratively certain.

A deductive argument does something different. It uses the information provided by the premises to conclude something about their logical relationship. If it is a deductive argument, the conclusion doesn't introduce any new information.

Inductive argument example	**Deductive argument example**
There are two trillion galaxies in the universe. __________ It is likely that life exists elsewhere in the universe.	If unicorns exist, then they can also fly. Unicorns exist. __________ Therefore, unicorns can fly.
• Depends on what the world is like. • New evidence can overturn the conclusion (though it would be very difficult to get evidence that no life exists elsewhere in the universe).	• Depends on the logical structure. • Cannot overturn conclusion with new evidence (the conclusion depends on premises alone).

One way to make sense of the difference between the two kinds of arguments is to suppose you wanted to disagree with the conclusion. Ask yourself, Can you overturn the conclusion by showing one of the premises is false? Or can you only overturn the conclusion by adding a premise? Consider an example:

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Premise 1: I was talking about vitamins with my mom, and my phone was on the table right next to me.
Premise 2: I told a friend I was burnt out from work, and my phone was next to me.
Premise 3: I received sponsored ads on social media for vitamins and a book titled *Avoiding Burnout at Work*.

Conclusion: My phone is listening to me.

What happens if we say premise 2 is false? It weakens the conclusion, but it doesn't overturn it. But, what if we added a premise 4: "Kristin was googling burnout and vitamins while logged into her browser"? This would overturn the conclusion because it makes the conclusion far more unlikely (her phone isn't necessarily a hot mic, but her sponsored ads could be due to her searching behaviour). So, this argument is *inductive*. The premises support the conclusion, but not without vulnerability to new evidence—it is contingent on what the world is like. Consider a different example:

Premise 1: When an employee is fired, they receive compensation.
Premise 2: Barun did not receive compensation.

Conclusion: Barun was not fired.

What happens if we say premise 1 is false? Does it affect the conclusion? Yes, it would overturn the conclusion. The conclusion depends on the combination of premises 1 and 2. This identifies the argument as deductive in form.

3.3 Inductive Strength and Probability

When we evaluate inductive arguments, we are interested in two central features of their conclusion: their likelihood or *probability* and their *reliability*, which has to do with their causal structure. Inductive arguments are typically based on probabilities in the sense that we support an inductive argument by gathering empirical evidence—such as above when Kristin was gathering evidence that her phone is listening to her. Usually, gathering evidence takes the form of collecting data points, counting the frequency of outcomes of differing types, or polling individuals. The evidence is then processed with appropriate statistical methods and expressed as a probability.

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An inductive argument is *inductively strong* just in case, if the premises are true, the conclusion has a *high* probability of being true.

These arguments usually are used for calculating risk or giving evidence for causal hypothesis. For example, it is common to hear that smoking increases your risk of dying from lung cancer by about 80 percent. And we can say cancers linked to tobacco use account for about 40 percent of all cancer deaths. Here we use "linked" to mean very likely the cause and "increases your risk" to mean there's a higher probability that something will happen. The important point in evaluating if an inductive argument is strong is to use appropriate, explicit, and precise statistical methods.

The simplest form of inductive inference is called *enumerative induction*. It argues from a set of premises about members of a group to a generalization about the entire group. Almost all of our beliefs about the world are about the unobserved, but we cannot help but assume the unobserved will largely be like the observed, so we use past experiences to give us guidance in the future. Consider the claim that "the sun will rise tomorrow." What would be conclusive proof this is true? Not only do we know there is a day that this won't be true (five billion years or so from now), but there could be an unforeseen catastrophe that undermines the claim. All we can do is generalize based on positive past instances where the sun did rise. We make this inference based on enumerative induction. Here are two traditional examples of enumerative induction that differ on the basis of whether there is an indefinite or definite number of possible observations on which to base a conclusion:

Example 1. Observing swans in Australia (indefinite)	**Example 2. A bag of one hundred marbles (definite)**
P1: Swan # 1 is white. P2: Swan # 2 is white. P3: Swan # 3 is white. . . . <u>Pn: Swan # n is white.</u> C: All swans are white.	P1: Marble # 1 is black. P2: Marble # 2 is black. P3: Marble # 3 is black. . . . <u>Pn: Marble # n is black.</u> C: All the (approximately one hundred) marbles are black.

The intuition is that as n (the number of observations) gets larger, the truth of the conclusion becomes more likely and thus more reasonable to believe. The irony of example 1 is that if you imagine the strength of the conclusion

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from the perspective of someone who lived somewhere that only had white swans (a British person in the seventeenth century), you might think you have conclusive proof only because they have never happened upon a black swan (because the swans are native to what is now known as Australia). How many white swans would a seventeenth century British person need to observe to conclusively verify that "all swans are white"? The point here is that the universal claim about swans is much harder to support than the strength of the *disproof* by the single black swan. This brings us to the value of *falsifying* hypotheses.

Karl Popper, the Austrian philosopher of science, argued that science should not pursue an inductivist account of scientific method aimed at showing which theories are *true* but instead should concentrate on crucial experiments aimed at *falsifying* hypotheses. This would mean designing experiments aimed at falsifying universal law hypotheses rather than designing experiments meant to verify them. So we would not be aiming to prove a conclusion true for all time, but we would be taking hypotheses and subjecting them to rigorous and harsh attempts to refute them as the next best thing. Just because we cannot conclusively verify an inductive universal generalization doesn't mean that science is a useless project!

However, the swan example is very different than when we are working with a definite number of things. For the marbles, imagine pulling them out one at a time but not looking at them until after you've take them out. You can feel the marbles and have a rough sense of how many there are, and you can stir them up and pull out a black marble. You reach in and stir vigorously from the bottom and pull out another black marble, repeating this a number of times. You wonder, "Are all the marbles black?" "Are a majority of them black?" Unlike with the swan example, your intuitions have more to work with. First of all, it is, *in principle*, possible to take out all of the marbles and observe them. If you took out one hundred marbles and they were all black, your conclusion would be strong—so strong it would be deductively certain (one hundred black marbles, therefore all marbles are black). Secondly, since you did a good job stirring up the marbles and reaching to the bottom, you made it more likely that you randomly selected a representative sample (or a non-biased sample—imagine if the marbles were in coloured layers and black was just the top). You kept drawing marbles, increasing the size of the sample, making it more likely to be sufficiently large. Lastly, you had helpful background beliefs about how the marbles got there and their patterning (which may or may not be well supported, but they contributed to your inductive conclusion). You had probably made some assumptions about how the marbles got into the box and whether the colours of the marbles would exhibit a regular pattern. And, in addition, other background beliefs you already have will provide some support for the assumptions you bring to this problem. Let's change the example:

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> Example 3. Imagine the box of marbles you are testing might look just like three other boxes on the shelf that have the labels "one hundred black marbles," "fifty red and fifty black marbles," and "fifty red and fifty blue marbles," except that this box has the label torn off.

In example 3, you have reason to think that all the marbles are probably one colour, or that there are two colours of marbles in a box, half and half, and at least *that there will be a regular proportion of marbles of different colours*. If you make such an assumption, then you will be testing for the relative probability of a small number of alternative hypotheses given your evidence. This is important because if there were ninety-nine black marbles and only one red one in the box, you could pull out a very large number of marbles before picking the red one—you couldn't easily rule out that hypothesis on inductive grounds alone; after all, if the box is from your grandfather's toy chest in the attic, it might well contain his favourite red agate shooter and ninety-nine black marbles. If you think about this case for a moment, you will see that the probability of the conclusion of an inductive argument *doesn't depend on the evidence* alone but upon the alternative possible conclusions that are compatible with the evidence. Part of what made the swan example *weak* was that we have no difficulty envisioning different breeds of swans that have different colours (since this is so common among other species), and so even testing *all* the swans in England does nothing to rule out a differently coloured swan in Australia.

To recap, there are two major types of arguments: *deductive*, or formal, arguments and *inductive*, or informal arguments. In a good deductive argument, the truth of the conclusion follows inescapably from the truth of the premises. In a good inductive argument, the truth of the premises makes the conclusion highly probable or likely. Good deductive arguments depend upon their logical structure alone. Inductive arguments, however, depend in complex ways on empirical facts about the world, the strength of evidence, our observations, and other conditions. Accordingly, they cannot be studied in abstraction from the facts as we believe them to be.

3.4 Validity

For the first two-thirds of this text, we will deal almost exclusively with deductive arguments, so until further notice, we will use the word "argument" to mean "deductive argument."

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We have just said that in a *good* deductive argument, the conclusion follows inescapably from the premises; this can be made more precise. The "goodness" of a good deductive argument is called *validity*. A valid deductive argument has the property that *in any situation in which the premises are true, the conclusion must also be true*. *Invalidity* is the failure of this relation. In an invalid argument, it is possible for the premises to be true and the conclusion to be false.

An argument is *valid* if and only if there is no possible situation in which the premises are true and the conclusion is false.

Validity and invalidity deal with the formal relationship between premises and the conclusion. If an argument is valid and, in addition, it has true premises,

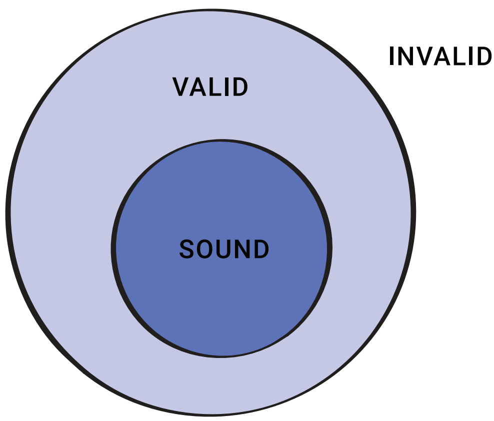

Figure 3.1 Sound arguments are a subset of valid arguments. Artwork by Jessica Tang.

it is called a *sound argument*.

Starting from the outside of figure 3.1, many deductive arguments are invalid. They do not have the correct logical structure. Validity is larger than soundness to represent that there are valid arguments that are not sound. Soundness is validity plus truth: Not all valid arguments are sound. Validity is a formal property of arguments whereby if the premises are true, then the conclusion must also be true. Valid arguments can have false premises, which is why we differentiate validity and soundness.

Validity is a formal property of arguments whereby if the premises are true, then the conclusion must also be true.

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To more easily identify validity, when we put an argument into **standard form**—we put the conclusion at the bottom. You will often have to rearrange the order of statements to present the logical structure. Sometimes what you need to do is find that support relationship—to return to our earlier metaphor, you will have to separate the legs from the table surface.

Consider these three sentences, which are all versions of the same argument:

1. You are tired, and tired people should sleep, so *you should sleep*.
2. *You should sleep*, because you are tired, and tired people should sleep.
3. Tired people should sleep, so *you should sleep*, because you are tired.

In 2, the conclusion comes first, and the word "because" signals that the other claims made support it; in 1, the conclusion comes at the end, and the word "so" functions to connect it to the other claims as following from or being supported by them. In order to make the structure of a logical argument clear, we put it in a *standard form*. To do this we identify all the premises (making implicit premises visible) and identify the conclusion, list the premises in a vertical stack with a line below it, and place the conclusion below the line.

Here is the standard form of 1–3 above:

Premise 1: You are tired.
Premise 2: Tired people should sleep.

Conclusion: You should sleep.

What makes "You should sleep" the conclusion is not *where it appears* in the argument but the *logical relation* it has to the other parts of the argument. An important part of recognizing an argument is seeing the relationships of support and dependence that the component claims have on each other; these relations give the argument its force by showing reasons that the conclusion should be accepted.

Philosophers have identified specific deductive patterns that are always valid or invalid. Many everyday arguments can fit into these patterns, and thus we would have an easy way of telling whether they are truth-preserving. We will present five valid forms and two invalid forms.

3.5 Five Valid Deductive Argument Patterns

Logical arguments usually occur in characteristic *patterns*. These patterns represent relationships of premises to each other that make them support a

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conclusion. We will look at a large number of argument patterns, some informal and some highly structured, with the aim of making you a better reasoner. Deductive arguments are important for critical thinking because the correctness of a deductive argument is purely a matter of its form or the argument pattern it exemplifies.

> Here's a video[2] where Kristin goes over validity, modus ponens, modus tollens, denying the antecedent, and affirming the consequent.

Modus ponens is the first form or syllogism we will discuss. "Modus ponens" is Latin for "method of affirming." This is because the second premise affirms what the first premise *hypothetically* affirms. This means the argument states a version of "if this thing happens—and it does!—then this other thing happens." See the form here:

> **MODUS PONENS**
>
> Premise 1: If *P*, then *Q*
> Premise 2: *P*
>
> ---
>
> Conclusion: *Q*

Here, the letters *P* and *Q* each stand for their own sentence. The logical relationship is a **conditional statement** (premise 1) and an assertion (premise 2), then a conclusion that is the result of the combination of premises 1 and 2.

> **EXAMPLE OF MODUS PONENS**
>
> Premise 1: *If* we live in Saskatoon, *then* we live in Saskatchewan.
> Premise 2: We live in Saskatoon.
>
> ---
>
> Conclusion: *Therefore*, we live in Saskatchewan.

2 https://www.youtube.com/watch?v=egpcJQeoKo4&list=PLiCuDiJCZZw4JinAOb020ZtP-0A7wzKvS&index=2&t=19s

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Here, "We live in Saskatoon" is *P*, and "We live in Saskatchewan" is *Q*. Modus ponens is a *valid* argument pattern because if the premises (1 and 2) are true, then the conclusion *must* also be true. It is true that if you live in Saskatoon, you live in Saskatchewan. The current relationship between cities and provinces is such that Saskatoon is *contained* within Saskatchewan, which is much larger than just one city. Premise 2 is different. It could be true; it could be false. Let's assume it is true, which is what we need to do to evaluate the structure of the argument. Notice, though, that premise 1 says, "If." This "if ____, then ____" relationship means that when you have *P*, you automatically get *Q*. Premise 2 asserts *P*, and then the conclusion says, "Therefore *Q*."

Validity means that if the premises are true, then the conclusion must also be true. This means that validity can apply to an argument with false premises. Consider this example:

EXAMPLE OF MODUS PONENS WITH FALSE PREMISES

Premise 1: *If* dogs are telepathic, *then* cats can fly.
Premise 2: Dogs are telepathic.

Conclusion: *Therefore*, cats can fly.

Premise 2 begins a kind of "chain reaction" between premises 1 and 2 and the conclusion. Just like above, premise 2 triggers the "if ____, then ____" in premise 1, and thus the conclusion follows inescapably. But, revisiting figure 3.1, remember that an argument can be valid without being sound. This same chain reaction can happen in the next syllogism, which is called a **hypothetical syllogism**. This argument form is as follows:

HYPOTHETICAL SYLLOGISM

Premise 1: If *P*, then *Q*
Premise 2: If *Q*, then *R*

Conclusion: If *P*, then *R*

This deductive pattern has three terms and it does something a bit different than modus ponens. It asks you to combine premises 1 and 2 (as usual), but it more specifically looks at how *Q* is in the middle of *P* and *R*, which allows you to cut the middle out and also assert (in the conclusion) that "if *P*, then *R*." We

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will deal with this relation in part 2 when we talk about *transitivity*. Looking at the form, ask yourself if the conclusion is true. On the basis of the two premises, can you see how if you had *P* you would also be able to deduce *R*, and thus the conclusion is true? Let's look at an example:

EXAMPLE OF HYPOTHETICAL SYLLOGISM

Premise 1: *If* we drink too much, *then* we fall down a lot.
Premise 2: *If* we fall down a lot, *then* we miss Eric's exciting lecture.

Conclusion: *Therefore*, *if* we drink too much, *then* we miss Eric's exciting lecture.

Here, "If we drink too much" is *P*, and "We fall down a lot" is *Q*. *R* is "We miss Eric's exciting lecture." Falling down a lot doesn't have to be mentioned in the conclusion, because it is already asserted in the premises that *P* gets you *Q*, which always leads to *R*, so you can know for sure that if you have *P*, then you will always get *R*, which is the conclusion.

The next syllogism we will cover is **modus tollens**. This name in Latin means "method of denying" or "method of lifting out or removing." This is because it is similar to modus ponens, but it uses a negation. The argument form is as follows:

MODUS TOLLENS

Premise 1: If *P*, then *Q*
Premise 2: Not *Q*

Conclusion: Not *P*

Modus tollens has a very different premise 2. It essentially affirms that the second part of premise 1, *Q*, does *not* happen. What happens to the chain reaction when we negate a term? Does anything result from the second part of premise 1 not happening? What can be deduced from that?

This is a good place to introduce a bit of language about how the "if ____, then ____" statements we've been using work. In "If *P*, then *Q*," there are two parts: the **antecedent** (what comes before) *P* and the **consequent** (or result) of that condition, which is *Q*. In other words, "If the antecedent, then the consequent." This statement is hypothetical as the name "hypothetical syllogism" suggests, since the condition comes into effect "if" something else happens—it

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requires that the "if" happens; otherwise, it remains hypothetical. But in the case of modus tollens, it is very, very important that the difference between the antecedent and the consequent are clear. Modus tollens denies the *consequent*. There is an invalid form of argument we will discuss below, which is "denying the antecedent." Let's look at an example of modus tollens:

EXAMPLE OF MODUS TOLLENS

Premise 1: *If* we live in Toronto, *then* we live in Ontario.
Premise 2: We *don't* live in Ontario.

Conclusion: *Therefore*, we don't live in Toronto.

Assuming we know that Toronto is in Ontario, then if we don't live in Ontario *at all*, there's no way that we could live in Toronto. "We live in Ontario" is the consequent that is denied here; it is denied in premise 2, which essentially says, "Not *Q*." You should be able to see that this argument is valid, since not living in Ontario should mean you can't live in Toronto. But think back to modus ponens here. If premise 2 said, "We live in Toronto," we could deduce that "we live in Ontario," which would also be valid.

The next syllogism we cover is a **disjunctive syllogism**. The root of "disjunction" is to separate something, whereas the root of "conjunction" is to bring something together. In the sentence "*P* or *Q*," *P* is one disjunct and *Q* is the other disjunct. Instead of having "if ____, then ____" as the logical connection between terms, the connection looks like "____ or ____." The way we understand disjunction in the disjunctive syllogism is that one of the two disjuncts must be true. They cannot both be false, and they cannot both be true. Think of "you can't be a little bit pregnant—you are either pregnant, or you are not." That is how our "or" operates. It operates exclusively. There are forms of "or" that are inclusive because they allow for both disjuncts to be true. We think of it as pancake house "or" because you can have toast or hashbrowns or both. But we are using an exclusive "or." They *cannot both be true*, and they *cannot both be false*. So when one is false, the other is automatically true. The argument form is as follows:

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DISJUNCTIVE SYLLOGISM

Premise 1: *P* or *Q*
Premise 2: Not *P*

Conclusion: *Q*

In the disjunctive syllogism, we are asserting in premise 1 that either *P* or *Q* happens or is true. Something being true could also mean it is the state of affairs or that it happens. If premise 2 says that *P* does *not* happen, then it must be the case that *Q* does. This is forced, since premise 1 clearly states it is *one or the other*. Let's look at an example:

EXAMPLE OF A DISJUNCTIVE SYLLOGISM

Premise 1: This coffee is *either* black, *or* it has something in it.
Premise 2: This coffee does not have something in it.

Conclusion: *Therefore*, this coffee is black.

In this syllogism, it is set out that either the coffee is black or it isn't (has something in it). Since those two options must be exclusive, the denial in premise 2 makes the conclusion automatically true. This means that disjunctive syllogism is valid.

EXAMPLE OF DISJUNCTIVE SYLLOGISM WITH A FALSE PREMISE

Premise 1: *Either* we live in Saskatoon, *or* we live in Toronto.
Premise 2: We don't live in Toronto.

Conclusion: *Therefore*, we live in Saskatoon.

Let us assume the argument is about us, and we don't happen to live in either place, therefore premise 1 is false. Nevertheless, premise 1 *asserts* that we either live in Saskatoon or Toronto, so the form dictates that as given. Premise 2 rules out Toronto, so we have to conclude Saskatoon. Again, this is valid but not sound (in our case, anyway!).

The last syllogism puts together what we've seen above.

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CONSTRUCTIVE DILEMMA

Premise 1: If *P*, then *Q*
Premise 2: If *R*, then *S*
Premise 3: *P* or *R*

Conclusion: *Q* or *S*

Here's a short video[3] from William Spaniel explaining the **constructive dilemma**.

Here you see that the first two premises are "if ____, then ____" premises where the first terms (antecedents) of both are contained in premise 3 as an "____ or ____" (disjunction). So if either of those antecedents (*P* or *R*) is true, then it allows us to draw *either* of the consequents of premises 1 or 2. Thus, the conclusion asserts the disjunction "*Q* or *S*" (the consequents of premises 1 and 2).

EXAMPLE OF CONSTRUCTIVE DILEMMA

Premise 1: *If* we drink too much, *then* we fall down a lot.
Premise 2: *If* we smoke dope, *then* we get spaced out.
Premise 3: *Either* we drink too much, *or* we smoke dope.

Conclusion: *Therefore*, either we fall down a lot, or we get spaced out.

Here, premise 3 really should grab our attention. It asserts that either the antecedent in 1 or the antecedent in 2 occur. Thus, we are able to say that either the consequent of 1 or the consequent of 2 occur. The conclusion is a disjunction. The soundness of this argument depends on the truth of the premises. Premises 1 and 2 are questionable, but it is unlikely that premise 3 is true (there are more options, we're guessing, for us all at any time), meaning that this example is valid but unsound.

3 https://www.youtube.com/watch?v=9VPN1qlkFzY&list=PLKI1h_nAkaQq5MDWlKXu0jeZmLDt-51on&index=31

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3.6 Two Invalid Deductive Argument Patterns

In each of these previous examples, the argument is valid by virtue of their form. In each case, the premises cannot all be true without the conclusion also being true. The truth of the conclusion is *necessitated* by the truth of the premises. Of course, not all argument patterns are *valid*. There are many *invalid deductive* argument patterns. We will look at two invalid deductive argument patterns, both of which are impersonating modus ponens and modus tollens, but they violate the conditional form the of "if ____, then ____." Here is the first of the two invalid forms we will cover:

DENYING THE ANTECEDENT

Premise 1: If *P*, then *Q*
Premise 2: Not *P*

———

Conclusion: Not *Q*

Denying the antecedent means that *P*, the antecedent in the conditional phrase that is premise 1, is denied. From the denial of *P*, the arguer concludes that *Q*, the consequent, absolutely does not occur. What is wrong with this pattern? It helps to think of an example with true premises that leads to a false conclusion.

EXAMPLE OF DENYING THE ANTECEDENT

Premise 1: *If* Muffin is a poodle, *then* Muffin is a dog.
Premise 2: Muffin is not a poodle.

———

Conclusion: *Therefore*, Muffin is not a dog.

When evaluating if an argument form is valid or invalid, you can ask yourself, Is there a *possibility* in which the premises are all true but the conclusion is false? In this instance, it might be true that "if Muffin is a poodle, then Muffin is a dog." Premise 2 rules out the possibility that Muffin is a poodle, so we know the conditional in premise 1 does *not* get triggered. Then how can the conclusion be that Muffin is not a dog? All we know is that Muffin is not a poodle. Couldn't she be a Doberman? By virtue of the premises, we cannot conclude she is *not* a dog whatsoever. Because the conclusion is possibly false *even if the premises are true*, this is an invalid form. Let's look at another example:

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EXAMPLE OF DENYING THE ANTECEDENT

Premise 1: *If* we live in Saskatoon, *then* we live in Saskatchewan.
Premise 2: We don't live in Saskatoon.

Conclusion: *Therefore*, we don't live in Saskatchewan.

Hopefully everyone who has ever lived in or visited Saskatchewan can attest to the fact that there is plenty of Saskatchewan beyond Saskatoon's outskirts. Imagine a situation in which the premises are true and the conclusion false: You live in Canoe Lake Cree Nation, Saskatchewan. Thus, we can declare *denying the antecedent* to be an invalid argument form. It might help to think of denying the antecedent as trying to trick you into thinking it is modus tollens but it is backwards. Remember that modus tollens denies the consequent, not the antecedent. Let's look at the second invalid form we will be covering:

AFFIRMING THE CONSEQUENT

Premise 1: If *P*, then *Q*
Premise 2: *Q*

Conclusion: *P*

Affirming the consequent is a common mistake where an arguer goes the wrong way with the conditional—it masquerades as modus ponens, but it is invalid. The conditional is always triggered on the *antecedent* condition, not the consequent. Recall that modus ponens *affirms* the antecedent.

EXAMPLE OF AFFIRMING THE CONSEQUENT

Premise 1: *If* we live in Regina, *then* we live in Saskatchewan.
Premise 2: We live in Saskatchewan.

Conclusion: *Therefore*, we live in Regina.

Again, all these statements could be true, but we live in Canoe Lake Cree Nation, Saskatchewan. Of anyone, presumably, it is true that if they live in Regina, they live in Saskatchewan. But affirming they are in Saskatchewan doesn't tell us they live in Regina whatsoever. One way to think of affirming the consequent is that in some logical symbolizations, the "if ____, then ____"

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relationship is symbolized with an arrow: $P \rightarrow Q$. In affirming the consequent, a person reasons the wrong way up the arrow. The arrow points from the antecedent to the consequent, not the other way around.

KEY TAKEAWAYS

- Premises are claims in support of a conclusion.
- A conclusion is the result of the assertion of supporting premises.
- In order to make clear the structure of a logical argument, we put it in a standard form, where the premises are in a vertical stack with a line below separating them from the conclusion.
- Deductive arguments have conclusions that follow necessarily from the premises and can be overturned by falsifying a premise.
- Inductive arguments have conclusions that are made likely by the premises and can be overturned by new information.
- An inductive argument is *inductively strong* just in case, if the premises are true, the conclusion has a *high* probability of being true. It is strong based on method, such as statistics, induction, and observations.
- Validity is a property of arguments whereby if the premises are true, then the conclusion is also true. In other words, there's no possible situation in which the premises are true and the conclusion is false.
- Soundness is when an argument is valid and the premises are true.
- Five valid argument forms: modus ponens, hypothetical syllogism, modus tollens, disjunctive syllogism, and constructive dilemma.
- Two invalid argument forms: affirming the consequent and denying the antecedent.

EXERCISES

Part I. Standard Form Practice

Here are a number of informally stated arguments. Identify the conclusion of each and put the argument in standard form.

1. "Many that live deserve death. And some that die deserve life. Can you give it to them? Then do not be so eager to deal out death in judgment. For even the very wise cannot see all ends" (Gandalf in J. R. R. Tolkien's *The Fellowship of the Ring*, 1954).
2. The kids said they were hungry, so Stella took them to Burger King.

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3. Mary isn't answering the phone, and she always answers if she can. So either she isn't home or something is wrong.
4. A square circle must be logically impossible. God can do anything that is logically possible, but God can't make a square circle.
5. The conservatives won't win the election because they won't have enough support in Ontario, and so they won't get enough seats to form the government.
6. Shanghai is the size of New York, so it is much bigger than Saskatoon.
7. If Dr. Shipley is elected as president of our club, we will have the first woman president in our history.
8. People don't trust the Liberals. This means that Stéphane Dion will probably lose the election because people just won't vote for a leader they don't trust.

Part II. Identifying Deductive Patterns

All these arguments are examples of the patterns we have seen in this section. Identify the pattern of each argument, put them in standard form, and explain whether they are valid or invalid.

1. The eggs are spoiled because they are six months old, and if eggs are six months old, they are spoiled.
2. If Ottawa is in Manitoba, then it is near Brandon. Ottawa isn't in Manitoba because it isn't near Brandon.
3. If Ottawa is near Brandon, then it is in Manitoba. Ottawa isn't near Brandon, so it isn't in Manitoba.
4. The Senators either play in Ottawa or in Montreal. They must play in Ottawa because they don't play in Montreal.
5. If eggs are six months old, they are spoiled, and the eggs are spoiled, so they must be six months old.
6. If you are tall, you can reach the cookies. You can eat some if you can reach them. So, if you are tall, you can eat some cookies.
7. In Vancouver, either it will rain or it just rained. You will get wet if it is going to rain. If it just rained, then you are wet. So in Vancouver, either you are wet or you will be.

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4

Putting Validity into Practice

4.1 Using Counter-Examples

We introduced validity and invalidity in the previous section. There are certain thought techniques that we can use to demonstrate when an argument is invalid. Recall the suggestion that you live in Canoe Lake Cree Nation in Saskatchewan. This was to offer a possible **counter-example** to the claim that if you live in Saskatchewan, then you live in Saskatoon. If a deductive argument form has a counter-example, then it is **invalid**.

A counter-example is when we imagine a circumstance or possible situation in which the premises are true and the conclusion is false. We're sure you have done this before even if you haven't specifically called it a counter-example.

A valid argument has *no counter-examples*, so the presence of *a single counter-example refutes an argument*.

For example, if your friend says, "Don't eat at Joy's Diner because *all the food there is terrible*," all it takes is one counter-example to prove false that *all* the food is terrible. Keep in mind that your friend said *all* the food is terrible. This is quite different than saying "most" or "some" or "many" or even "almost all." If you use definitive statements like "all" or "only" or "never," then a single counter-example will refute it. In this case, if you have been to Joy's Diner, you could say, "I had one good sandwich there" and refute the statement. This is very different from requiring you to say, "All the food at Joy's Diner is good." You don't need another "all" statement here, you just need a single counter-example to prove it false that "all the food is terrible." When we talk

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about generalizations and fallacies, we will talk a lot about how to construct good generalizations.

In the real world, it matters if the examples we use are true—it matters if the person saying they had a good sandwich at Joy's Diner is telling the truth. But for a deductive argument, we are searching for the possible situation that *could* exist—like it is possible you live in Canoe Lake Cree Nation. But what we imagine must be *consistently thinkable*. This means it can't be paradoxical or contradictory, such as "this sentence is false" or "triangles are round."

> Western philosophers have several paradoxes that they have wrestled with resolving. Encyclopaedia Britannica has outlined eight paradoxes,[1] several of which will come up in the course of this textbook.

The validity of an argument doesn't depend merely on what is actually true or false—a valid argument must work in *every possible circumstance*. That means that every possible circumstance that makes the premises true must also make the conclusion true.

Finding a single counter-example **refutes** an argument's claim to validity. To see this more clearly, let us compare *modus ponens, modus tollens, and affirming the consequent*.

4.2 Modus Ponens

Modus Ponens has two propositions (*P* and *Q* are the letters we have been using so far) within them. If we think of all the possible combinations of **truth values**, or combinations of truth and falsity that generates, then we can better understand how counter-examples help us understand validity. Consider two propositions:

A = The cat is on the mat.
B = It is raining.

We can compare them using a graphic diagram of the four possible situations or **truth values** generated by two sentences and their negations. Since

1 https://www.britannica.com/list/8-philosophical-puzzles-and-paradoxes

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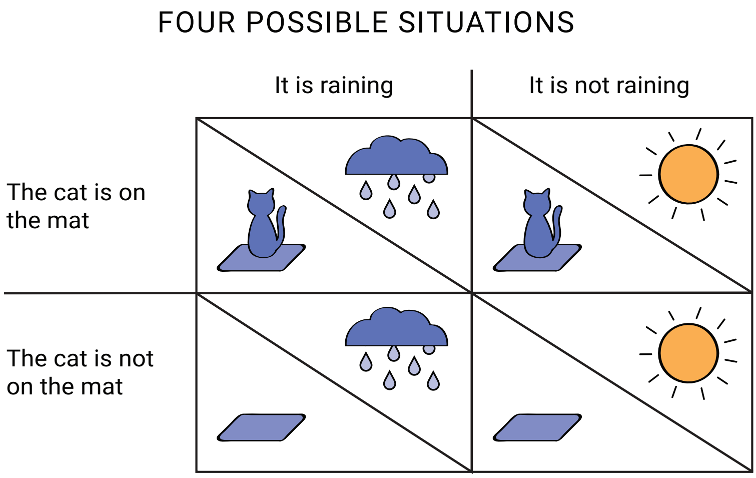

Figure 4.1 Four possible truth combinations. Artwork by Jessica Tang.

each sentence is either true or false, there are four possibilities for truth and falsity for combining the two sentences.

Sentence	Possibility 1	Possibility 2	Possibility 3	Possibility 4
A (cat is on the mat)	true	true	false	false
B (it is raining)	true	false	true	false

One way of reading this chart is that in the case of possibility 1, both *A* and *B* have a positive truth value in the argument. In the case of possibility 2, *A* is positive and *B* is negative, represented as "not *B*." In possibility 3, it is "not *A*" and *B*, and in possibility 4, it is "not *A*" and "not *B*." These are *all the possible combinations* of the possible truth values of the sentences.

APPLICATION TO MODUS PONENS

Premise 1: If the cat is on the mat, then it is raining (if *A*, then *B*).
Premise 2: The cat is on the mat (*A*).

Conclusion: It is raining (*B*).

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Why is this valid? Since premise 1 asserts "if *A*, then *B*," then possibility 2 is not possible because the cat is on the mat (*A* is true) but it isn't raining (*B* is false), so that cannot represent "if *A*, then *B*." Premise 2 essentially asserts *A* as true, which rules out situations 3 and 4, where *A* is false.

The only possible remaining truth values, which is to say the only possibility that is *not ruled out by the premises*, is situation 1. In situation 1, the conclusion (*B*) is true. Here's the result of this whole discussion. The argument is valid because the only possible assignment of truth values is one in which the truth of the premises *guarantees* the truth of the conclusion (B). This is why validity is seen as a method of truth preservation. When the premises are true, the conclusion is also true. This *proves* modus ponens is valid.

4.3 Modus Tollens

We can also use this method to prove modus tollens is valid.

APPLICATION TO MODUS TOLLENS

Premise 1: If the cat is on the mat, then it is raining (if *A*, then *B*).
Premise 2: It is not raining (not *B*).

Conclusion: The cat is not on the mat (not A).

Recall our four possible truth-value assignments:

Sentence	Possibility 1	Possibility 2	Possibility 3	Possibility 4
A (cat is on the mat)	true	true	false	false
B (it is raining)	true	false	true	false

Premise 1 states that "if *A* is true, then *B* is true as well," which rules out possibility 2, "*A* is true, but *B* is false." Premise 2 states "not *B*," which rules out 1 and 3 because they require *B* to be true. So the two premises rule out all the possibilities except possibility 4, which states that *A* and *B* are both false. So, why is modus tollens *valid*? Because if the premises are true, there's no way for the conclusion to be false, which includes possibility 4 where the premises are false.

This one is a bit harder to grasp given the setup we have. Consider: "If you are a poodle, then you are a dog." "You are not a dog, therefore you are not a poodle." Even though cats and rain are not connected in the same way as

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poodles and dogs, the logical structure is the same. So when we say that if the cat is on the mat, then it is raining, we are saying at the same time that if it is not raining, the cat is not on the mat. Why? Because premise 1 clearly states that if the cat is on the mat, then it is raining.

4.4 Affirming the Consequent

This method also allows us to demonstrate why affirming the consequent is *invalid*.

APPLICATION TO AFFIRMING THE CONSEQUENT

Premise 1: If the cat is on the mat, then it is raining (if A, then B).
Premise 2: It is raining (B).

Conclusion: The cat is on the mat (A).

Sentence	Possibility 1	Possibility 2	Possibility 3	Possibility 4
A (cat is on the mat)	true	true	false	false
B (it is raining)	true	false	true	false

Possibility 2 is ruled out because it would mean that it is true that the cat is on the mat, but it is false that it is raining. This contradicts premise 1 (if A is true, then B is true). Premise 2 asserts B is true, so that rules out possibilities 2 (again) and 4 (because B is false on those possibilities).

Here's a short video refresher[2] from William Spaniel on why affirming the consequent is invalid.

We are left with two situations: possibility 1 and possibility 3. In possibility 3, it is raining, but the cat is not on the mat. But the conclusion asserts the cat *is* on the mat. What we are seeing, then, is that the conclusion is false in situation 3,

2 https://www.youtube.com/watch?v=T8JYN1oOvkM&list=PLKI1h_nAkaQq5MDWlKXu0jeZmLDt-51on&index=49

and thus *the truth of the premises is consistent with the falsity of the conclusion*, making the argument invalid.

4.5 Denying the Antecedent

APPLICATION TO DENYING THE ANTECEDENT

Premise 1: If the cat is on the mat, then it is raining (if A, then B).
Premise 2: The cat is not on the mat (not *A*).

Conclusion: It is not raining (not *B*).

Sentence	Possibility 1	Possibility 2	Possibility 3	Possibility 4
A (cat is on the mat)	true	true	false	false
B (it is raining)	true	false	true	false

Remember that with denying the antecedent, you cannot derive "not *B*" from premises 1 and 2. This is because *B* has enough independence from *A* that it can occur on its own. We only know "if *A*, then *B*." We do not know enough from "not *A*" to conclude "not *B*." From the truth-value possibilities, possibility 2 is ruled out because it would mean that it is true that the cat is on the mat, but it is false that it is raining, which denies premise 1.

Here's a short video refresher[3] from William Spaniel on why denying the antecedent is invalid.

Another way of stating that is to say that premise 1 asserts that if *A* is true, then *B* is also true, so possibility 2 can't be true (since *B* is false). Premise 2 asserts that the cat is not on the mat, so there has to be a possibility where *A* is false, which rules out possibility 1. Now we are left with possibilities 3 and 4. In this case, we cannot rule out either one, which means that it is possible for the premises to be true while the conclusion false (possibility 3 has *B* as true, which contradicts the conclusion, which is "not *B*").

3 https://www.youtube.com/watch?v=5bQEe6GGNyY

KEY TAKEAWAYS

- A counter-example is a possible instance where the premises are true but the conclusion is false.
- Valid arguments do not have counter-examples. If they are valid, they are valid in every possible circumstance.
- Valid arguments can have false premises.
- Validity is a method of truth preservation: when the premises are true, the conclusion must also be true.
- Affirming the consequent and denying the antecedent are invalid because the truths of their premises are consistent with the falsities of their conclusions.
- Mapping all truth-value possibilities allows you to look for counter-examples to argument forms.

EXERCISES

Part I. Validity Practice

Complete the following exercises on validity.

1. Write down the argument forms modus ponens, modus tollens, and disjunctive syllogism. Give an example of each pattern that has true premises (and so has a true conclusion) and an example that has false premises.
2. For each example in question, one of modus tollens and disjunctive syllogism, make a square representing the four possibilities for truth and falsity of the component sentences of your examples, and show that each is valid by crossing out each possible situation that is ruled out by a premise and determining that the conclusion is true in any possibility consistent with the truth of the premises.
3. Write down some examples of the invalid forms *denying the antecedent* and *affirming the consequent*. Give an example of each that has true premises and a true conclusion and using the four-possibility method to show why it is still invalid.

Part II. Validity True and False

Here is a set of assertions involving soundness and validity. Use a *T* or an *F* to indicate whether these statements are true or false.

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1. No sound argument has false premises.
2. If an argument has true premises and a false conclusion, then it is invalid.
3. Every valid argument has a true conclusion.
4. If an argument has a counter-example, it is invalid.
5. Some unsound arguments have true premises.
6. No valid argument has false conclusions.
7. Some invalid arguments have true premises.
8. Every sound argument has a true conclusion.
9. No sound argument has a counter-example.
10. All valid arguments have true premises.
11. If an argument has false premises, it cannot be sound.
12. No valid argument has a counter-example.
13. All unsound arguments have false premises.

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5

Classification Systems

Clarity and precision are important for critical thinking. Using words or concepts in a fast and loose manner is an invitation to errors of many kinds. It is now time to talk about the importance of precision and clarity in our use of words and symbols for critical thinking. First, we will discuss how words classify and what they refer to, and after that, we will turn to the discussion of the importance of definition.

If we reflect on maps, it is clear that different maps or parts of maps may classify what they represent in different ways. Consider a road map of Ontario. Cities and towns may be represented by circles of different sizes, where the size of a circle represents population, but they could also be represented by squares representing the physical size of the urban area. Different ways of representing Ontario might be good for different purposes, and one can imagine specialized maps that identify cities and towns by economic activity, treaties, religion, quality of drinking water, or even the number of claimed UFO sightings.

Maps are just one sort of system of representing the relationships of objects classified in different ways. Our theories and hypotheses similarly vary in the ways in which they classify the things that they represent. The concepts we use do not simply list the things in the world but *organize them into patterns*; in fact, there is no way to list things without classifying them in some way. Here is an example. Suppose Karen, who lives in North Bay, has a brown long-haired dachshund named Mabel that likes cornflakes, naps in the sun, and has once bitten the postal worker. Mabel may be known in the neighbourhood as "that sleepy wiener dog," "Karen's pet," or "lil' bitey," and each of these terms will function like a name picking Mabel out from the other things in the neighbourhood. In this case, those names pick out a unique individual. But what if terms are used to pick out a number of things with common properties, such as "dachshunds"?

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This is where we start to make classes, or build a *classification system*. We can refer to Mabel as a brown dog, in which case we are saying Mabel is a member of the class of all things that are brown dogs. We are saying Mabel belongs in this group because she and the other members are similar in some respect. Mabel is also part of the class of all things who are "animals that have bitten a postal worker," of which a quick google search reveals cats are also a member. In fact, there are indefinitely many terms that have Mabel as a referent ("weighs less than one million kilograms," "is wingless," "cost more than four hundred dollars," "lives in North Bay," "is not a mountain lion," "is not immortal," and so on).

5.1 Building a Classification System

We classify things for many different purposes, and so there are many possible classification schemes.

> By definition, **classification** *is a kind of division according to a rule*: a group of individuals is divided into subgroups by a rule that sorts them by a set of common properties.

Imagine that you have a pile of toys and you want to sort them into groups so that you can put them away on a set of shelves. You might put all the Legos on one shelf and all the stuffies on another and all the dolls on a third. You could label each shelf ("the Lego shelf," "the stuffy shelf," and so on) so you know what to put there. A good classification scheme would divide the toys into a coherent set of groups, where each group went on a different shelf, and each and every toy was assigned to only one group, such that every toy had a place on one shelf or another.

Imagine that you decided to put stuffies on one shelf and red things on another shelf and Legos on a third. If none of the Legos or stuffies were red, this system might work well enough, but suppose one of the stuffies was red (not to mention all the tiny red Lego pieces). Now you have a problem: Your rules of classification would tell you to put the red stuffy on two different shelves—the shelf for stuffies and the shelf for red things. Of course, you can't put it on both shelves at the same time. So your classification system would fail to tell you where to put stuffies (or Legos) that are red. A *good* classification scheme won't do that. Here are the rules we will use to build a good classification system:

FOUR RULES FOR A GOOD CLASSIFICATION SYSTEM

1. A classification system should be *exhaustive*. This means that each and every member of the whole group being classified should be put in some subgroup or another; the classification scheme *doesn't leave anything out* in the group being classified.
2. A classification system should be *exclusive*. This means that no member of the group being classified should be put into more than one group; groups don't overlap.
3. A classification system should be *clear*. The rules of classification should be sufficiently easy to understand and apply, and it should be clear to which group members belong.
4. Classification systems are developed to perform particular jobs, so a classification scheme should be *adequate* for its purpose.

The first two rules of classification, that a scheme should be *exhaustive* and *exclusive*, have the consequence that everything in the group being classified is put into a group and only one group; the other two rules are aimed at *usefulness*.

EXAMPLE FOR CLASSIFICATION

Imagine you are given the job of digging potatoes, and you are given a large basket and a small one and told to put the big ones in the big basket, the tiny ones in the small basket, and leave the rotten ones in the field. This leaves you with three categories for potatoes. Is this a good classification scheme?

We can all understand that the rotten potatoes don't have to be divided by size (yuck). So we have three categories then: big keepers, small keepers, and rotten non-keepers. How do you know which potatoes are big and which are small? That is another classificatory distinction that requires a rule. In this case, the circumstances will determine which are big and which are small. If this particular kind of potato only ever grows really big or very small, this task is easy. Or maybe only the middle-size ones rot, making it easy to differentiate big from small. But it seems like potatoes usually have varying sizes and rot somewhat randomly. This means you will need a clear-cut boundary for how to divide the potatoes by size. This exercise in thinking about potatoes is to show how *what potatoes are like* and *what we want to do with them* will in part determine the kind of classification scheme. There are a number of assumptions

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about potatoes and our purposes that make the classification scheme adequate or inadequate.

Many things, particularly natural kinds and manufactured objects, come already classified in certain ways. Paper money, for example, comes only in certain denominations. New cars come in a finite number of models and colours, and metals are either iron or gold or tin, and so on.

KEY TAKEAWAYS

- Objects get classified together in groups because they are similar in some respects.
- Classification systems help us organize the world by dividing individuals into subgroups using a rule that sorts them by a set of common properties (e.g., brown dogs).
- Classification systems must be exhaustive: nothing is left out.
- Classification systems must be exclusive: groups don't overlap.
- Classification systems must be clear: rules need to be understandable.
- Classification systems must be adequate: it needs to do its job.
- The first two rules of classification systems (i.e., exhaustive and exclusive) ensure that everything being classified is put into only one group; the latter two (i.e., clear and adequate) ensure that the classification system is useful.
- The kind of a thing being classified determines, in part, the kind of classification scheme that is accurate.

EXERCISES FOR CLASSIFICATION

Part I. Classification Practice

Evaluate these classification schemes. Are they exhaustive, exclusive, clear, and adequate to the task? If so, say why. If not, explain why.

1. (Toys) Very small things go on the top shelf. Large stuffed animals go in the box. The books go on the middle shelf and everything else goes in the closet.
2. (Marble collection) multi-coloured solids, the clear coloured, the clear colourless with swirls inside, and the clear colourless without swirls inside.
3. Big animals, scary animals, smelly animals, animals named George.

4. Friends (be nice to them), people who can hurt you (be nice to them), everyone else (who cares?).
5. My mom, my brothers and sisters, my parents, my friends, the people I hate, everyone else.
6. (Kinds of animals) Pets, vermin, game, work animals, food animals.
7. (Pre-season list for the coach) Last year's returning players, kids with attitudes, losers, kids who are promising but need more skills, kids I can't tell about yet.

Part II. Create a Classification System

Think of a number of different things that are small enough to put on a shelf. List ten of these things picked at random. Now make a classification system that will sort and organize them onto three shelves that puts like items on like shelves. (Don't cheat by picking things that will clearly fit the classification system; pick the things first.)

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6

Definitions

6.1 Definition and Language Use

The meaning of a term in effect classifies what the term refers to. Definitions tell you what a term means. There is an intimate connection between **definition** and **classification**. The meaning that a term has is not a natural property of the term that could be discovered by investigation; a term has whatever meaning it has been given by the people using the term. Of course, some terms—for example, "water" or "gold"—refer to natural kinds of things, and the properties of those natural kinds *are* discovered by investigation and observation. Of course, not all parts of the natural world are as easy to define as molecules (water) and elements (gold), not to mention the social and imaginary world that language also describes.

> Philosophers have debated the existence of natural kinds, since it is not clear exactly how the categories themselves exist beyond the individual members we identify. For further information on philosophical discussions of natural kinds, see this entry[1] in the Internet Encyclopedia of Philosophy[2] by Zdenka Brzović.

Generally speaking, language users agree on what terms to use to pick out specific parts of the world, but this is not entirely arbitrary. The terms we use are, in some part, a consequence of the kind of thing in question. The meanings of words are a function of social practice stipulated by users, so it is important

1 https://iep.utm.edu/nat-kind/
2 https://iep.utm.edu/

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for successful communication that all the parties in an argument are *using terms in the same way to mean the same thing*.

Enjoy this clip from *The Princess Bride*[3] that references correct word usage!

For example, imagine two people are having a discussion about the moral permissibility of abortion. One person says it is impermissible and the other person says it is permissible. What if they are not using the word "abortion" to mean the same thing? What if one of them has defined abortion as terminating a pregnancy *after* three months (and is arguing that it is morally wrong)? What if the other one defines abortion as terminating a pregnancy *before* three months (and argues that it is morally permissible)? Do these two people really disagree? Is it possible that they both agree that abortions should not be allowed after three months?

Consider the disagreement in figure 6.1. This is what is often called talking past each other. Now what would this look like if there was an agreed-upon definition as illustrated in 6.2? We don't know if there is a disagreement. We would have to ask *A* what their position is with the stipulated definition.

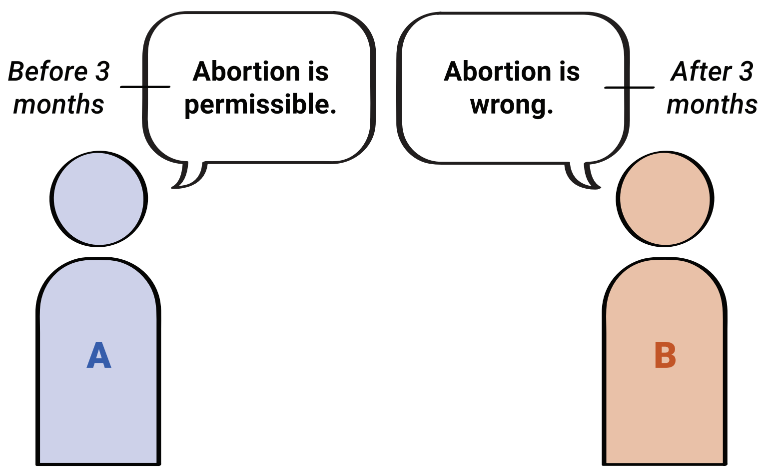

Figure 6.1 An example of a disagreement using two different definitions. Artwork by Jessica Tang.

3 https://www.youtube.com/watch?v=qhXjcZdk5QQ

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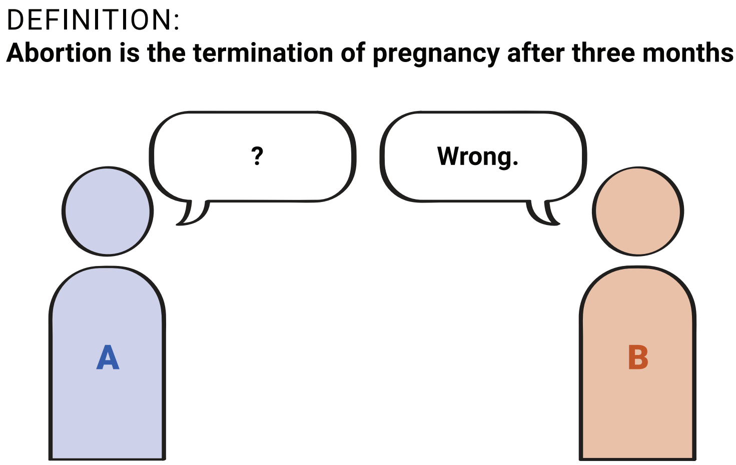

Figure 6.2 What happens to the disagreement (6.1) with a stipulated definition. Artwork by Jessica Tang.

6.2 Classification and Language Use

There is a kind of order to the natural world that is independent of the meanings that human beings use. Dogs, for example, exist quite independently of the fact that we have a word, "dog," that we use to refer to them. The same is true of cats. Cats and dogs are both animals, but they are different *kinds* of animals, and if we used one word to refer to both species, they would still be different and we would need other words to distinguish them in thought (e.g., barking cats versus purring cats, or tail-wagging dogs versus not tail-wagging dogs).

> This point often brings up discussions of whether Inuit languages have fifty or one hundred different words for snow.[4] This is a myth, since the languages in question build words differently than English. It is like saying "crunchy snow," "soft snow," "sticky snow," and so on. The myth has been used to support the idea that the language you speak might determine how you see the world.[5] This is a very different claim than the idea that the language you speak is influential in how you see the world.

4 https://www.theatlantic.com/notes/2016/01/mini-object-lesson-no-there-are-not-a-hundred-eskimo-words-for-snow/426651/
5 https://www.babbel.com/en/magazine/50-words-for-snow

It is important to keep in mind that the meaning of a term does not stand alone; terms stand in relation to other terms that also have meanings. One of the principal uses of definition is to clarify the relationships *between* terms. When the English dictionary (created by human users!) defines "dog" as a "domesticated canine animal," it provides us with the meaning of the word "dog" by referring us to several other terms ("domesticated," "canine," and "animal"). If we know the meanings of those terms, we should know the meaning of "dog." If we looked those terms up and then looked up the terms those terms were defined by, and we continued to look up terms in a dictionary, we would ultimately find a closed circle of terms, meaning all the terms we looked up would be defined by using other terms we had looked up already.

Since definitions classify or group things together that are the same or similar in some respects, the language as a whole functions as a giant *classification system*. You might even call a language a super set of classification systems, which allows us to group the things in the world in a variety of ways depending on our interests and needs. Furthermore, the ways we can distinguish the things in the world from each other reflect real differences in things and facts about the world that are there for us to discover. As a result, there is an enormous amount of factual knowledge about the world that is embedded in word meanings, and we can gain access to that knowledge simply by paying attention to definitions. So knowing what words mean gives us a great deal of knowledge of what the world is like. This is one reason it is important to know what words mean and to have a large usable vocabulary.

Watch this CrashCourse video on language and meaning.[6] It discusses the importance and difficulties of devising adequate definitions.

6 https://www.youtube.com/watch?v=zmwgmt7wcv8&list=PL8dPuuaLjXtNgK6MZucdYldNkMybYIHKR&index=27

6.3 Definitions and Reference

Definitions have more than one function; we have mentioned so far how they tell us a term's meaning. Another use of definition is to tell us what is and what is not included in the reference of a term. This is important because arguments use words, and the meanings of the words are necessary for the success of the argument. Recall the example of talking past each other. Thus, we must get good at stipulating definitions.

Well-constructed definitions can do this because the terms we use classify things in systematic ways. In the definition of "dog" as "domesticated canine animal," for example, the term "domesticated" rules out the other members of the class of canine animals (wolves, coyotes, etc.) because they are not domesticated, the word "canine" rules out other classes of animals (rodents, felines, etc.), and the word "animal" rules out other classes of beings (plants, minerals, etc.). Not all classification systems are equally orderly. But the careful use of terms that have systematic definitional connections with other terms makes using the terms in arguments much easier. This is because there are many truths that simply follow from the meanings of the words.

A good definition of a term will have a number of important features. Dogs are mammals—every single one of them is a mammal—so if we know that something is a dog, then we know it will be a mammal as well. We can put this as *being a mammal is a necessary or essential condition for being a dog*. Another way of explaining this is with the visual here that demonstrates there are other mammals (in the larger circle), and dogs are wholly within the set of mammals. There are no non-mammal dogs.

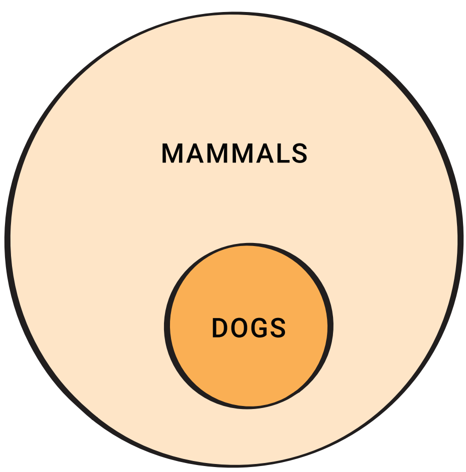

Figure 6.3 The relationship between two properties. Artwork by Jessica Tang.

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On the other hand, lots of non-dogs are mammals as well (cats and horses and sheep and humans . . .). Keep in mind with the visual, these circles are not representative of the *proportion* but rather the relationship of properties.

So "being a mammal" is not an adequate definition of being a dog, since it is *too wide*—while it does include all the dogs, it also includes many animals in the definition that are not dogs. Poodles are dogs—every single one of them is a dog—so if something is a poodle, we know it will be a dog as well. We can put this as *being a poodle is a sufficient condition for being a dog*. In other words, you don't have to be a poodle to be a dog, but being a poodle is *sufficient* for being a dog.

We don't need to point out that lots of non-poodles are dogs (dachshunds, boxers, shepherds, terriers, and so on), so "being a poodle" isn't an adequate definition of a dog either, since it is *too narrow*—it would fail to include all the animals that are dogs. Thus we can provide a definition of an ideally adequate definition (of a dog):

> An ideally adequate definition of being a dog is one in which the parts of the definition are, when taken together, *jointly necessary and sufficient* so that every creature that is a dog is included in the definition (it is not too narrow), and no creature that is not a dog is included in the definition (it is not too broad).

Another way of describing these relations is by way of the terms "genus" and "species" (which are here used in a more general way than they are in biology today). We understand "genus" as a broad concept that includes narrower

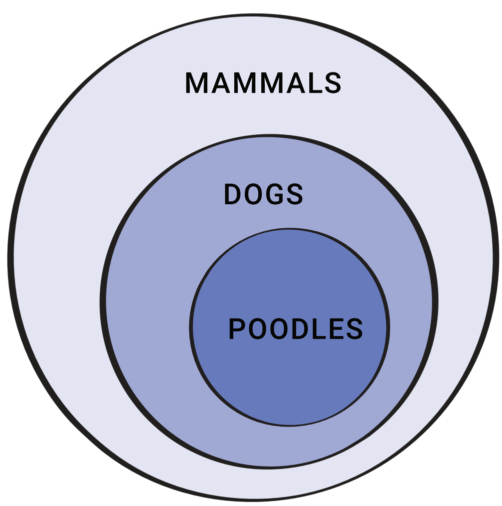

Figure 6.4 Illustration of necessary and sufficient conditions. Artwork by Jessica Tang.

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concepts that pick out subgroups from all the referents in the genus. We understand "species" as a narrower concept included under some genus. A species picks out one type of that larger class. Genus and species are relative terms. For example, *dog* is a species of *mammal*, but *dog* is a genus for *poodle*.

6.4 Rules for a Good Definition

With these terms in mind, we can give six rules for a good definition.

Rule 1. A Good Definition of a Term *X* Shouldn't Be Too Broad (*Include Too Much*)

We can also put this as the requirement that the definition state the sufficient conditions that a thing must meet in order to be *X*. This means that it should include only things that ordinary usage calls *X*.

EXAMPLES OF DEFINITIONS THAT ARE TOO BROAD

1. A horse is defined as an animal.
2. A mirror is something that reflects.
3. A soda is a beverage.

Example 1 is too broad because just being an animal is not enough to pick a horse out from the world. The definition needs to pick out horses specifically. This would have to include the characteristics that differentiate it from other animals.

Example 2 is also too broad because while a mirror does reflect, and reflecting is one of its expressed purposes for human use, there are other things in the world that reflect that this definition would pick out (e.g., glass, smooth clear ponds). It would be more specific to define a mirror according to its common properties: smooth glass surface with reflective coating of a specific type for viewing. We were going to say "for viewing clear images," but some mirrors are fuzzy. Do they stop being mirrors?

And in example 3, simply identifying soda as a beverage doesn't do enough either. It is sufficient for being a beverage that something is a soda, but it is not jointly *necessary* and *sufficient* for a soda to define it as a beverage. To give a necessary and sufficient definition, we would say it's a flavoured carbonated beverage. In coming up with that definition, we're asking ourselves if there are non-flavoured sodas, or non-carbonated sodas (maybe if they go flat . . .), or non-beverage sodas. We can make an argument that defining soda as a flavoured carbonated beverage is adequate for our purposes.

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Rule 2. The Definition Shouldn't Be Too Narrow (*Exclude Too Much*)

A good definition of a term *X* should state the **necessary conditions** for meeting the definition. This means that it should include in the definition *all* the things that ordinary usage calls *X*.

> **EXAMPLES OF DEFINITIONS THAT ARE TOO NARROW**
>
> 1. A Canadian citizen is defined as someone born in Canada.
> 2. A game is defined as a challenge according to rules played in competition.
> 3. Critical thinking is defined as thinking that avoids fallacies.

Example 1 is too narrow because it excludes people who are naturalized citizens. Again, we can always ask ourselves, Is being born in Canada necessary for being a citizen? It isn't, since you can immigrate and acquire citizenship. It is certainly a *sufficient* condition—if you are born in Canada (and not born to foreign diplomats), you are a citizen. This is because Canada has something called "birthright citizenship," and only some countries have this.

Example 2 is too narrow, since some games are cooperative (e.g., Pandemic), and some games don't have explicit rules (e.g., pretend). In this case, "game" is going to be notoriously difficult to define, since there are games that do not keep score, games that are played against yourself, and games with no point whatsoever. So "games" will require a nuanced definition.

Example 3 is also too narrow. It uses one aspect of critical thinking—avoiding fallacies—and identifies it as standing in for all the qualities of critical thinking. It represents a feature that is necessary as if it is sufficient. Ask yourself, Is there anything else that this requires? What if we avoid fallacies but don't have open minds about new information? Is being open-minded a quality of critical thinking? This is a much more difficult definition than those for "horse" or "violin."

Rule 3. A Good Definition of a Term *X* Should Avoid Vagueness and Obscurity

The point of definition is clarity; it shouldn't be harder for your audience to understand the definition of *X* than to understand the word *X* itself. This is also an important skill in writing summaries. In explaining someone's view in a summary it should be easier to understand than the original work being summarized. Obscurity and vagueness often go together. Vagueness is a general lack of clarity, and one reason a definition might be unclear is because

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it is obscure, meaning using words that are out of use, overly clunky, or hide meaning (when the purpose of a definition is to illuminate).

EXAMPLES OF DEFINITIONS THAT ARE VAGUE OR OBSCURE

1. A political party is a multitude of human inhabitants who systematize harmonious injunctions in the body politic.
2. An empath is someone who has responsive, meaningful feelings.
3. Love is a transcendental feeling.

Example 1 is simultaneously obscure and vague. It uses a bunch of overly complex words that don't normally go together instead of simple words. Compare using the word "people" versus using "multitude of human inhabitants." Using "multitude of human inhabitants" creates so many openings for interpretation, it doesn't actually help the reader understand the original term (political party). Because of this unnecessary complexity, the definition is vague, meaning open to various understandings and therefore hard for your audience to understand.

Example 2 is also obscure and vague. What does it mean for a feeling to be meaningful? Responsive to what? From this definition, you are no further along in trying to understand what it means to be an empath.

Example 3 obscures by using a complex word, "transcendental," without defining it.

Rule 4. A Good Definition of a Term *X* Must Not Be Circular (*Define Itself*)

A term cannot explain what its own meaning is. If we tell you that "podiatry" means the subject that a podiatrist practices but you don't know what podiatry is, then the definition is useless, since it provides you with no information about how to use the term. Even if you already know what the term means, the definition doesn't add anything. Circularity is also a problem with arguments, which we will discuss with fallacies.

EXAMPLES OF CIRCULAR DEFINITIONS

1. "Detoxification" takes toxins out of your body.
2. "Good business" is when your business is successful.
3. "Free market" is a market without restrictions.

Example 1 fails to explain the necessary and sufficient conditions for "detoxification." Indeed, it uses the word "toxin," which is part of the word "detoxification," and thus this definition basically says "detox detoxifies." Do you understand detoxification yet? Maybe it would be helpful to say that the liver filters chemicals or impurities out of the bloodstream. This definition is perhaps too narrow, since you might be able to detox things other than a body. But if we think of it as bodily detoxification, we'd need a stipulated definition of the process and what is being filtered from where.

Example 2 fails to explain "good business" because it basically repeats itself. It just defines good as successful, which is really close to the same thing. Here, good is being explained by "successful." Are we any further in understanding "good business"?

Example 3 defines "free market" as a "market without restrictions." This gives us a bit of information about restrictions, but we have to ask ourselves whether explaining free as "without restrictions" adds much of anything to our understanding. Are you any further along in understanding what a free market is?

Rule 5. A Good Definition of a Term *X* Should Not Be Negative (*Unless Absolutely Necessary*)

Negative definitions define a thing by what it is not rather than by what it is. For this reason, negative definitions are quite uninformative and they are also usually either too broad or too narrow. If we tell you that a cat is a domesticated animal that is not a dog or a horse, we have not ruled out enough (e.g., donkeys), but more importantly, we haven't said anything positive about what makes something a cat.

EXAMPLES OF NEGATIVE DEFINITIONS

1. A sandal is not a shoe.
2. A desk is not a table.
3. A vitamin is not a mineral.

All three examples are uninformative. They tell us what something is *not*, but they still include all the things it might be. So a sandal is not a shoe, but it might be a walrus, a laptop, a lamp, and so on. Either you have to say *all* of the things it isn't, or you need to give an informative definition of what it is. In other words, you have to say what something is, which means you need to say something positive. Contrast "a desk is not a table" with "a desk is a flat surface used for working."

This might seem like a tangent, but we think it illuminates what is wrong with negative definitions. When Starbucks was first breaking into the coffee

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market, there was a language change from "skim milk" to "non-fat milk." This move to "non-fat milk" is interesting. "Skim milk" conveyed that the milk had fat skimmed out, but non-fat milk makes it seem like the milk is "all things except fat *plus* milk." It is a weird point, but the idea here would be that telling us it doesn't have fat doesn't necessarily tell us what's in it.

Rule 6. A Good Definition Should Not Be Slanted or Biased

Slanted definitions do not really state the necessary or sufficient conditions of being *X*, but they instead express the (positive or negative) *attitudes* or biases of the speaker toward the thing being defined. For example, if we tell you that politicians are professional liars who live off the public purse, we have not given you either necessary or sufficient conditions but instead have given a negative value judgment about politicians.

EXAMPLES OF SLANTED DEFINITIONS

1. "Protestors" are people with nothing better to do than make signs and disturb the peace.
2. "Protestors" are morally upstanding citizens standing up for freedom.
3. "Euthanasia" is a destructive practice that offends God.

Two examples of defining "protestor" should demonstrate how both negative and positive evaluations can find their way into definitions. It would be more accurate to say that protestors are those who engage in acts of public demonstration to bring forth social and/or governmental change. This is perhaps a bit narrow, but it is at least neutral in attitude.

Example 3 uses the term "destructive," which is biased, and then it adds a religious judgment about offending God. It would be best to say what euthanasia is without sentiment. If people want to argue about whether it is destructive or religiously offensive, then they can give reasons outside of the definition for that. Generally, "euthanasia" is ideally a consensual killing or letting die by active or passive means to someone who is experiencing intractable pain or a debilitating progressive and terminal illness. Hopefully taken together, this rules out the kinds of killings we would want to rule out.

It is possible for a definition to be both too broad and too narrow at the same time. For example, the definition "a swimming pool is an enclosed, artificially constructed area of water intended for public use" is both too broad and too narrow at once. It is too broad because it includes wading pools and fountains and other things that are not swimming pools. It is also too narrow because not all swimming pools are intended for public use; some swimming pools are privately owned.

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Here is another example: a dog is a short-haired pet with four legs and paws rather than hoofs. This definition is too narrow in two different ways because it mentions two inessential characteristics. It excludes dogs with long hair, but it also excludes dogs that are not pets. Neither being a pet nor having long hair has anything essential to do with being a dog.

KEY TAKEAWAYS

- When arguing, users need to agree on using terms in the same way in order to successfully communicate.
- Definitions can tell us a term's meaning, but they can also help us determine what is not included in the reference of a term. Definitions stand in relation to each other.
- Definitions are composed primarily of essential features that a thing must have if the term is to apply to them. Knowledge is embedded in definitions.
- An adequate definition is one in which all parts of the definition are, when taken together, jointly necessary and sufficient.
- Six rules for a good definition: the definition is not too broad, it is not too narrow, it avoids vagueness or obscurity, it is not circular, it is not negative, and it is not slanted or biased.

EXERCISES FOR RULES FOR DEFINITIONS

Evaluating Definitions

Here is a list of one-liner definitions; imagine that they are in a small pocket dictionary. Trying to be charitable, evaluate these definitions. Are they adequate, or are they too broad, too narrow, vague or obscure, circular, negative, or slanted?

1. The Conservative Party is a political organization of patriotic, civic-minded citizens dedicated to preserving the cherished freedoms of all Canadians.
2. A kite is a toy consisting of a light frame, with paper or other thin material stretched upon it, to be flown in a strong wind by means of a string attached and with a tail to balance it.
3. "Democracy" is not a feudal system.

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4. "Postmodern" means a chaotic and confusing mishmash of images and references that leaves readers and viewers longing for the days of a good, well-told story.
5. An oar is a stout pole shaped into a wide and flat blade at one end that is held free hand and used to propel a boat through the water.
6. A poem is a rhymed composition in verse.
7. "Rectangle" means a two-dimensional figure with four sides.
8. A programmer is one who applies model C45D to seven-second ratios.
9. Life is what you make of it.

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7

Arguments from Definition and Enthymemes

7.1 Reasoning with Definitions

As we have just seen, when we provide a good definition, we will state *essential features* that things must have for the term to apply to them. These features will usually be facts about the world that are independent of language, and this means that the meanings of words have knowledge about things embedded in them, knowledge that we can use when we make inferences and give arguments.

When we reason and when we formulate arguments, we always rely to a certain extent on information that is *implicitly* available in the form of knowledge carried simply by the meaning of words. This might be somewhat "free-floating" knowledge, which anyone who is proficient in a language would know. But the vast majority of what "everyone knows"—that water is wet, that dogs are animals, that you can buy food to eat at a restaurant, and so on—is just knowledge that everyone has by virtue of being part of a culture and knowing a language. However, a lot of "free-floating" knowledge that "everyone knows" can just be simple prejudice or overgeneralization. Reasoning is damaged by unchecked assumptions, and we will look into this further in part 3 when we examine fallacies and biases.

So what makes a good **argument from definition**—an argument where we make deductions based on the definitions of words? Here we talk about how a good argument from definition can contain implicit information that *if made explicit shows that the argument is valid*.

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An argument from definition is an argument in which the conclusion is presented as following simply by definition or by the meanings of the words used in the argument.

Consider "Bruce is a parent, so Bruce has a child"; here the conclusion "Bruce has a child" is presented as following from the meaning of "parent" and from the fact that a good definition of "parent" will include the requirement that if someone is a parent, then that person has a child.

A statement that follows "by definition" from a good definition of a term will capture a necessary or essential condition of the application of that term, and so the statement is made necessarily true by virtue of reflecting part of the meaning of a term.

Since a statement that is necessarily true is true in *every possible circumstance*, adding a **necessary truth** to an argument cannot make a valid argument invalid. A good argument from definition is therefore *implicitly valid* and can be shown to be valid by making the definitional connection explicit.

7.2 Validity and Definitional Arguments

The definition of "bungalow" is "a single-story house." Let's look at the argument from "*X* is a bungalow" to "*X* is a house." How do we prove that an argument from a good definition is valid? This means that the concept of being a "bungalow" includes the concept of being "single-story" and being "a house." This means that the assertion that "*X* is a bungalow" implicitly includes the assertion that it is a house and that it is single-story.

How do we construct this information into a valid argument?

1. *X* is a bungalow (the premise).

However, since "bungalow" *means* "single-story house," and "*X* is a bungalow" says the same thing as "*X* is a single-story house," we can substitute one for the other, and so by substituting one for the other, we can rewrite 1 as

2. *X* is a single-story house.

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Again, since "*X* is a single-story house" says *both* that *X* is a house and that *X* is a bungalow, we replace it by these two claims, and so by substitution again, we can rewrite 2 as

3. *X* is single-story, and *X* is a house.

But if *X* is *both* single-story and a house, then *X* is a house, so we can conclude from 3 that

4. *X* is a house (the conclusion).

What does this mean for validity? Validity is the formal property of arguments where if the premises are true, then the conclusion must also be true. To put this again, validity is the formal property of arguments where there's no situation in which the premises are true and the conclusion is false. Consider the argument again:

Premise 1: *X* is a bungalow.
Premise 2: [Implicit premise by definition] *X* is a house.
Premise 3: [Implicit premise by definition] *X* is single-story.

Conclusion: Therefore, *X* is a house.

Or

Premise 1: *X* is a bungalow.
Premise 2: [Implicit premise by definition] *X* is a house.
Premise 3: [Implicit premise by definition] *X* is single-story.

Conclusion: Therefore, *X* is single-story.

But premises 2 and 3 are contained within premise 1, so what we are really doing is saying, "*X* is a bungalow, therefore *X* is single story," or "*X* is a bungalow, therefore *X* is a house." This demonstrates a derivation by way of a definition, since the conclusion is information from the premises.

Now we ask the validity question: Is it possible for all the premises 1–3 to be true *and* the conclusion false? This is the work validity does—it explains how the premises can force a conclusion to be true. Here, if the premises 1–3 were true (which is basically a way of saying that the definition of a bungalow is what we think it is) *and* the conclusion were false, it would mean that *X* is both single-story *and* not single-story. This would be a **contradiction**, which rules it out.

These logical moves depend on making explicit what is included in the definition of a bungalow. We might just say that the conclusion was "included" in the premise, and it follows from it by the definition of the term "bungalow." Once again, the argument is valid because the conclusion must be true *if the premises are true*.

Some caution is warranted in extracting information from definitions. Definitions are after all human creations, and just to the extent that the terms are not fully defined, we need to be cautious about argument from definition. This just underscores the importance of defining your terms. The practice of defining your terms carefully imposes the clarity your arguments need. When arguing, if we can appeal to common terms and definitions, then it is easier to make reasonable inferences that we will find more rationally persuasive and secure.

7.3 Enthymemes

Arguments from definition are not the only kinds of arguments relying on implicitly available information. We often rely on our audience to share common knowledge with us, which we therefore do not need to state. Arguments that rely on this sort of shared knowledge are called "enthymemes."

An enthymeme is an argument in which a required premise is not stated explicitly but is assumed implicitly as part of the argument.

Why do enthymemes matter? If we want to be convincing, we have to pay very close attention to what we are assuming and background information. Arguments necessarily require a lot of background knowledge, and making as much of that as explicit as possible helps guard against any logical errors.

Consider the argument "Dogs are animals, so they are not machines." This seems right to us, of course, but we are relying on our audience to agree on something that is not explicit. This is a deductive argument, and when making a deductive argument, the premises and conclusion need an explicit connection. Here's what this enthymeme looks like with the implicit premise explicitly stated:

Premise 1: Dogs are animals.
Premise 2: [implicit] Animals are not machines.

Conclusion: Therefore, dogs are not machines.

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Before the implicit premise was made explicit, someone without our particular background knowledge would be left to wonder how "animals" and "machines" are related to each other. The *enthymeme* was appealing to "what everyone knows." "Dogs" were in premise 1 and the conclusion, so that made some sense, but we needed a way to tie together "animals" and "machines." We tie them together by explicitly stating that "animals are not machines." Even though this is negative, it demonstrates what their relationship is.

Let's try another one: Seattle is south of Vancouver, so Vancouver is north of Seattle. Notice that "Vancouver" and "Seattle" both appear in the premise and the conclusion. So what do we need to make explicit about their relationship to make the conclusion work?

Premise 1: Seattle is south of Vancouver.
Premise 2: [implicit] South and north are opposite spatial relationships.

Conclusion: Therefore, Vancouver is north of Seattle.

Here, the speaker is assuming you know how south and north operate. You might say this is a type of argument from definition, but that doesn't mean we can't make this information explicit so that someone who doesn't understand or doesn't use the concepts "south" and "north" can understand that the argument is valid (recall: there's no way for premises 1 and 2 to both be true and the conclusion false).

Do we always have to make everything explicit in an argument? Won't we always be relying on background information and implicit premises to some extent? Insofar as we are sharing a language, we are going to have to take some things for granted, but when we can make something explicit so that our reasoning is more solid and clear, we should do so.

EXAMPLES OF ENTHYMEMES

1. There is no water on Venus, therefore there is no life on Venus.
2. People who love children make good teachers, therefore Mary will be a great teacher.

Example 1 has as an implicit premise that living beings require water. This is how you can infer that the lack of water on Venus means there isn't any life. Notice that Venus is in the premise and the conclusion, but the argument lacks an explicit connection between life and water. We make this explicit by adding that life requires water.

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Example 2 takes a general rule and applies it to an individual. But it doesn't give us enough information about that individual to know if the conclusion follows. Do you know anything about Mary? Maybe Mary's *friends and relatives* don't need this to be explicit, but to make the argument public so that anyone reading it can follow the logic, we need to know that Mary loves children. This is how we make the argument explicit and demonstrate its validity. If we stated clearly that "people who love kids make great teachers; Mary loves kids, therefore Mary would make a great teacher," can you imagine a case in which the premises are true and the conclusion false? Can it be the case that people who love kids make great teachers and Mary loves kids are true, *but* at the same time, Mary would *not* make a great teacher? That would be impossible, therefore the argument is valid.

Although the enthymemes we have gone over have implicit premises of different kinds, what they all have in common is that in a particular context, leaving the implicit assumption unstated can be reasonable. The trouble with enthymemes is that they assume that you will *notice* the implicit assumption or premise and fill it in and, so, get the point. But this doesn't always happen, even when the thing that you fail to notice is something you know well and that might be obvious at times. Context functions to highlight certain relevant considerations, but it can also make us inattentive to other considerations that are obvious but that the context does not highlight. This adds a dimension of unreliability that we want to avoid. Thus in order to evaluate arguments with implicit parts, we need to be able to reconstruct them to make what is implicit explicit.

Hopefully you can see that an important part of critical thinking is simply being careful, and making implicit assumptions explicitly available is one way of being careful. Often there will be a fallacious inference that has been made without being noticed, and reconstructing the argument will reveal the error.

KEY TAKEAWAYS

- An argument from definition is an argument in which we make deductions on the basis of the definition of words. If the definition is good, the conclusion is made necessarily true by virtue of reflecting part of the meaning of a term.
- A good argument from definition contains implicit information that, if made explicit, shows that the argument is valid.
- An enthymeme is an argument in which a required premise is not stated explicitly but is assumed implicitly as part of the argument.

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- To evaluate enthymemes and avoid unreliability, we must reconstruct the argument to make what is implicit explicit.

EXERCISES

Part I. Arguments from Definition

Place these definitional arguments in standard form. Make the implicit information explicit. Evaluate the definition and say why the argument is or is not deductively valid.

1. Mammals have fur, therefore otters have fur.
2. Democracy is when power is held by the people. The United States is a democracy.
3. This is a smartphone, therefore it connects to the internet.
4. Google tracks your browsing, therefore there is a record of your browsing.
5. This book is in the library, therefore it is a published book.

Part II. Enthymeme Practice

Place these arguments in standard form. If they are enthymemes, then make the argument explicit by adding the missing premise(s).

1. Bill will be late for dinner; he stopped for a pint with friends after work.
2. Mary didn't study for the test tomorrow; I guess she is going to fail.
3. Death cannot be the final end; it wouldn't be fair.
4. I'm sorry I cannot sell you any beer. I am not permitted to sell to underage kids.
5. Mary went to Burger King, so she must have been hungry.
6. Boxing should be banned in Canada because it is dangerous.
7. If today is Tuesday, either Eric is in class or he is sick. It is Tuesday, so he must be sick.
8. Don't ever buy a Taurus. It's a Ford!

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PART II

Categorical Logic

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8

The Syllogism

A **syllogism**, as we are using it, is a general argument pattern that involves two premises, a conclusion, and three terms.

Syllogisms come in many patterns, based on the terms and relationships.

SYLLOGISM EXAMPLE 1 (OLDER THAN)

Premise 1: Bill is older than Galla.
Premise 2: Galla is older than Neetu.

Conclusion: Therefore, Bill is older than Neetu.

If we analyze this argument, we see that each premise has two terms (Bill and Galla in premise 1 and Galla and Neetu in premise 2) connected by a relation. The relation in all three statements is "____ is older than ____."

A proper syllogism will have a "middle term," which is in premises 1 and 2 but not in the conclusion. Premises 1 and 2 share a middle term, which in this case is "Galla." Galla's relation to both Bill and Neetu (within the two premises) allows us to conclude something about Bill's relation to Neetu.

8.1 Transitivity in a Syllogism

SYLLOGISM EXAMPLE 2 (CONTAINMENT)

Premise 1: Regina is in Saskatchewan.
Premise 2: Saskatchewan is in Canada.

Conclusion: Therefore, Regina is in Canada.

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Here our middle term is "Saskatchewan," and the relationship is one of *containment*. Containment, like the relation in example 1 ("____ is older than ____") is a transitive relationship. *Transitivity* is a relationship of ordering. If we know how things are ordered, then we can draw conclusions about the sequence. The order of example 1 is the order it would take to move from one place (Saskatoon) through another (Saskatchewan) to another (Canada).

Transitivity means that there's a transfer of relationship between two things.

The transitivity of containment is demonstrated in figure 8.1. For containment, if *A* is inside of *B* and *B* is inside of *C*, then it stands to reason that *A* is inside of *C*. Through the middle term *B*, *A* gets the transitive property of being inside of *C*.

This relation also works with relative height. If we use "____ is taller than ____," we can construct a conduit for deduction about those who are being measured for height. You might want to draw your own visual about "____ is taller than ____" for three people you know using a vertical line. So we can formulate a more specific definition of a transitive relation.

A *transitive* relation, *R*, has the property that for every three things *a*, *b*, and *c* to which *R* applies, if *a is R to b* and *b is R to c*, then *a is R to c*.

Let's consider another example using the "____ is greater than ____" relation. Is it also transitive?

SYLLOGISM EXAMPLE 3 (GREATER THAN)

Premise 1: Nine is greater than seven.
Premise 2: Seven is greater than four.

Conclusion: Therefore, nine is greater than four.

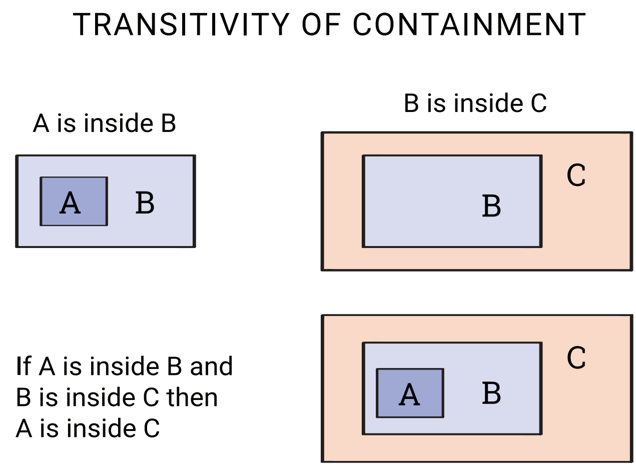

Figure 8.1 The transitivity of containment. Artwork by Jessica Tang.

This pattern should again demonstrate that properly formulated syllogisms with three terms and a transitive relationship are *valid*. To revisit that definition, if the premises are true, then the conclusion must be true—or there's no possibility for the premises to be true and the conclusion false. "Is greater than" is a transitive relation. Notice that the two premises have the form "*a is R to b*" and "*b is R to c*," and the conclusion has the form "*a is R to c*" (notice that "*b*" is the middle term).

Other relations that are transitive:

____ = ____ (is equal to).
____ > ____ (is greater than).
____ ≤ ____ (is smaller than or equal to).
____ ≥ ____ (is greater than or equal to).
if ____, then ____.
____ is a species of ____.
____ is heavier than ____.
____ is poorer than ____.

8.2 Intransitivity

Of course, *not every relation is transitive*, and *not every syllogism using a transitive relation is valid* because the terms may not be in the right position in the argument.

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EXAMPLE OF INTRANSITIVE RELATION (PARENT OF)

Premise 1: Mary is the mother of Sarah.
Premise 2: Sarah is the mother of Mina.

Conclusion: Mary is the mother of Mina.

When we look at this relation, we can think of the connection through the middle term. Here, the middle term is "Sarah." In this example, the problem is that the relation "____ is the mother of ____" is not transitive: the parent of your parent is not your parent (they are your grandparent). You could also say the friend of my friend is not necessarily my friend: recall the phrase "the enemy of my enemy is my friend!" So be on the lookout for relationships that are not transitive. Similarly, If *A* loves *B* and *B* loves *C*, does it follow that *A* loves *C*? No, because "love" is a relation between two terms, or a binary relationship. Intransitive relationships block the validity of three-term syllogisms.

In an *intransitive relationship*, *R* has the property that for every three things *a*, *b* and *c* to which *R* applies, if *a is R to b* and *b is R to c*, then *a is* not *R to c*.

Sometimes a relationship *is* transitive, but it fails to produce a valid argument because of the *location* of the terms in the argument. Above, we discussed that "is taller than" was transitive, but it is *only when the terms are in the right place*. Let's look at an example:

EXAMPLE OF INTRANSITIVE "TALLER THAN" SYLLOGISM

Premise 1: My house (*A*) is taller than my car (*B*).
Premise 2: Your house (*C*) is taller than my car (*B*).

Conclusion: My house (*A*) is taller than your house (*C*).

All we know here is that both houses are taller than my car. This doesn't give us any information on the *relative heights of each other's houses*. Given the position of the terms, *B* (my car) fails to be a proper middle term. Its location blocks transitivity. If you read over the syllogism, do the premises make the case that our houses have a height difference? Could the premises be true *and*

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our houses be the same exact height (counter-example)? Yes. So it is possible for the premises to be true and the conclusion false, making it invalid.

In Chapters 9–12, we will spend some time looking at the traditional logic of terms also known as **categorical logic**. The syllogism pattern figures prominently in that logic in the form of the *categorical syllogism*. Here are two examples that are easily seen to be valid.

8.3 Containment Revisited

Consider the following example:

> **EXAMPLE OF CATEGORICAL SYLLOGISM**
>
> Premise 1: All ducks are birds.
> Premise 2: All birds are living creatures.
>
> ---
>
> Conclusion: All ducks are living creatures.

In the first case, we can imagine drawing a circle around all the ducks and a larger circle around all the birds (fig. 8.2). If all ducks are birds, then the duck circle will be *inside* the bird circle. Similarly for all living creatures, the bird circle will be inside the circle around all the living creatures, and the duck circle will be inside that. When we draw a circle that is "living creatures," we think of it as "the set of all things that qualify as living creatures." So the size of "birds" within that set is not proportionate! But what the circles demonstrate is that birds are wholly contained within "living creatures."

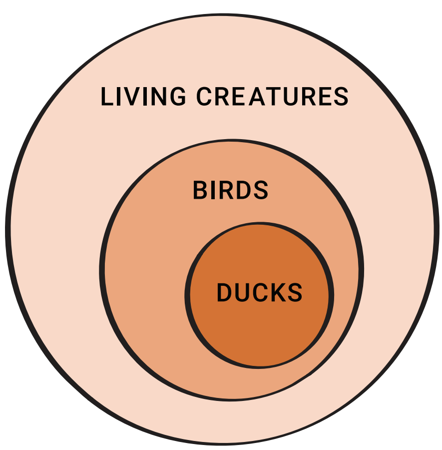

Figure 8.2 Containment relationship. Artwork by Jessica Tang.

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Another transitive relationship that was mentioned above is the "if ____, then ____" relationship. Thinking of this explicitly as a transitive relationship allows us to understand the syllogism better.

EXAMPLE OF HYPOTHETICAL SYLLOGISM

Premise 1: If you are a duck, then you are a bird.
Premise 2: If you are a bird, then you are a living creature.

Conclusion: Therefore, if you are a duck, then you are a living creature.

Looking back at figure 8.2, if you are in the smallest circle we demonstrated (ducks), then you must be in the other two circles (birds and living creatures). But if you are in the biggest circle (living creatures), it doesn't necessarily follow that you are a duck (you could be a gorilla!). And if you are a bird, it doesn't necessarily follow that you are a duck (you could be a warbler!). So you can go from the inside out with "if ____, then ____" but not from the outside in.

Here is another way to think about why this argument is valid: First of all, to say that all ducks are birds is tantamount to saying that *if* something is a duck, *then* it is a bird. And to say that all birds are living creatures is tantamount to saying that *if* something is a bird, *then* it is a living creature. In the case of the ducks argument, unless something changes and ducks are no longer birds and living creatures, the argument isn't just valid, it is sound.

KEY TAKEAWAYS

- Syllogisms consist of two premises, three terms, and a conclusion.
- For a syllogism to be valid, the relation must be transitive, and the terms must be in the proper location.
- Transitivity is an ordering relationship that helps us draw conclusions about terms in a sequence.
- Certain relationships are transitive ("taller than," "older than," "if ____, then ____," etc.) and others are intransitive ("the parent of," "the friend of," etc.).
- Intransitivity blocks the logical deduction in a syllogism.

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EXERCISES

Working with Syllogisms and Transitivity

Complete the following exercises:

1. Draw a relationship between three terms, and revisit the five valid forms and two invalid forms of deductive argument from Chapter 3. Construct versions of each form with three or fewer terms.
2. Make up a valid syllogistic argument that relies on the transitivity of containment or one of the other transitive relations mentioned above.
3. Think of another relation you think is transitive, and construct a syllogism to test for validity.

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9

Categorical Logic Statements

In this chapter, we will examine the traditional logic of terms. Developed by Aristotle, it was studied for many centuries in Western philosophy as the only formal treatment of validity in inference. We will look at categorical statements, the theory of immediate inference, and the theory of the syllogism.

> Aristotle (384–322 BCE) is considered one of the most influential philosophers in the Western tradition. He is the originator of the particular form[1] of categorical logic in this text.

A categorical statement makes a claim about the relationship between some or all the members of two classes of things. It denotes relationships of inclusion and exclusion as well as whether things exist within certain classes.

9.1 Four Kinds of Categorical Statements

There are four kinds of categorical statements, represented by the following standard forms:

1 https://plato.stanford.edu/entries/aristotle/

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Name	Type	Standard form	Example
A	Universal Affirmative	All *S* are *P*.	All pineapples are juicy.
E	Universal Negative	No *S* are *P*.	No apples are oranges.
I	Particular Affirmative	Some *S* are *P*.	Some apples are juicy.
O	Particular Negative	Some *S* are not *P*.	Some apples are not juicy.

Keep this chart handy. It will be important for the rest of this chapter, which explores how each statement works and how to diagram them one by one.

In the chart, under "type" you will see four combinations of the terms "universal," "particular," "affirmative," and "negative." The **quality** of a categorical statement is the character of the relationship it affirms between its subject and predicate terms (affirmative or negative). A categorical statement is an *affirmative* statement if it states that the class designated by its subject term is *included*, either as a whole or only in part, within the class designated by its predicate term, and it is a *negative* statement if it wholly or partially *excludes* members of the subject class from the predicate class. The *quantity* of a categorical statement, on the other hand, is a measure of the degree to which the relationship between its subject and predicate terms holds. A categorical statement is *universal* if it makes an *exceptionless claim* about the subject and predicate terms. It is *particular* if it makes claims that hold for *one or more members* of the subject class.

9.2 Four Parts of Every Categorical Statement

Every categorical statement in standard form has four parts (fig. 9.1).

1. *A quantifier*—they all start with *all*, *some*, or *no*. In categorical logic, we only make statements about all (every single member), some (which means at least one or many, but at least not none) and no (meaning none or never).
2. *A subject term*—a word or phrase denoting a class of things serving as the subject of the sentence. This is labelled "subject" because, like a sentence, it is the main thing you are talking about. When we say, "All goats are hungry," "goats" is the subject term and the subject of the sentence.

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Figure 9.1 Four parts of a categorical statement. Artwork by Jessica Tang.

3. *A predicate term*—a word or phrase denoting a class of things serving as the *subject complement* of the sentence. What does this mean? This is what is said *about* the subject. The predicate modifies the subject.
4. *A copula*—a linking verb, a form of the verb "to be," which connects the subject term with predicate term. The action of a statement (the verb) in categorical logic says something about the being of the subject. We are saying something about what it is.

9.3 Venn Diagrams

John Venn (1834–1923), who was a mathematician at Cambridge University, devised a method of diagramming categorical statements, now called **Venn diagrams**, which makes representing the relationships between the statements very easy.

Classes of things are represented with a circle. The class of all things that are *S* is represented on the left lune (think of the moon!). The class of all things that are *P* is in the right lune. The centre lens represents the intersection between the two, which would be all the things that are both *S* and *P*. The outside, labelled "**universe of discourse**," is everything else in the world that is not *S* or *P* (fig. 9.2).

Here's an introduction to how to map statements[2] using Venn diagrams.

For example, in figure 9.3, if *S* stands for the class "Albertans" and *P* stands for the class "Canadians," then the lens will represent the class of Albertan Canadians, the left lune will represent the class of non-Canadian Albertans, the right lune will represent non-Albertan Canadians, and the remaining area outside of the two circles, the universe of discourse, will represent all other things in the universe that are not Albertans and not Canadians.

2 https://www.youtube.com/watch?v=ax_zLYtE7DQ

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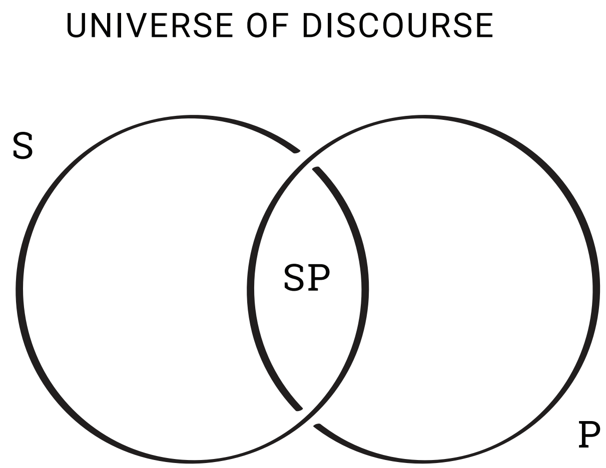

Figure 9.2 Two classes in a universe of discourse. Artwork by Jessica Tang.

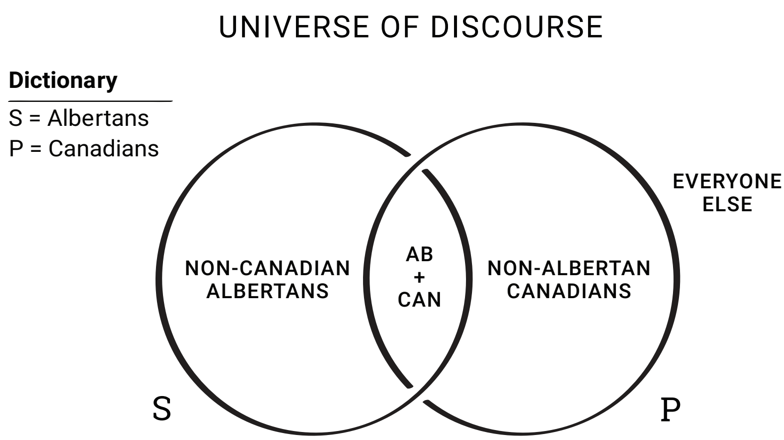

Figure 9.3 A diagram of the two classes, Albertans and Canadians. Artwork by Jessica Tang.

9.4 Universal Affirmative: *A*

The universal form *A* is affirmative and takes its name "A" from the medieval Latin word "affirmo" (I affirm). It affirms a rule about all members of a group and is thus universal. *A* statements make a rule *without* exception: it is a *universal* statement if the asserted claim holds for every member of the class designated by its subject term.

A. *All S are P*: this statement makes a universal declaration about *S*. It says that all things that are *S are also P*. Representing this with circles means that you would eliminate the *S* lune that is not intersecting with *P* (fig. 9.4).

For example, if our sentence is "All dogs (*S*) are mammals (*P*)," we know that there are not any dogs that are not mammals. This seems true, right? What would a dog that is not a mammal be like? Would it still be a dog? No. So we "get

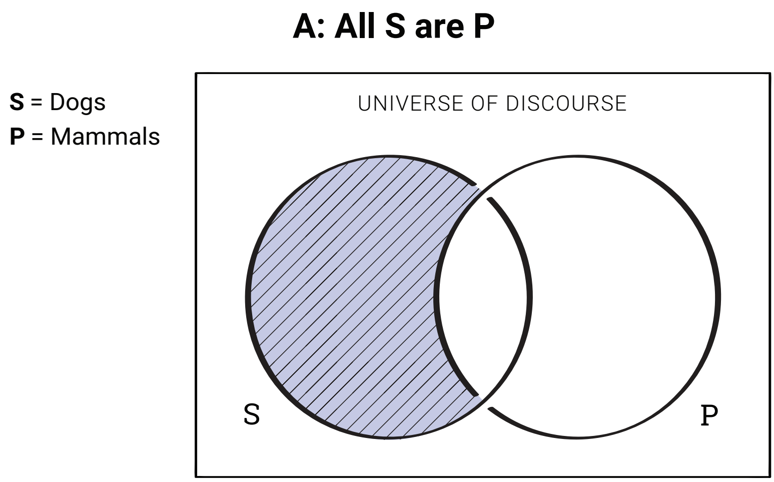

Figure 9.4 Universal affirmative. Artwork by Jessica Tang.

rid" of the *S* that is outside of the P (*shade it out*). *P* is a larger set of mammals that would contain all other mammals (humans, cats, etc.). The lens in the middle, then, represents dogs by telling us that they are all the way overlapped by the property of being a mammal.

> It is important to note that universal statements (*A* and *E*) can be true *even if the classes they refer to are empty*. So you cannot infer that there are *things existing* in a class from a universal affirmative or negative term. For example, from the truth of the statement "all unicorns are animals with horns," you cannot infer that there are some unicorns that exist. We will discuss this issue in depth in Chapter 10.

Sometimes the shading is confusing. What are we colouring in, exactly? In this instance, what you shade is *taken out of existence*. You are saying this section isn't allowed to exist—you are saying that it in fact cannot exist. You are demonstrating the rule that the *A* or *E* statement makes. This form of mapping is especially important to understand when mapping *E* statements that also make a rule but make a universal negative.

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9.5 Universal Negative: *E*

The universal form *E* takes its name from medieval Latin word "nego" (I deny). It is negative because it *blocks* a possibility. It is also universal because it makes a rule without an exception.

E. No S are P: If No *S* are *P*, then there is no possibility of something existing in the overlapping area. For example, if our sentence is "No snakes are poodles," we know that there is nothing that is both a snake and a poodle, and we indicate this by *shading out* the overlap area (fig. 9.5).

An *E* statement makes a rule that there's no possibility for anything to be both of the terms. In the above, we are saying not only that there are no snake poodles but that snake poodles are *impossible*. Since the left and right lunes are still open, this diagram demonstrates that being a snake or being a poodle is possible.

Note that when we say no snakes are poodles, it also makes sense to say that no poodles are snakes. This means that in an *E* statement, the subject and predicate terms can be interchanged. This is called converting the statement: it produces the converse of the original statement. We can see right from the diagram that if no snakes are poodles then no poodles are snakes either. So an *E* statement is *logically equivalent to its converse*. (**Conversion** is a relationship discussed in more depth in Chapter 11.)

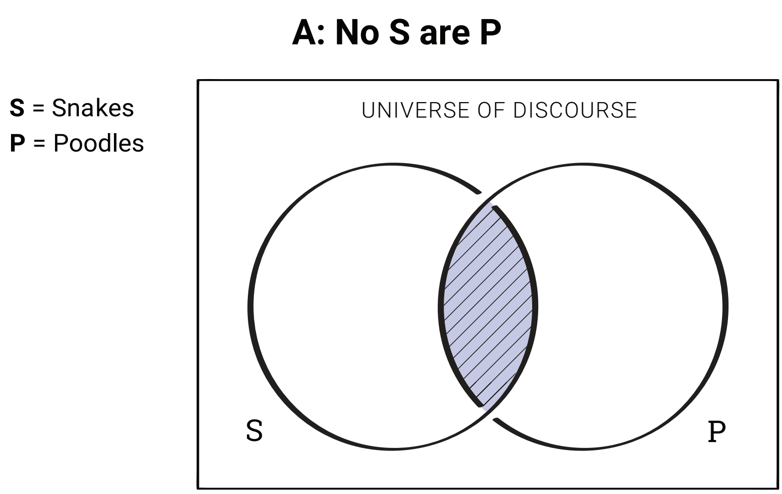

Figure 9.5 Universal negative. Artwork by Jessica Tang.

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9.6 Particular Affirmative: *I*

An *I* statement takes its name from the second vowel in "affirmo." It is affirmative because it says something positive, and it is particular in that it suggests there is at least one member or thing in a class (a "particular" such as a unique thing). This is a different *quantity* of a categorical statement than a universal (which we have seen in *A* and *E*). The quantity of a categorical statement tells us the degree to which the relationship between its subject and predicate terms holds: is it universal, or do we know that the relationship only holds sometimes? If it is a *particular* statement, then the claim is asserted to hold only for one or more members of the subject class.

I. Some S are P: The statement "some *S* are *P*" tells us both that there is at least one thing that is *S* and that that thing (and possibly others) is also *P*. We indicate this by putting an *x* in the overlap of the *S* and *P* circles (fig. 9.6). When we put an *x* somewhere, we are saying there is something there—a particular thing within the terms given.

For example, there are different sizes of dogs; some are miniatures, and some are standards, so if our sentence is "Some standards are poodles," we know that at least one poodle in the world is that size. The *x* represents a particular standard poodle.

What an *E* statement and an *I* statement share is that they are both logically equivalent to their converse. Think: If some poodles are standards, doesn't it also tell us that some standards are poodles. This is just to say that if there are poodles that are standards, then there are standards that are poodles.

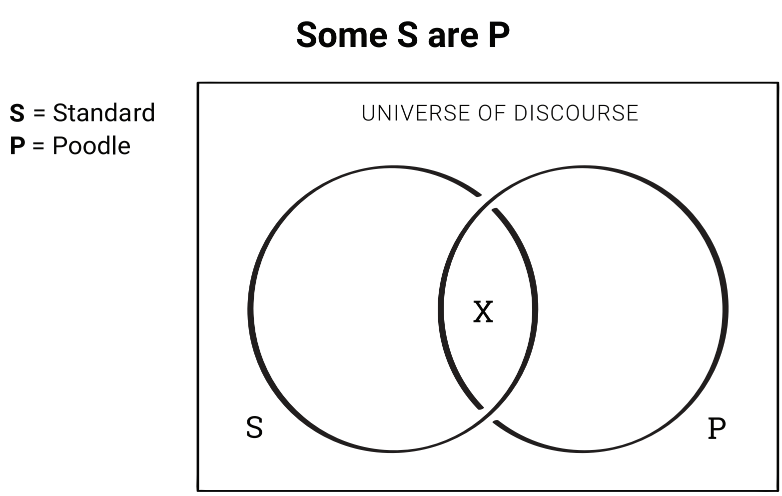

Figure 9.6 Particular affirmative. Artwork by Jessica Tang.

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9.7 Particular Negative: *O*

The particular negative takes its name from the second vowel in the medieval Latin word "nego" (I deny). A particular negative represents something as existing (particular), but it tells us that the *X* has a relationship of not being included in the predicate class.

O. Some S are not P: The statement "some *S* are not *P*" tells us both that there is at least one thing that is *S* and that we know of that thing that it is not *P*. So we put the *X* in the part of *S* not overlapping *P* (fig. 9.7).

Since there are snakes of many kinds and some of them are not puffadders, the statement "Some snakes are not puffadders" is true. This statement directs us to the area of *S* that isn't touching *P* because it tells us specifically that there is something in the *S* area (the subject term) that is not a *P*.

We discussed how *E* statements and *I* statements are logically equivalent to their converse (you can switch the subject and predicate terms, and they remain true). Note that you cannot do that for *O* or *A* statements. This means it is very important that you get these in the proper order when you are mapping. For example, from the fact that some snakes are not puffadders, you cannot infer that some puffadders are not snakes. Just as you cannot infer that all dogs are poodles from the fact that all poodles are dogs.

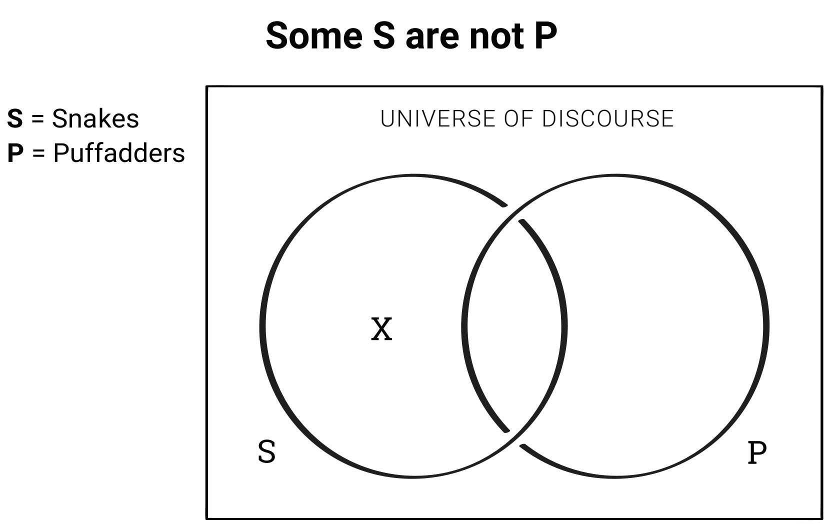

Figure 9.7 Particular negative. Artwork by Jessica Tang.

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KEY TAKEAWAYS

- Categorical statements make a claim about the relationship between some or all the members of two classes of things.
- There are four types of categorical statements: universal affirmative (A), universal negative (E), particular affirmative (I), and particular negative (O).
- There are four parts of every categorical statement: quantifier, subject term, predicate term, and copula.
- Universal negative (E) statements and particular affirmative (I) statements are logically equivalent to their converse, but universal affirmative statements (A) and particular negative statements (O) are not.

EXERCISES

Identifying the Form of Categorical Statements

For each of the following statements, *identify* the form (A, E, I, or O) of each of the following statements. Choose a letter to identify each subject and predicate term, and rewrite the statement in categorical form. Draw a Venn diagram to map the statement:

1. The gods have no mercy.
2. Lead is malleable.
3. Squares are always rectangles.
4. Rectangles are sometimes squares.
5. All sandwiches have lettuce.
6. Some uranium is radioactive.
7. Iron is not radioactive.
8. Some dogs bite children.
9. Dogs are never reptiles.

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10

Translating Categorical Statements

10.1 Three Issues for Translation of Statements

Few statements in ordinary English look like standard form categorical statements. But a surprisingly large number of statements can be translated into standard form categorical statements. Just trying to translate statements into categorical logic will demonstrate how limited these statements are in everyday use. However, if we are to try to direct claims into formal structures to test for validity, we have to be quite rigid and specific about how we formulate statements. The statements have to preserve a logical structure. There are three main issues that come up in these translations: the problem of empty terms, problems related to the natural world versus fictional terms, interpretations of "some," and direct singular reference.

What About Empty Terms?

In the *modern* interpretation of categorical statements, the universal categoricals "All *S* are *P*" and "No *S* are *P*" make no claims about whether anything exists. The statement "All cats have fleas" is understood to be simply about the relation between being a cat and having fleas and to make the claim that for everything in the universe of discourse, if that thing is a cat, then that thing has fleas. It is not considered part of the job of the statement to say whether or not there are any cats. By contrast, the two particular categoricals "Some *S* are *P*" and "Some *S* are not *P*" are taken to make claims about the actual existence of at least one thing that is *S*. This distinction is observed in the Venn diagrams mentioned in Chapter 9 by the fact that the two universal categoricals are graphed only by shading out areas known to be empty, whereas the two particular categoricals are graphed by placing an *X* in an area to show that something exists in the corresponding class.

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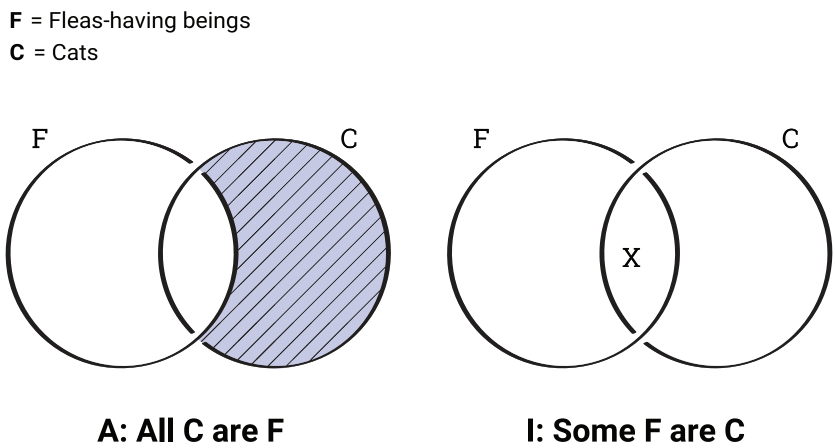

Figure 10.1 Universal and particular statements. Artwork by Jessica Tang.

This feature of the modern interpretation is admittedly to some degree at odds with how we normally speak. Usually when we say something like "All diamonds are hard," we assume that there are some things that are diamonds and that all of them are hard things. But modern categorical logic treats the universal statements as *conditional* claims, so "All diamonds are hard" is understood as "If something is a diamond, then it is hard," or more accurately "For all the things that there are, if a thing is a diamond, then that thing is a hard thing."

EXAMPLES OF STATEMENTS ABOUT AN EMPTY CLASS

1. All people cheating on the test will receive a failing grade.
2. All students who leave to go to the bathroom must have a hall pass.
3. All unicorns have horns.

Example 1 gives us a rule that is true of anyone found cheating on the test, but as far as we know right now, there is no one in that class. So we really understand empty terms as conditional statements: "If someone is found cheating on the test, then they will receive a failing grade." That rule is true even if no one cheats (the class is empty).

Example 2 gives us a similar rule, since at any given time, no students might need to use the bathroom. But if they do, they must use a hall pass. So awkwardly, this would translate to "All bathroom-needing students are students who need a hall pass." There might not be anyone who needs to go to the bathroom, but if they do, they need a hall pass.

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Let's look at example 3. As we have shown, a categorical statement can be expressed as an "if *A*, then *B*" form (a conditional). If 3 says, "If this being is a unicorn, then it has a horn," but keep in mind that nothing is a unicorn (so anything that *actually asserts* there are will be false), then the whole statement is true. Why? Remember the cat on the mat? If the antecedent is false, then the whole statement is true, since the only way for the statement to be false is if it goes from true to false. In the case of universal categoricals, this has the unintuitive result that in cases where the *subject term is known to be empty in advance*, as in the case of the term "unicorn," then "All unicorns are white" *will be true in a trivial way*—true because there aren't any unicorns. In fact, "No unicorns are white" will be true for exactly the same reason.

There are some problems here, though. When we are talking about using categorical sentences such as "Not all Albertans are steelworkers," we do understand that there are some Albertans who are not steelworkers. What this means is that in natural language, we often assume that classes have members even when we don't make this assumption using categorical logic. But this feature of usage is due to a fact about context; we understand sentences in the context of the beliefs and knowledge we have about the world. So when we assume that there are Albertans, this is due not to the meaning of the universal categorical but to an independent piece of knowledge we bring to the task of how best to translate the sentence. This means that we need to pay attention to context when we are translating ordinary sentences into categorical form, and this will have a bearing on fictional contexts, as we will see in a moment.

What About When Terms Are Necessarily Connected?

The second problem is that universal claims often assert a necessary or conceptual connection between the terms in question. Compare these two claims:

> **EXAMPLES TO COMPARE NECESSITY**
>
> 1. If you won a billion dollars, you would be rich.
> 2. If you won a billion dollars, you would be a duck.

What is the relationship between having a billion dollars and being rich? Is it anything like the relationship between winning a billion dollars and being a duck? Assuming a billion dollars means you are rich, 1 seems true. If it were true that you won a billion dollars, then you would be rich. But what about your duck status? It seems like there is no way for that to be true even if you win the billion dollars. This is because there's no overlap between the classes of things: (a) people who could win a billion dollars and (b) ducks (who were once

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people?). There is just no relation of meaning or any other kind of connection of necessity between the classes.

This is why it is important to pay attention to the specific grammar of claims. Many universal claims appear to involve both subjunctive claims (claims that involve possibility) and indicative claims (claims that are objective or certain). Compare these two claims:

EXAMPLE OF INDICATIVE VERSUS SUBJUNCTIVE

1. All diamonds are hard.
2. If anything were a diamond, it would be hard.

We know that all diamonds are hard because this is a fact about the *nature* of diamonds (indicative). But we can also express this using the subjunctive, such that if anything *were* a diamond, it *would* be hard. This shows us that the statement "All diamonds are hard" is true not only of all the *actual* diamonds but of all *possible* diamonds as well.

An **indicative sentence** is one that when uttered makes a truth claim—that is, it's either true or false.

The fact that many universal claims tell us about necessity and possibility is due to a central feature of our ordinary conception of the world. We have a conception of the possible, of what *could* be true, that is part of our conception of actual things. It is part of our understanding of how things actually are that things could be different than they are in certain ways but not others. For example, if you see a red apple, it is possible that there is a weird light shining on it and it is actually green. We are always considering ways in which the world could be different in order to understand how it is.

We must understand how the world isn't in order to understand how it is. Part of this is just about the nature of the causal fabric of the world. We don't make traffic bridges out of butter. This isn't by choice, really; it is because we can't. Butter doesn't have the right tensile strength necessary for it to be adequate bridge-building material.

Claims such as "If we had spent the day sunning on the beach, we would have been tanned by the sun" make sense in our ordinary language even though they aren't currently true. Relationships of possibility are hard to express properly in categorical logic. Sometimes what we have to do is restrict the universe of discourse in order to allow our claims to work. For example, imagine we

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are planning a holiday, and imagine first that we plan to go to Mexico, and then at the last second we instead go to Greece; we have no trouble thinking about what would be true *if* we were in Mexico while we are in Greece.

What About Fictional Terms?

Can we use unicorns in our categorical statements even though they don't properly exist? We have no trouble thinking that there are facts about what unicorns are like even though there aren't any unicorns. Properly understood, these may simply be facts about what is appropriately (or commonly) *said* or *imagined* about unicorns, since there are no unicorns to make those claims true.

EXAMPLE OF SYLLOGISM WITH FICTIONAL TERMS

Premise 1: All hobbits have hairy feet.
Premise 2: Some hobbits are gardeners.

Conclusion: Some gardeners have hairy feet.

Here we have to think about what the universe of discourse is. There is an implicit universe of discourse such that we are talking about the stories told by J. R. R. Tolkien. Even though there aren't any hobbits, isn't this argument valid? If all hobbits have hairy feet and some hobbits garden, doesn't it follow that some gardeners have hairy feet? This is valid, but depending on whether we can have a fictional universe of discourse, it is unsound. If you are interested in this area of logic, philosophers have different schools of thought about the metaphysical status of fictional entities. This doesn't need to be dealt with for our purposes. It is a difficult subject, and the mathematical and logical resources needed to deal with those difficulties are well beyond the scope of this text.

Empty classes, subjunctive possibilities, and fictional objects are not issues for our modern interpretation of universal categoricals. We will not assume the existence of members of the classes being described. This is important because as we move toward constructing syllogisms with categorical statements, we need to remember that *we cannot infer from the existence of a class that there are members in that class*. You cannot infer as a matter of logic that there are some things in a class (a universal affirmative or negative). For example, from the truth of the statement "All unicorns have a horn in their foreheads," you cannot infer that there are some unicorns. Of course, sometimes the context makes it clear that there are members of the classes in question, but then the inference from, say, "All cats are mammals" to "Some mammals are cats" is

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not grounded in the universal claim alone but also depends on our knowledge that there are cats.

10.2 Interpretations of "Some"

Unfortunately, categorical logic only has a meager stock of quantifiers ("all," "no," and "some"). Categorical logic doesn't do a good job of distinguishing more from less, and thus the differences between exactly one, a few, some, many, and almost all are not clear. If there is exactly one member of *S* that is *P*, then the statement "Some *S* are *P*" is true, and the same is true if almost all *S* are *P*. Compare these examples:

EXAMPLES TO TRANSLATE

1. Apples are fruit.
2. Dogs are funny.

Hopefully the translation of 1 is clear. It is making a claim about the kind of thing an apple is. It is claiming that the class of apples is a subset of the class of fruits. Thus we can represent 1 as "All apples are fruit."

But how should we translate 2? Should we treat this as the universal claim "All dogs are funny" or as the particular one "Some dogs are funny"? To see which to do, we need to look at the context in which the statement occurs. We need to ask what kind of argument is being made and whether that argument *depends* on a universal or particular treatment for that claim. Consider for example the argument "Dogs are funny; funny things fall down a lot, so dogs fall down a lot." If we translate this to particular affirmative statements:

1. Some funny things fall down a lot.
2. Some dogs are funny.
3. Thus some dogs fall down a lot.

Remember that we translate "some" as at least one—which means there might be *only* one. Premise 1 tells us that there is at least one funny thing that falls down a lot and premise 2 tells us that there is at least one dog that is funny. And the conclusion tells us that there is at least one dog that falls down a lot. Can we infer that? Do we know that the "funny thing" in premises 1 and 2 is the same thing, i.e., the dog in the conclusion? We cannot know that for sure, thus we cannot assert this conclusion, and the syllogism is invalid (it is possible for premises 1 and 2 to

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be true and the conclusion false). But if one of the premises were translated as a universal claim, the conclusion would follow, because we could make the connection through dogs with the statement "All dogs are funny." We will see examples of arguments of these sorts ahead. By giving careful translations, we can extend the range of arguments that can be successfully translated into categorical form. It is usually clear in a particular context what the best translation is.

10.3 Direct Singular Reference

What do we do when a categorical statement is referring to a specific individual thing? Maybe we are picking out something by a proper name or identifying "this apple" or "that chair." English contains many kinds of noun phrases that allow reference to individuals and groups of individuals. Proper names, determiners, and demonstratives all play roles in fixing the reference in noun phrases. If we say, "Nushi is tall," you understand us to be referring to a particular person named Nushi even though there are many people named Nushi.

Definite reference	Indefinite reference
that cat	a cat
my house	houses
this old computer	most old computers

The difference here is between making reference to a specific individual creature or thing and referring to any member of a class (not a specific one). Sometimes we need to rely on context, since the use of "a" in a phrase such as "I want to buy a shirt" means that you want to buy one specific shirt, but you haven't picked one out yet. If you told a salesperson "I want to buy *a* shirt," they would know you mean something very different from "I want to buy *that* shirt." At the same time, if you say, "I want that shirt in a large," pointing to a small shirt, then you are referring to a *specific type* of shirt but not to a particular instance of that type.

Translating specific claims into categorical statements can be difficult. The universal categoricals make no reference to individuals—they say something about classes. The particular categoricals make reference to *individuals*, but they only refer *indefinitely*. "Some Manitobans are nurses," for example, tells you that one or more Manitobans is a nurse, but it gives you no information about *which* Manitobans are nurses. This makes it difficult to translate arguments in

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which *both premises are about the same individual or individuals* (recall the dogs that are funny and fall down). Consider two interpretations of a categorical argument:

Version 1: Original argument	**Version 2: Particular interpretation (invalid)**	**Version 3: Universal interpretation (valid)**
P1: Some Manitobans are nurses. P2: They are very dedicated. C: Some Manitobans are very dedicated.	P1: Some nurses are very dedicated people. P2: Some Manitobans are nurses. C: Some Manitobans are very dedicated people.	P1: All nurses are very dedicated people. P2: Some Manitobans are nurses. C: Some Manitobans are very dedicated people.

In version 1, it is clear that "they" refers to the group of Manitoban nurses and that the point of the argument is to say that since they are very dedicated and Manitobans, it follows that some Manitobans are very dedicated people. But in categorical logic, we cannot keep the "they" in premise 2. It is not a *proper* subject term.

So we have two options for translation: some (particular) or all (universal). In version 2, we run into difficulty. The first premise does not tell you that the nurses who are dedicated are *Manitoban* nurses, and the second premise does not tell you that the nurses who are Manitobans are *dedicated* nurses, and so the argument is invalid. But if you translate the first premise as "All nurses are very dedicated people" (since in the context you know that you are talking about the dedicated Manitoban nurses and can thus reasonably restrict the universe of discourse to them), the argument is valid.

10.4 Proper Names

Translating statements containing proper names also requires special treatment. To properly translate proper names, we need to treat the name as referring to a special class that contains all and only the things named. So to translate "Kristin is a professor," we say, "All persons identical to Kristin are a professor," and since there is one and only one person in the class of persons identical to Kristin, this gets us *most* and perhaps all of what we want. It tells us that "for all the things that there are, if a thing is a member of the class of people identical to Kristin, then that thing is a professor." Remember, though, that on the modern interpretation universals do not tell us that there *is* anything that is a member of the class of people identical to Kristin. If we need to assert the existence of Kristin, then we need to translate the statement as "Some professors are people identical to Kristin."

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Version 1: Original argument	**Version 2: Particular only interpretation (invalid)**	**Version 3: Universal and particular interpretation (valid)**
P1: Kristin is a professor. P2: Kristin is a parent. C: Some professors are parents.	P1: Some people identical to Kristin are professors. P2: Some people identical to Kristin are parents. C: Some professors are parents.	P1: Some professors are people identical to Kristin. P2: All people identical to Kristin are parents. C: Some professors are parents.

In version 2, we don't know that the "some" picked out in premise 1 and 2 are the same, so we cannot draw the conclusion based on the premises. In version 3, premise 1 tells us that *there is* at least one professor who is a person identical to Kristin. The second premise tells us that *if* there is a person identical to Kristin, *then* that person is a parent. Between those two premises, we have the information that there is at least one parent who is a professor. Thus, version 3 is valid, since P1 and P2 cannot both be true while the conclusion is false.

As in the case involving the Manitoban nurses, we cannot translate *both* premises as either universal or particular categoricals, because in neither case will the argument be valid. Instead, we need to make one premise universal and the other particular. Version 3 is valid because the conclusion, which says that there is at least one professor who is a parent, is made true by the combination of the two premises.

The point to keep in mind when translating sentences into categorical form is that there is quite a bit of information implicitly available in an argument informally presented, and you always lose some of that information in the translation, so it is important to make sure that you don't lose the information *that you need* for assessing the validity of the argument. Very often, the important information that must be preserved in the translation is information that keeps track of specific individuals mentioned in the argument.

10.5 Translating an Informal Statement

Why do we translate ordinary sentences with such precision in categorical logic? This is because in order to evaluate the argument with formal procedures, we must regiment the argument. This also provides us with tools of analysis that can be applied in other domains of analysis—clarifying how claims of quantity and class relate to each other is important in everyday reasoning contexts. In the case of categorical logic, we are trying to control for the effects of background

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and contextual knowledge required to understand certain claims. This also brings to our attention the assumptions we rely on when making arguments. Using a standard form or a template allows us to see how far we must go to clarify sentences that are normally expressed in English without regimentation. This section goes through informal categorical translations of the four statement types.

EXAMPLES OF INFORMAL *A* SENTENCE TRANSLATIONS

1. "Fruits are plants." → All *fruits* are *plants*.
2. "If it's a fish, it lays eggs." → All *fish* are *egg layers*.
3. "He only likes red smarties." → All *smarties liked by him* are *red smarties*.
4. "Only engineers will be hired today." → All *people to be hired today* are *engineers*.

Example 3 is a bit tricky. You can break it down by asking, What are the two classes of things being discussed? Red smarties are a class of things we are talking about, and then we have "he only likes" to deal with. This can be transformed into a class of things: "smarties liked by him." Then you can try the *all* statement in both directions: "All red smarties are smarties liked by him" or "All smarties liked by him are red smarties." Which one seems right? The answer, or the "clue" of this sentence, lies in the use of "only." If we say, "All red smarties are smarties liked by him," we are saying that he definitely likes red smarties, *but* that leaves open the possibility that *he could like other smarties*, which isn't what example 3 is saying. Example 3 says he *only* likes red smarties. Thus, if we put it in the other direction, "All smarties liked by him are red smarties," we rule out him liking other smarties and capture the use of "only" properly.

Example 4 is similar in scope, since it also uses "only." We can do the same exercise of reversal to see if we are translating properly. Our two classes are "people who will be hired today" and "engineers." Let's try this with the "if ____, then ____" structure: "If people are hired today, then they will be engineers," or "If they are an engineer, they will be hired today." The second version makes it seem like all engineers are people who will be hired. This can't be what it is saying, since we can't hire all engineers. What it is actually saying is that if a person gets hired today, that person will be an engineer, which means that "all people to be hired today are engineers."

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EXAMPLES OF INFORMAL *E* SENTENCE TRANSLATIONS

1. If it's easy, it isn't worth it. → No *easy things* are *worthy things*.
2. Cats are never vegetarians. → No *cats* are *vegetarians*.
3. Every Baptist is a non-drinker. → No *Baptists* are *drinkers*.
4. Pigs can't fly. → No *Pigs* are *flying animals*.

Example 3 deserves some discussion. At first blush, this might seem like an "all" statement, since it begins with "every." But this would mean translating it as "All Baptists are non-drinkers." To understand why we don't prefer this, it is important to look at the class of people being discussed. The term we are talking about is "drinker," and the complement to that term is "non-drinker"; it refers to everything in the universe of discourse that is *not* a drinker. And in the universe of discourse, everything either falls into a category or its complement (it has or lacks a property). You could technically say, "All Baptists are non-drinkers," however, when offered the choice, you should use the term itself and not its complement. Ask yourself, Am I using a term that points to anything else in the universe of discourse, or am I picking out a specific class? This is what points us to the proper translation of 3, which is "No Baptists are drinkers." Thus, we find a rule for translating *E* statements:

When there is a choice, you should always use the affirmative form of the predicate rather than its complement (use "are ____" rather than "are non-____"), so that the negations are as much as possible expressed by the form of the categorical rather than by the predicates.

The same goes for "No cats are vegetarians." We could say, "All cats are non-vegetarians," but then we'd be using the complement term as a predicate, which is not preferred.

EXAMPLES OF INFORMAL *I* SENTENCE TRANSLATIONS

1. Many men run. → Some *men* are *runners*.
2. Engineers are sometimes flautists. → Some *engineers* are *flautists*.
3. Insects often can fly. → Some *insects* are *fliers*.
4. Canadians are friendly. → Some *Canadians* are *friendly people*.

Notice how "many," "most," "some," "a few," and "at least one" all translate the same way as "some." Because of this, we have to be very careful in figuring

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out how these statements fit into arguments (as demonstrated above with the cases of Kristin as a parenting professor and dedicated Manitoban nurses).

EXAMPLES OF INFORMAL *O* SENTENCE TRANSLATIONS

1. Not all animals can fly. → Some *animals* are not *fliers*.
2. Most students don't cook. → Some *students* are not *cooks*.
3. There are fruits that aren't sweet. → Some *fruit* are not *sweet things*.
4. Chemists aren't usually funny. → Some *chemists* are not *funny people*.

Example 1 builds on things we have already talked about in terms of reference. When we say, "Not all animals can fly," we know that there are animals that do and don't fly. Translating this sentence to "Some animals are not fliers" only works because the subject term "animals" has actual reference. If it is an empty subject term, or if it is unknown whether the subject term class has members, the translation would be illegitimate. Consider: "Not all unicorns are white" cannot necessarily be translated to "Some unicorns are not white" *unless* we restrict the universe of discourse specifically to a world in which unicorns do exist. Otherwise, what 1–4 demonstrate is that classes should express positive properties and the relation of "not" should be represented by where you put the *X* on the graph (O statement).

10.6 Steps in Translations

1. *Rephrase* the *subject* and *predicate* terms so that they refer to *classes*. Many sentences in English have adjectives as their grammatical predicates. These should be rewritten as noun phrases; thus "Some clowns are funny" becomes "Some clowns are *funny people*," "All oceans are large" becomes "All oceans are *large bodies of water*," and so on.
2. If the verb in the statement is not the copula, *rewrite* the *verb* or *verb phrase* so that it takes the *copula noun-phrase form (conjugation of "to be," meaning "are")*. Use the copula and a noun phrase that captures the sense of the verb (in short use these forms: "are [*noun phrase*]" or "are not [*noun phrase*]"); thus "Fish *swim*" becomes "All fish are *swimmers*," "Some newlyweds *take vacations*" becomes "Some newlyweds are *people who take vacations*," and so on. Do not use the complement of classes in your translations of non-phrases (e.g., do *not* translate "fish swim" as "No fish are non-swimmers").
3. *Insert the right quantifiers.* Pay close attention to the context, and make sure to get the *quantity* of the categorical right. Thus "Dogs are

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mammals" is universal. It is a definitional or classificatory claim and so should be written as "All dogs are mammals," but "Bankers are conservatives" should be written as "Some bankers are conservatives" because it is implicitly a claim about what *most or at least many* bankers are like and is not a universal law or definitional claim about all bankers. When in doubt, look at the argument and ask yourself which translation is most well suited to the context of the argument being made.

4. Finally, treat statements about *individuals* as universal claims about the unit class in question. So "*President Bush* is a Christian" would be written as "All *people identical to President Bush* are Christians," and "*Ottawa* is *the capital of Canada*" would be rewritten as "All *places identical with Ottawa* are *places identical with the capital of Canada*," and "*This beer* doesn't taste good" would become "No *things identical with this* beer are good tasting things."

KEY TAKEAWAYS

- Translation is necessary in order to regiment the argument by helping us control for the effect of background and contextual knowledge required to understand certain claims.
- Three problems that arise with translations: empty terms, interpretations of "some," and direct singular reference.
- When translating, use the affirmative form of the predicate rather than its complement.
- There are four steps in translations: rephrase the subject and predicate terms, rewrite the verb so that it takes the copula noun-phrase form, insert the right quantifiers, and treat statements about individuals as universal claims.

EXERCISES

Part I. Categorical Statement Practice

Identify the form (*A*, *E*, *I*, or *O*) of these statements and put them in standard categorical form.

1. Only doctors are surgeons.
2. Mustangs are Fords.
3. Students often bike to school.

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4. There are polar bears in Canada.
5. Some polar bears do not live in Canada.
6. If not you, I'll have no friend.
7. Everything worth doing is worth doing well.
8. Paris is beautiful.
9. This swamp isn't beautiful.

Part II. Categorical Arguments in Standard Form

Identify the three statements (the premises and conclusion) in these arguments, translate them appropriately, and put the premises and conclusion into the standard form.

1. Bananas are delicious, but rotten bananas are not, so some bananas are not rotten.
2. Stephen Harper is the prime minister, and Stephen Harper is anglophone, so some prime ministers are anglophone.
3. (In the TV show *Buffy the Vampire Slayer*): Angel is a vampire with a soul, and no one with a soul is totally evil, so some vampires are not totally evil.
4. Willow branches are weak, and the weak always fail, so some willow branches fail.
5. The melting point of tin is 232° C, and some of my pots are tin, so they melt at 232° C.
6. The monsters under your bed are afraid when your teddy is in your bed, and your teddy is here in bed with you, so no monsters will come out from under your bed tonight. (*Hint:* Remember that you need to translate this using only three terms so you will need to be creative.)

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11

Categorical Equivalence

11.1 Theory of Immediate Inference

In this chapter, we will discuss what kinds of inferences can be drawn from categorical statements before combining them into a syllogism. In other words, we will find out how to draw inferences from one statement. This is what is called the "theory of immediate inference." When we introduced *E* and *I* statements, we discussed how the terms can be interchanged and the statements remain equivalent (i.e., if some bagels are toasted, then some toasted things are bagels, and if no markers are made of chalk, then no things made of chalk are markers). This was the relation of **conversion**. The theory of immediate inference helps us to better establish the context of statements and provides tools for properly translating arguments.

We will look at six relations between categorical statements, which are the product of manipulating the *order* of the terms, the *quantity* of the statement (whether it is universal or particular), and the *quality* of the statement (whether it is affirmative or negative). These relations are *conversion*, *contraposition*, *obversion*, *contradiction*, *contrariety*, and *subcontrariety*. As we will see, many of these relations will only hold based on the added condition that *the classes in question are not empty*.

11.2 Conversion

The *converse* of a categorical statement is the product of interchanging the statement's subject and predicate terms. Looking back at the Venn diagrams, you can see that the diagrams for *E* and *I* categoricals are symmetrical with respect to the subject and predicate terms—if you switch the order, the diagram looks exactly the same.

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Conversion: The converse of a categorical statement is the product of interchanging the statement's subject and predicate terms.

The converse of the *E* statement "no snakes are poodles" is "no poodles are snakes," and these are equivalent claims, so an *E* statement is *logically equivalent to its converse*. And the same goes for an *I* statement; you can see that *an I statement and its converse are logically equivalent*: "Some snakes are pretty things" is equivalent to "Some pretty things are snakes." Conversion thus is the ground of an immediate inference between *E* and *I* statements.

A and *O* categoricals, however, are not equivalent to their converses. Because their diagrams are not symmetrical, interchanging the subject and predicate terms changes the diagram. It does not follow for the fact that all poodles are mammals that all mammals are poodles! Neither does it follow that if some mammals are not poodles, then some poodles are not mammals.

Categorical	Original sentence	Converse	Equivalent
A	All *S* are *P*.	All *P* are *S*.	*No*
E	No *S* are *P*.	No *P* are *S*.	*Yes*
I	Some *S* are *P*.	Some *P* are *S*.	*Yes*
O	Some *S* are not *P*.	Some *P* are not *S*.	*No*

But remember that sometimes the fact that an entity exists in the unit class is relevant to the argument, and then you may need to opt for a particular categorical. Look back at the example about Kristin the professor parent for help here.

One way to better understand converse relationships is to look at the relationship of distribution. An *A* statement says something about *all members* of the class identified by the subject term. This is called *distribution*.

With the *A* statement "All dogs are mammals," for example, a claim is being made about all dogs. But the same is not true for the predicate term: "mammals." Other mammals, in addition to those identified as dogs, may exist, and so we *cannot* infer that all mammals are dogs. All *A* statements are the same in this regard: the *subject term is distributed* and the predicate term is not distributed.

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A term in a categorical statement is distributed if the statement makes a claim about every member of the class referred to by that term.

Another way of understanding this is that an *A* statement distributes the subject to the predicate, but not the reverse. Distribution is a formal property of a categorical statement. *E* statements distribute both the subject and the predicate terms. One way of understanding this is that in an *E* statement, the subject and predicate terms both say something about each other. When we say that "no snakes are mammals," we can infer that "no mammals are snakes." We exclude mammals from snakeness, and we exclude snakeness from mammals. It goes both ways.

I statements do not distribute either term. *I* statements don't say anything about either class (subject or predicate) because they just assert at least one thing exists in the overlap of classes.

O statements are problematic. Like *I* statements, *O* statements do not refer to all members of the subject class. But we could interpret them as saying something about the whole predicate class. Saying the statement "Some students are not engineers" is like saying that all engineers are excluded from the subgroup of students picked out by "some students." In this view, it follows that the subject of any *universal* statement is distributed, but the subject of any *particular* statement is not. *I* statements do not distribute either term. And it would make sense that the predicate of any negative statement is distributed, but the predicate of any affirmative statement is not. This is nice and symmetrical, but it poses problems for existential import (inferences about what actually exists), as we shall soon see. As a result, we will take the view that neither term in an *O* statement is distributed.

Categorical	**Sentence**	**Subject distributed**	**Predicate distributed**
A	All *S* are *P*.	*Yes*	*No*
E	No *S* are *P*.	*Yes*	*Yes*
I	Some *S* are *P*.	*No*	*No*
O	Some *S* are not *P*.	*No*	*Yes*

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11.3 Contraposition

We saw previously that the **complement** to a class is the class of everything not in the original class. For example, the class of non-dogs is the complement of the class of dogs. Equally, the class of dogs is the complement of the class of non-dogs. To obtain the *contrapositive* of a categorical statement, we first obtain the converse (switching the subject and predicate terms), and then we negate the terms by attaching a "non-" to both the subject and predicate terms.

Contraposition is a manipulation involving two changes: both terms are replaced by their complement, and the order of the terms is switched.

For example, the contrapositive of "All pickles are green things" is "All non-green things are non-pickles," which is true: if *all* the pickles are green things, then all the non-green things are non-pickles. But contraposition does not preserve truth in *E* statements. If "No pickles are red things" is true, it does not follow that no non-red things are non-pickles! Presumably, there are lots of non-red things that are not pickles. For *I* statements, if we are asserting that some *S* are *P*, then saying that some non-*P* are non-*S* cannot be inferred. For example, if we say some apples are red things, does it follow that some non-red things are non-apples? Keep in mind the question here. From the *I* statement, can it be inferred that some non-red things are non-apples *from the very fact* that some apples are red things? No, that cannot be inferred. We do not know what the rest of the universe of discourse contains. *O* statements do turn out to be equivalent to their contrapositive, and it involves some double negation. If we say, "Some philosophers are not artists," we are saying that some philosophers exist outside of the intersection with the predicate class "artists." Then in a very roundabout way, we talk about those philosophers as "non-artists" in the contrapositive and say that they are *not* non-philosophers (which is to say that they are philosophers). Then it is true that some non-artists are not non-philosophers.

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Categorical	Original sentence	Contrapositive	Equivalent
A	All *S* are *P*.	All non-*P* are non-*S*.	*Yes*
E	No *S* are *P*.	No non-*P* are non-*S*.	*No*
I	Some *S* are *P*.	Some non-*P* are non-*S*.	*No*
O	Some *S* are not *P*.	Some non-*P* are not non-*S*.	*Yes*

11.4 Obversion

Obversion is the product of changing both the quality of a categorical statement (changing it from negative to affirmative or affirmative to negative) and replacing the predicate term with its complement (negating it by attaching a "non-" to the predicate term). Every categorical statement is equivalent to its obverse.

> Obversion: The obverse of a categorical statement is the result of changing the quality of the statement and replacing the statement's predicate term with its complement.

In obversion, we change the quality of the statement by changing the quantifier. "All" switches with "no," and "some" switches with "some are not." Then the predicate term is replaced by its complement, which we have seen. For an *A* statement, if we say that "all snakes are reptiles" it follows that "no snakes are non-reptiles." They are all reptiles! If we say that "no snakes are mammals," it follows that "all snakes are non-mammals."

I and *O* statements require a bit of thinking. If some *S* are *P*—say, "Some artists are philosophers"—does it follow that some philosophers are not non-artists? Yes, because the two negations point us back to the category of artists. An *O* statement is a bit more straightforward. Consider some dogs are not poodles; it would follow then that some dogs are non-poodles (all the other dogs!).

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Categorical	**Original sentence**	**Obverse**	**Equivalent**
A	All *S* are *P*.	No *S* are non-*P*.	*Yes*
E	No *S* are *P*.	All *S* are non-*P*.	*Yes*
I	Some *S* are *P*.	Some *S* are not non-*P*.	*Yes*
O	Some *S* are not *P*.	Some *S* are non-*P*.	*Yes*

11.5 Negation

We now turn to a discussion of *negation*. In traditional categorical logic (subject classes are not empty), there are three kinds of negation that form the basis for logical inference between categoricals: *contradiction*, *contrariety*, and *subcontrariety*. Of these, only *contradiction* holds as a matter of logic on the modern account (subject classes cannot be assumed to have members). The other two, *contrariety* and *subcontrariety*, do not hold universally in the modern form of categorical logic because they depend on the interpretation that the classes are not empty. But because this assumption is almost always the case *in practice*, it is useful to discuss all three forms of negation for the light that they shed on choices for translation. But it is important to keep firmly in mind that *inferences involving contraries and subcontraries can only be made in contexts in which reasoners know that the classes of things under discussion are not empty, and that the inferences depend materially on that knowledge*.

11.6 Contradiction

The *contradictory* of a categorical statement is the explicit *denial of the whole statement*. A categorical statement and its contradiction accordingly always have opposite truth values. This means that they cannot both be true, and they cannot both be false (at the same time). Another way of saying this is that if one is true, the other must be false.

Here you can see that *A* and *O* statements are contradictory (fig. 11.1). The *A* statement completely rules out the possibility of any *S* that is not *P*, whereas the *O* statement claims that there is indeed an *S* that is not *P*. A class cannot both be empty and have members at the same time.

Similarly, an *E* statement asserts that the *SP* area is empty—it is an impossibility—whereas the *I* statement asserts that there *is* an *S* that is *P* (fig. 11.2). Again, a class cannot both be empty and have members at the same time. Thus, *E* and *I* contradict each other.

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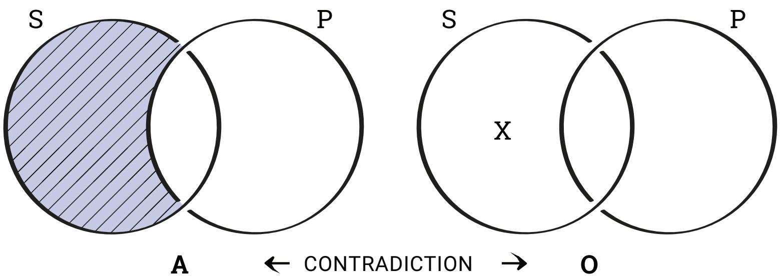

Figure 11.1 *A* and *O* statements contradict each other. Artwork by Jessica Tang.

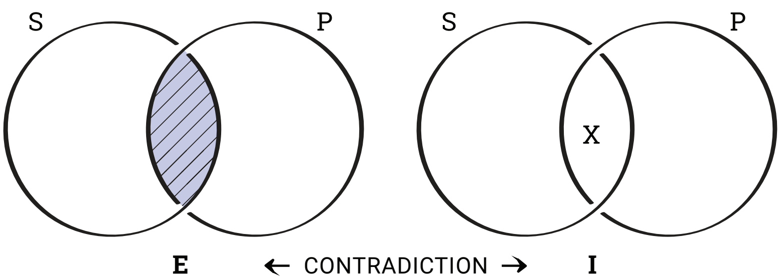

Figure 11.2 *E* and *I* statements contradict each other. Artwork by Jessica Tang.

11.7 Contrary and Subcontrary

Later in this text (Chapter 18), we will discuss the *fallacy of bifurcation*. This is where claims that are merely *contrary* are treated as *contradictory*. Recall that in a contradiction, the two claims cannot have the same truth value. In categorical logic, often the contrary is mixed up with contradiction. Previously, we established the contradiction is between asserting *something exists in a class* and asserting *that same class is empty*. In the case where subject classes are not empty, A and E statements are contraries and I and O statements are subcontraries.

Contrary statements cannot both be true (like a contradiction), but they *can both be false*.

Our immediate inference here is that if one is true, the other *must be false*. But if one is false, we do not know the truth value of the other. A **contrary** is identified by the relation between an *A* statement and an *E* statement (fig. 11.3).

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Let's look at an example. "All pickles are green," and "No pickles are green." It is pretty clear that these statements cannot *both be true* (all pickles are both green and not green at the same time), but can they both be false? Can it be false that both all and none are green? If it is false that all are green, then there is at least one pickle of another colour. If it is false *that* no pickles are green, then there is at least one green pickle (recall that *E* statements are contradicted by *I* statements). In both cases, the existence of at least one green pickle and at least one other colour pickle do not contradict each other, thus it can be consistent to have *both statements be false*. But keep in mind that in both cases, we are assuming that the classes are not empty—we are assuming pickles exist.

Adding to this discussion of contraries is the notion of **subcontrary**. *I* and *O* statements are subcontraries of each other (fig. 11.4).

Two *subcontraries* can both be true, but *at most*, one can be false.

Can it both be true that there is some *S* that is *P* and some *S* that is not *P*? If you look at the diagrams, you can imagine them overlapping and it wouldn't

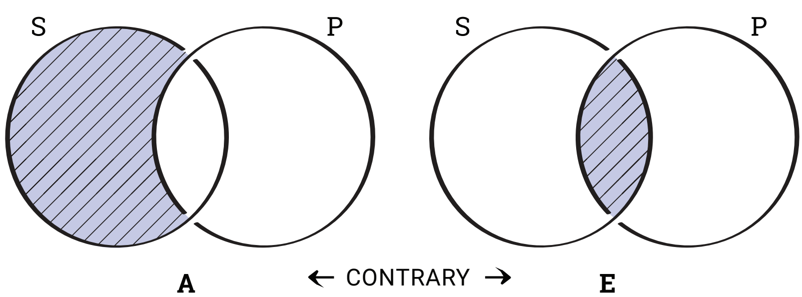

Figure 11.3 *A* and *E* statements are contrary. Artwork by Jessica Tang.

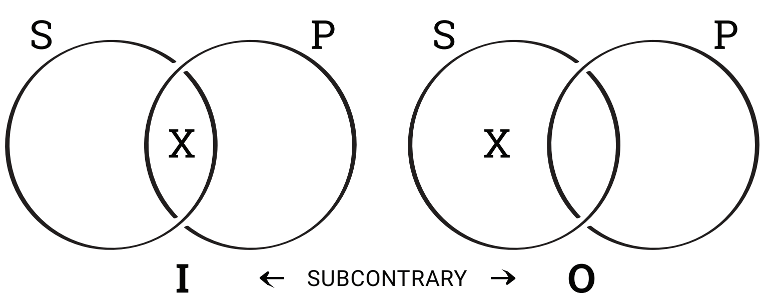

Figure 11.4 *I* and *O* statements are subcontraries. Artwork by Jessica Tang.

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be a big deal. There would be one "x" in the *SP* lens and one "x" in the *S* lune. In our previous example, we could say there is at least one green pickle and at least one pickle that is not green. These can both be true.

But what if they were both false? What if there is no "x" in *SP* and there is no "x" in *S*. Can that be true? It depends on *whether the classes are empty*. Let's return to green pickles. If both the *I* and *O* forms are false, then there would be no pickles in the world (regardless of colour). So, the relation of subcontrariety relies on the condition that the classes are not empty.

11.8 Subaltern

Subalternation is the final ground for immediate inference we will discuss in this chapter. If subject classes are not empty, then subalternation holds between *A* and *I* categoricals and between *E* and *O* categoricals. Subalternation represents the fact that one can infer that "Some *S* are *P*" is true from the fact that "All *S* are *P*," and that "Some *S* are not *P*" is true from the fact that "No *S* are *P*."

> *Subalternation* is the relation where if we know the subject classes are not empty in a universal affirmative, we can infer a particular affirmative. And if we know a universal negative, we can infer a particular negative.

Thus, if we know that *there are ducks*, and we know that all ducks are birds, we can infer that "some ducks are birds." Similarly, if we know that there are snakes, we can infer from the fact that "no snakes are mammals" that "some snakes are *not* mammals." Below, we introduce the traditional square of opposition, where you can see the subaltern relationship on the sides (fig. 11.5).

11.9 Traditional Square of Opposition

All these relationships of immediate inference are summarized in what is known as the traditional square of opposition. The relationships that it demonstrates were of central importance to the development of logic for over two thousand years.

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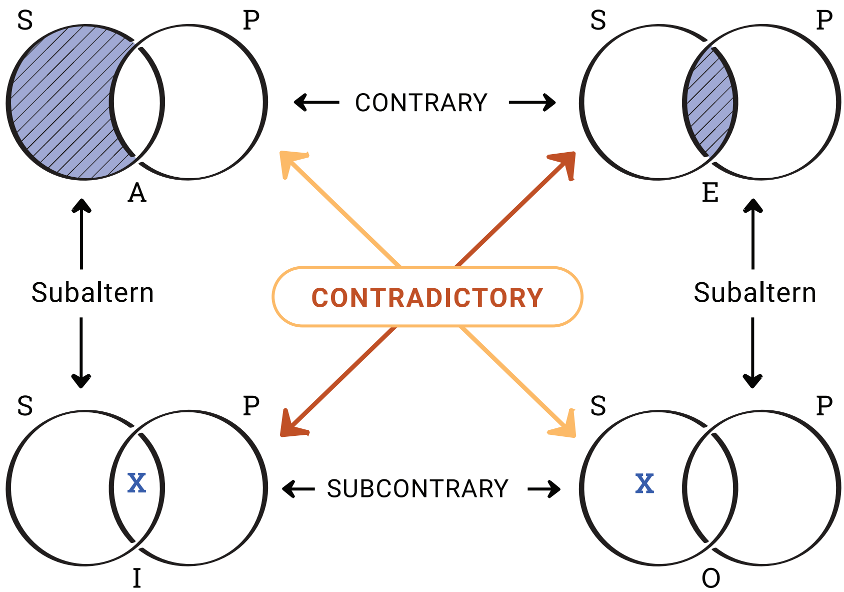

Figure 11.5 Traditional square of opposition. Artwork by Jessica Tang.

> If you are interested in the relationship between modern and traditional categorical logic, you can read the entry in the *Stanford Encyclopedia of Philosophy* on the traditional square of opposition.[1]

With the development of modern logic and the mathematics of classes, the theory of immediate inference demonstrated in the square of opposition has declined in importance. Of the relations summarized by it, *only contradiction holds for modern categorical logic*.

In looking at the square, it is helpful to recall the truth-value relationship. The contradictions outlined demonstrate that they cannot both be true, and they cannot both be false; they must have opposite truth values. This is the case in both modern and traditional logic. On the traditional interpretation, the contraries cannot both be true, but they can both be false. Likewise, subcontraries cannot both be false, but they can both be true. Tracking each relation on the square, we can see that:

1 http://plato.stanford.edu/entries/square/

An ***A*** categorical is: the *equivalent* to its contrapositive and its obverse, the *contradictory* of the corresponding *O* categorical, and the *contrary* of the corresponding *E* categorical.	An ***E*** categorical is: the *equivalent* to its converse and its obverse, the *contradictory* of the corresponding *I* categorical, and the *contrary* of the corresponding *A* categorical.
An ***I*** categorical is: the *equivalent* to its converse and its obverse, the *contradictory* of the corresponding *E* categorical, the *subcontrary* of the corresponding *O* categorical, and the *subaltern* of the corresponding *A* categorical.	An ***O*** categorical is: the *equivalent* to its contrapositive and its obverse, the *contradictory* of the corresponding *A* categorical, the *subcontrary* of the corresponding *I* categorical, and the *subaltern* of the corresponding *E* categorical.

KEY TAKEAWAYS

- There are six relations between categorical statements: conversion, contraposition, obversion, contradiction, contrariety, and subcontrariety.
- Conversion is a one-step process where you switch the subject term and the predicate term. *E* and *I* statements are equivalent.
- Contraposition is a two-step process where you switch the subject term and the predicate term and replace both with their complement. *A* and *O* statement contrapositives are equivalent.
- Obversion is a two-step process where you change the quality of the statement (all/no, and some/some are not) and you change the predicate to its complement. All statements are logically equivalent to their obverse.
- *A* and *O*, and *I* and *E* statements are contradictory: cannot both be true, cannot both be false.
- *A* and *E* statements are each other's contraries. They cannot both be true, but they can both be false.
- *I* and *O* statements are each other's subcontraries. They cannot both be false, but they can both be true.

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EXERCISES

Categorical Equivalence True or False

For each sentence, use an *F* or a *T* to mark whether it is *true* or *false*.

1. *A*- and *E*-type categorical statements are equivalent to their converses on the traditional interpretation.
2. *A* and *E* categorical statements are affirmative in quality.
3. *A* and *O* statements are contradictories.
4. No term is distributed in an *I* statement.
5. In conversion, one interchanges the subject and predicate terms.
6. If *all S are P* is true, then *all non-P are non-S* is true.
7. If *some S are P* is true, then *some non-P are non-S* is true.
8. All four types of categorical statements have the same form as their contrapositives.
9. The middle term of a syllogism never appears in the conclusion.
10. If *all S are P* is true, and *some S are Q* is true, then *some P are Q* is true.
11. The subcontrary of an *I* statement is an *E* statement.
12. If *some S are P* is true, and *some S are Q* is true, then *some P are Q* is true.
13. A term *T* is distributed in a statement if the statement makes a claim about everything that is *T*.
14. The middle term of a syllogism always appears in the conclusion.
15. If *some S are not P* is true, then *not all S are P* is true.
16. *A*- and *E*-type categorical statements are equivalent to their contrapositives.
17. The three kinds of negation in categorical statements are converse, obverse, and contradiction.
18. A term is distributed if its extension has members.
19. The three kinds of negation in categorical statements are contradiction, contrariety, and subcontrariety.
20. All four types of categorical statements have the same form as their converses.
21. The three kinds of negation in categorical statements are contrary, contradiction, and converse.
22. All four types of categorical statements have the same form as their contrapositives.
23. The contradictory of an *A* statement is an *E* statement.
24. The contradictory of an *A* statement is an *O* statement.
25. A statement has existential import if its predicate is distributed.
26. In *O* statements, the subject term is distributed but not the predicate term.

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12

The Categorical Syllogism

12.1 Theory of the Syllogism

We now turn to the theory of the syllogism. A syllogism is an argument composed of three categorical statements, two of which are premises, and the third is the conclusion. The three statements jointly contain three non-logical referring terms (subject terms and predicate terms), each appearing in two of the three statements. The theory of the syllogism has as its job determining which syllogisms are valid. Consider the following example:

EXAMPLE OF A CATEGORICAL SYLLOGISM

Premise 1: All birds are egg layers.
Premise 2: All ducks are birds.

Conclusion: All ducks are egg layers.

There are three terms—"ducks," "birds," and "egg layers"—and each appears *twice*. The word used as the *subject* term of the conclusion of the syllogism ("ducks") is called the *minor* term of the syllogism. The *major* term of the syllogism is the predicate term of its conclusion ("egg layers"). The third term in the syllogism ("birds") doesn't occur in the conclusion at all, but it appears in each of its premises; we call it the *middle* term.

In order to identify which is the major and which is the minor term, you work backward from the conclusion. The subject term in the conclusion is the minor term and the predicate term in the conclusion is the major term. The middle term is the one mentioned in the premises only but not the conclusion. The premise in the syllogism containing the major term (and a middle term) is called the *major premise* of the syllogism. The major premise is always

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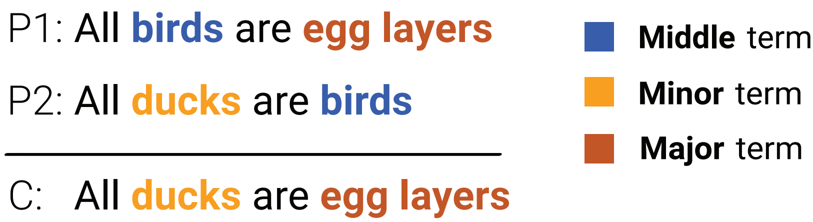

Figure 12.1 "Birds" is the middle term in this example of AAA1 (Barbara). Artwork by Jessica Tang.

written first. The other premise, which links the middle and minor terms, we call the *minor premise*, and it is written second.

12.2 Moods and Figures

In the example above, all three statements are *A* statements, which we can represent by "*AAA*." Since there are 4 kinds of statements (*A*, *E*, *I*, *O*), there are 64 possibilities; these were traditionally called the *moods* of the syllogism.

The *figure* of a categorical syllogism refers to the four possible arrangements of the middle term. The middle term arrangement is represented as 4 numbered possibilities.

1. The middle term is the subject of the first premise and the predicate of the second premise.
2. The middle term is the predicate of both premises.
3. The middle term is the subject of both premises.
4. The middle term is the predicate of the first premise and the subject of the second premise.

In the example of ducks, egg layers, and birds, the *figure* is 1, and the categorical syllogism is called *AAA*1 (fig. 12.1). The combination of *mood* and *figure* is known as *form*. Since there are 4 figures for each mood and there are 64 moods, there are 64 × 4 (= 256) syllogistic forms. Of these forms, *only a few are valid*; medieval logicians gave each form a mnemonic name to keep track of the valid ones.

12.3 Valid Forms

The syllogism with the form *AAA*1 is known as "Barbara," because "Barbara" has three *A*s as vowels. The syllogism with the form *EAE*1 is known as "Celarent," the syllogism with the form *AII*1 is known as "Darii," and so on.

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Barbara	**Celarent**	**Darii**	**Ferio**
A: All birds are egg layers. *A*: All ducks are birds. ——————— *A* (C): All ducks are egg layers.	*E*: No mammals are birds. *A*: All whales are mammals. ——————— *E* (C): No whales are birds.	*A*: All swans are white. *I*: Some birds are swans. ——————— *I* (C): Some birds are white.	*E*: No student is a baby. *I*: Some adults are students. ——————— *O* (C): Some adults are not babies.

Fortunately we do not need to remember the fifteen valid forms, nor do we need to apply the complex rules for determining validity that were necessary prior to the development of modern class logic.

12.4 Graphing Syllogisms

Venn diagrams provide us with a concrete and intuitive measure of validity. To determine the **validity** of a syllogism, we graph its premises on a "trefoil" Venn diagram containing three interlocking circles. For this purpose, we use *diagrams with three interlocking circles*, as shown in fig. 12.2.

This creates all possibilities for overlap between the three terms but of course does not represent classes in proportion to their size.

Consider the example of the valid form Celarent as shown in fig. 12.3.

We treat the *top circle* as the *middle* term, the lower left as the *major* term, and the lower right as the *minor* term. First, we graph the major premise, shading out the overlap between *M* and *B*. Then we graph the minor premise by shading out the area of *W* that is not *M*.

We do not graph the conclusion! Never graph the conclusion. Make a special note of this wherever you plan to do your homework. This method is for checking for validity, which means asking ourselves, If we graph the premises of the syllogism as true, then is it possible for the conclusion to be false? We understand this by inspecting the combination of the two premises. Inspecting the instance of Celarent as shown in fig. 12.3, is it possible for "No *W* are *B*" to be false? No. Indeed, *it is true*. It is represented because the overlap between *W* and *B* has already been shaded out. This is a valid argument.

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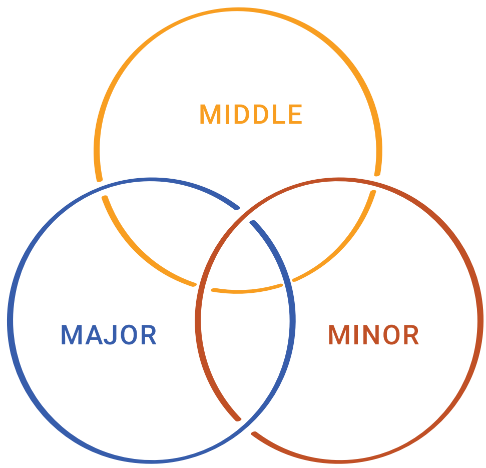

Figure 12.2 Positioning of the circles for major, minor and middle terms. Artwork by Jessica Tang.

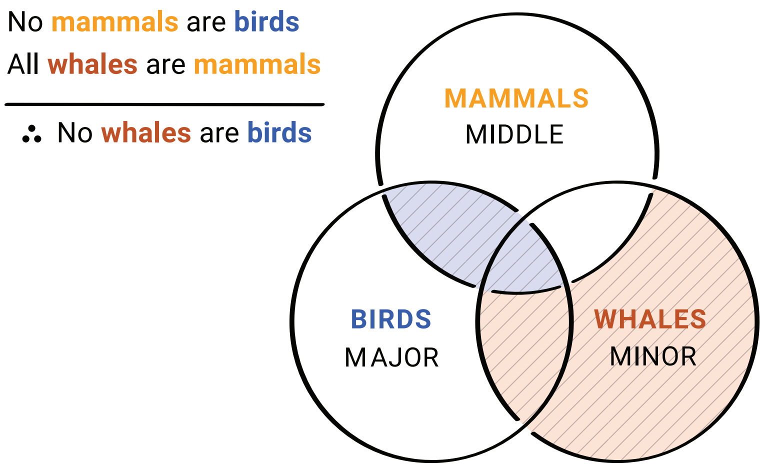

Figure 12.3 Graphing an example of Celerent. Artwork by Jessica Tang.

Checking for validity: We inspect the diagram and see whether the conclusion *is already represented* in the diagram. If the conclusion is already present in the diagram after graphing the premises, then the truth of the conclusion follows from the truth of the premises and the argument is valid.

Graphing *I* and *O* statements on a three-circle diagram requires thinking a bit differently about representing the existence *of* something. Let us consider another example:

EXAMPLE OF SYLLOGISM WITH AN *I* AND AN *E* STATEMENT

Premise 1: Some bankers are vegetarians.
Premise 2: No anarchists are bankers.

Conclusion: Some anarchists are not vegetarians.

The major term is "vegetarians," the minor term is "anarchists," and the middle term is "bankers" (fig. 12.4).

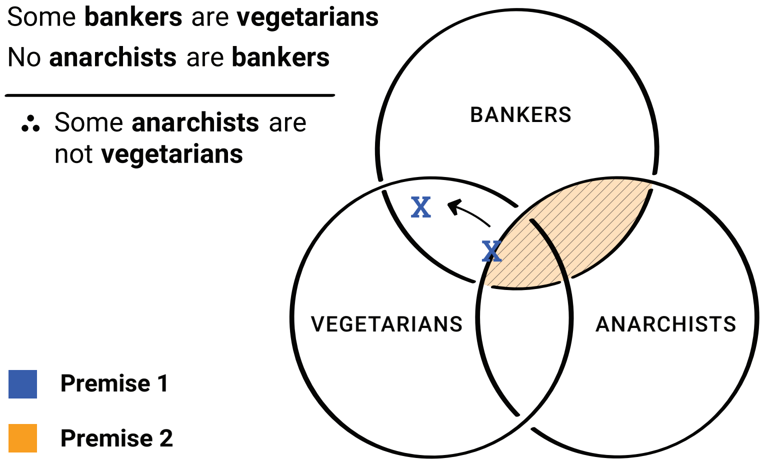

Figure 12.4 Example of a syllogism where an *E* statement pushes an *I* statement off of a line. Artwork by Jessica Tang.

The middle term is represented by the top circle, with the major to the left and the minor to the right. We graph the first premise by putting an *X* in the lens between the "vegetarians and bankers" circles. Premise 1 tells us there is "some (at least one) vegetarian" that is "a banker," but it doesn't tell us what its relationship is to anarchists. We cannot decide either way, so *we put it on top of the line to express our ignorance*. However, when we graph the second premise, we shade out the lens between "bankers and anarchists," which then pushes the *X* into the remaining space between "bankers and vegetarians." *Remember that we never graph the conclusion.* We now *look to see* whether the conclusion is graphed as a result of the combination of premises. The conclusion states that there are some "anarchists that are not vegetarians." Is this represented? No, there is no *X* in the anarchists space at all, nevermind in the anarchist space that is not vegetarian, thus the argument is invalid.

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Here is another example using all *I* statements:

EXAMPLE OF SYLLOGISM USING *I* STATEMENTS

Premise 1: Some used car sales people are cheats.
Premise 2: Some cheats are bankers.

Conclusion: Some bankers are used car sales people.

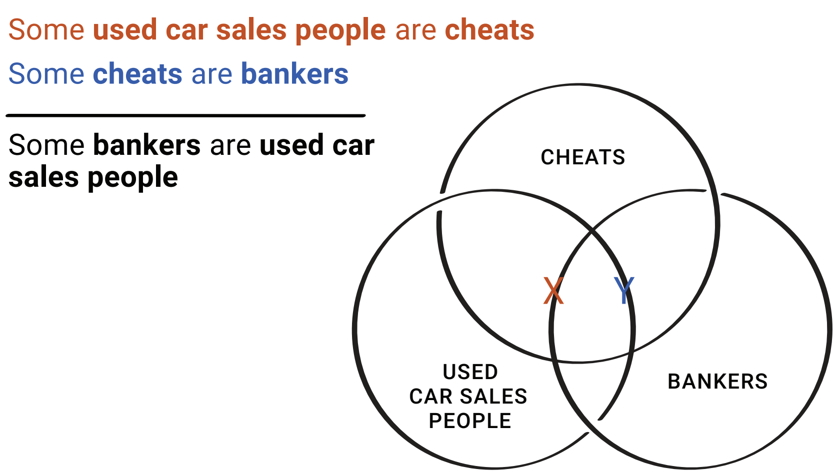

Figure 12.5 Graphing two *I* statements using "X" for one premise and "Y" for the second. Artwork by Jessica Tang.

The middle term is "cheats," so that is represented by the top circle; the major term is used car sales people, represented by the left-hand lower circle, and the minor term is bankers, represented by the right-hand lower circle. We graph the first premise by putting an *X* on the centre line in the middle of the lens formed by the "cheats" and "used car sales people" circles. We graph the second premise by putting a *Y* on the line in the centre of the lens formed by the "cheats" and "bankers" circles. We put the "X" and the "Y" on the line to express our ignorance about its relationship to other classes. Remember that we never graph the conclusion. We look to see if the conclusion is represented. Is there at least one banker who is a used car sales person? No.

We know for sure the argument is invalid because although we know that there is someone (*X*) who is a used car sales person and a cheat, *we don't know whether that person is a banker*. And although we know that there is someone (*Y*) who is a cheat and a banker, *we don't know whether that person is a used car sales person*. If we could know that *X* and *Y* were *the same person*, then the argument would be valid, but the premises do not authorize us to make that claim. In

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order to be valid, we need to see that there is in fact some banker that is also a used car salesperson, and we just don't know that.

12.5 Enthymemes

We have seen enthymemes before, but we can also identify them in categorical syllogisms. In Chapter 7, we introduced enthymemes as follows: *an enthymeme is an argument in which a required premise is not stated explicitly but is assumed implicitly as part of the argument*. This section discusses how to identify an enthymeme in a categorical syllogism.

A *syllogistic* enthymeme is either a syllogism missing a premise that is assumed or, in the case of a *chained* enthymeme, a *pair* (or more) of syllogisms in which the unstated conclusion to the first is an implicit premise in the second.

Consider these examples:

SYLLOGISTIC ENTHYMEME EXAMPLES

1. Humans are animals, so they need food.
2. Humans are fools, so they regret their wasted lives.

Example 1 can be reconstructed as a syllogism, working from the conclusion backward. The conclusion is "So they need food." The "they" is referring back to "humans," so the conclusion is "Humans need food." Is this a "some" or an "all" statement? It is making a universal rule: "*All* humans need food." Remember that we turn the predicate into a class, so we would transform this into "All humans are food needers." Since this is the conclusion, "humans" is the minor term, and "food needers" is the major term. This makes "animals" the middle term. We get one premise above, "Humans are animals," which translates to "All humans are animals." So we have identified one premise and the conclusion:

Premise: All humans are animals.
Conclusion: All humans are food needers.

How do we find the suppressed premise? Recall the work we did on syllogisms identifying *transitivity*. What would it take to connect the two statements?

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Both statements say something about humans. But what is the connection between being an animal and being a food needer? It is not explicit. We have to make it explicit by adding a premise. It would be too weak to say that "Some animals are food needers," so an "all" statement makes more sense. Is it "All animals are food needers" or "All food needers are animals." Well, we should identify that plants are food needers too, even if they eat differently. So we have to say that "All animals are food needers" is the suppressed premise, which turns out to be our *major* premise. The syllogism turns out to be a Barbara figure.

P1: All animals are food needers.
P2: All humans are animals.

C: All humans are food needers.

Example 2 requires even more of our translation skills from the previous units: "*Humans are fools so they regret their wasted lives.*" Immediately you should notice that the syllogism has four terms: "Humans," "fools," "people who waste their lives," and "people who are regretful." The following chart offers interpretations to consider for translating this argument:

Propositions	**Universal interpretations**	**Particular interpretations**
1. Humans are fools.	All humans are fools.	Some humans are fools.
2. Fools waste their lives.	All fools are lifewasters.	(Not possible to be particular.)
3. People who waste their lives regret it.	All lifewasters are regretful people.	Some lifewasters are people who are regretful.
C: So humans regret.	All humans are regretful people.	Some humans are regretful people.

Since it has three premises and four terms, it must be reconstructed as a pair of syllogisms where the conclusion of the first syllogism is a premise in the second (fig. 12.6). The pair could either make a claim about some humans, as in the conclusion of the first interpretation or about all humans, as demonstrated in the second interpretation.

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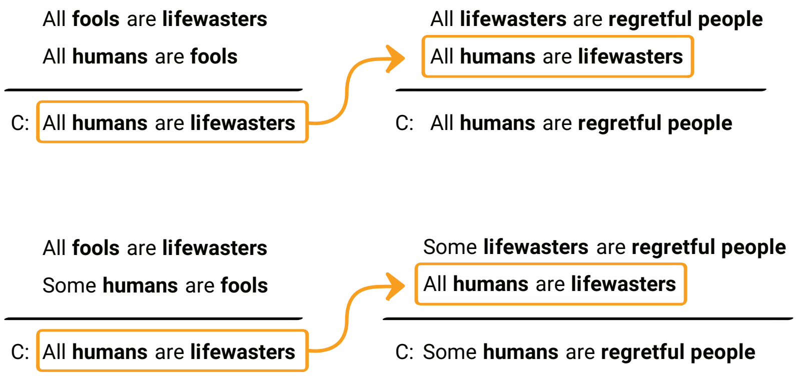

Figure 12.6 In a chained enthymeme the conclusion of one syllogism is a premise of the next. Artwork by Jessica Tang.

Here the conclusion of the first argument, that all (or some) men are lifewasters, forms a premise in the second argument, producing two valid syllogisms chained together to form a larger argument.

12.6 Rules for Using Venn Diagrams to Determine Validity

1. *Identify* the premises and conclusion. Determine that there are two premises and a conclusion. If there appears to be only one premise, then the argument may be an *enthymeme* with an implicit premise, and if there appears to be three premises, the argument may be a **chained enthymeme**, in which two arguments are joined together by an implicit statement that is the conclusion of one argument and a premise in the other.
2. *Identify* the *three* referring terms. The predicate term of the conclusion is the *major* term; the subject term of the conclusion is the *minor* term. The *middle* term appears only in the two premises. If there are four terms, the argument is a *fallacy of ambiguity* (a fallacy of four terms) or a chained enthymeme.
3. *Place* each statement in *standard categorical form* and if you want, you can abbreviate the terms with a capital letter, but you must explain which term corresponds to which letter.
4. Formalize the argument by placing the major premise first. Place the abbreviated version of the minor premise second. Place the conclusion last under the line.
5. Diagram the argument. First, *draw* three intersecting circles, with one on top, and make sure to label them so that the lower left circle is

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labelled with the letter that stands for the *major* term, the top centre circle is labelled with the letter for the *middle* term, and the lower right circle is labelled for the *minor* term. Then *graph* the two premises on the diagram. Use different colours or crosshatching so that you can see each premise independently. *Do not* graph the conclusion. Make sure to graph particular premises by putting the *X* on the line if there is a line dividing the space where the *X* goes. If one side of the line is shaded by the graph of a universal premise, you must move the *X* into the remaining open space.

6. *Test* the argument for validity. *Examine the diagram* you have made. *Look to see* whether the graph for the conclusion is present. If it *is*, the argument is formally valid, if it is not present, the argument is invalid.

KEY TAKEAWAYS

- A syllogism is an argument composed of *three* categorical statements, *two* of which are premises, and the *third* is the conclusion. The three statements jointly contain *three* non-logical terms referring to classes, each appearing in exactly *two* of the statements.
- Major premise: The premise in the syllogism containing the major term (and a middle term). The major premise is always written first.
- Minor premise: The premise in the syllogism containing the minor term (and a middle term). The minor premise is always second.
- The *figure* of a categorical syllogism refers to the four possible arrangements of the middle term.
- When graphing a syllogism, *never graph the conclusion*. Graph both premises and inspect the diagram to see if the conclusion is represented.
- A *syllogistic* enthymeme is either a syllogism missing a premise that is assumed or, in the case of a *chained* enthymeme, a *pair* (or more) of syllogisms in which the unstated conclusion to the first is an implicit premise in the second.

EXERCISES

Part I. Venn Diagram Practice

Put these arguments in *categorical form, and use a Venn diagram to test for validity*.

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1. Sailors are not always swimmers. Swimmers always drink beer. So some sailors don't drink beer.
2. Most high school teachers are 40 years old. Some 40-year-olds are not dope smokers, since high school teachers never smoke dope.
3. Snakes are reptiles, and reptiles lay eggs, so snakes lay eggs.
4. No painters are rational, since no rational being is an artist and painters are artists.
5. Mary is unhappy. Unhappy people are always overworked, so Mary is overworked.

Part II. More Venn Diagram Practice

Use Venn diagrams to determine whether these arguments are valid.

1. People wearing gym shoes are allowed to play in the gym. All the first graders are wearing gym shoes, so they can play in the gym.
2. Only students get a free lunch. Martha is not a student, so Martha cannot eat lunch for free.
3. All vampires drink blood. No living creatures are vampires. (So) Some blood drinkers are not alive.
4. Some dead things have souls, because some vampires have souls and all vampires are dead.
5. Some philosophy classes are very boring, although all Eric's philosophy classes are exciting. So there are philosophy classes not taught be Eric.
6. Not all Canadians know the periodic table of elements, but only people who know the periodic table of elements are scientifically literate, so not all Canadians are scientifically literate.
7. All the reporters at the *Daily Planet* live in Metropolis. Clark Kent is a reporter at the *Daily Planet*, so he lives in Metropolis.
8. All the reporters at the *Daily Planet* live in Metropolis. Lois Lane lives in Metropolis, so Lois Lane is a reporter at the *Daily Planet*.

Part III. Enthymeme Practice

Reconstruct these enthymemes as syllogisms and test for validity.

1. All fish can swim, so trout can swim.
2. The students in philosophy 140 will do badly on the test because they didn't study.
3. Trout are fish, and fish are tasty, so you will like eating trout (treat as two syllogisms where the conclusion of the first is a premise in the second).
4. Some Canadians are not critical thinkers, so don't listen to their opinions.

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PART III

Informal Fallacies

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13

Introduction to Fallacies and Bias

13.1 Introduction to Fallacies

The introduction to this book gave an overview of the role of identifying fallacies for critical thinking, including defining the term "fallacy," which we distinguished from a "falsity." A *proposition* is either true or false, but *arguments* contain *fallacies*. The term "fallacy" is often used in everyday speech to just mean "error" or mistaken beliefs. We will not use it that way. We are identifying fallacies as mistakes in reasoning or inferences. We have already covered deductive fallacies (invalid argument patterns) such as *denying the antecedent* and *affirming the consequent*.

> A fallacy, in the strict sense, is a form of argument that is invalid or else violates a relevance condition.

This part of the book covers *informal reasoning*, so we are now looking at more everyday forms of making arguments. Here we will look at the strengths and weaknesses of patterns and examine the ways they can be misused. So what makes something an *informal fallacy*? Fallacies are specific features of unsuccessful arguments. Fallacies appear in arguments—that is, they appear in the *transition from a set of premises to a conclusion*. There is often more than one way that an argument can go wrong at once. It is rarely so simply separated as many of the examples we show here. We are offering exemplars as diagnostic tools so that you can become a more careful reasoner—identifying both what is wrong and how to fix it.

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Douglas N. Walton, in his *A Pragmatic Theory of Fallacies* (Tuscaloosa: University of Alabama Press, 1995, p. 255), offers five conditions for identifying fallacies:

1. an argument (or at least something that purports to be an argument) that
2. falls short of some standard of correctness,
3. is used in a context of a dialogue,
4. has a semblance of correctness about it, and
5. poses a serious problem to the realization of the goal of the dialogue.

So far we have talked about conditions 1 and 2—that *arguments* have fallacies and fallacies are a problem. But the rest deserve more attention. Condition 3 reminds us that arguments are about trying to convince, thus they are part of an exchange where a conclusion is considered (ideally!). Arguments are public exchanges, governed by rules, intended to establish a truth. But since fallacies are not successful or undermine cogency in some way, we must pay attention to 4. Many fallacious arguments will feel familiar, and *by that very fact*, they might seem convincing. Sometimes fallacious arguments will say true things that are irrelevant to the dialogue at hand, thus distracting the conversation. Either way, the problem with a fallacy isn't always immediately detectible, so we should be looking below our first impressions. Condition 5 tells us that sometimes a fallacious argument, more than even being bad reasoning, is just a roadblock that interrupts the very possibility of getting to the argument we want to make. To a certain extent, one or all these will apply to the fallacies we cover in part 3 of this book.

Remember that critical thinkers have a certain kind of attitude toward belief: They are both open-minded and sceptical. Fallacies usually have a deceptive appearance and pass for good arguments. In fact, we all likely use fallacious forms of argument many times every day. Thus we can all benefit from paying attention to our level of scepticism of what we hear and read. Often we perpetuate fallacies and it causes no damage because, if we were more careful, we could reformulate our arguments in better forms. However, about equally often, the very *thinking* behind our arguments is at fault (our inferences), and the fallaciousness of our arguments can only be removed by rethinking our opinions and correcting our tendencies for sloppy and irrelevant thinking. So the study of fallacies is valuable because it provides us with tools for thinking more coherently and increasing our ability to discover the truth.

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You can find many indexes of fallacies online.[1] There are often various names for the same fallacy—some in English and some in Latin!

While we will cover fallacies and identify them according to specific names, the important bit is to differentiate *the kind of error* in reasoning and *what is wrong with it and why*. Biases also lead us astray from the truth and need to be identified in order to improve our thinking. Often when evaluating the ways in which arguments go wrong, biases and fallacies are both identified. Arguments often have both! However, it is important to find out how fallacies relate to biases.

13.2 Bias and Relativism

The fallacies involving bias might well be called fallacies of *irrelevance*. In each, a different kind of irrelevancy involving bias is introduced in an attempt to obscure the real issue by stirring up our emotions. It is very common for critical thinking texts to focus on the importance of *avoiding bias* and the evils of stereotyping, vested interests, prejudice, and conflicts of interest. The danger of this sort of overemphasis is that these failures of reasoning can be overstated and exaggerated so that students come to believe that *everyone's opinion is equally valid* because we are *all* woefully biased. Often students also jump to the conclusion that simply *criticizing* another's position or argument is a kind of error (because "all opinions are valid"), or that our beliefs are all reducible to claims toward our self-interest (people "believe what they want to believe"), none of which are *remotely true*. So some preventative medicine is called for.

First, let's deal with the claim that "everyone's opinion is valid." We hear this claim a lot, but if we are to understand it, we need significant context. Does this mean that everyone has a political right to free thought? It does seem like we have a right to form our opinions without direct interference from the *government*. But does this mean that all the opinions formed are "valid" in the sense that they all lay claim to truth?

1 https://iep.utm.edu/fallacy/

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If we are talking about truth when saying, "All opinions are valid," the position is called relativism,[2] which the *Stanford Encyclopedia of Philosophy* author Maria Baghramian defines as the following: "Relativism about truth . . . is the claim that what is true for one individual or social group may not be true for another, and there is no context-independent vantage point to adjudicate the matter. What is true or false is always relative to a conceptual, cultural, or linguistic framework."

If the truth is *completely relative*, then there is little point in a book on critical thinking that is trying to offer *better methods* of arriving at the truth. A lot depends on *what* we are investigating. If we mean complex linguistic and spiritual claims embedded in a total way of life, then it might need context for its truth to be understood. But if we mean most of our usual truth claims, such as "Smoking causes cancer," or "Climate change is accelerating" and "The earth is round," the truth of these claims do not vary by culture, language, or location. So this means that there are some truth claims that are not relative or context dependent. Critical thinking is about building a method for finding and justifying truth claims.

So if all truth isn't relative, then we should work on trying to weed out inaccuracies. Let us start with concerns that opinions are biased. We can look directly at the word "bias." It has a neutral origin but is now primarily used in a negative way. The word "bias" starts its life simply as referring to a *diagonal line*, as when cloth is cut "on the bias" (diagonally across the grid made by the threads) and has come to mean *point of view* or *preference* or *attitude toward*. The idea that bias is *bad* creeps into usage because our preferences or attitudes can lead us to deviate from, or outright conflict with, what reason requires. Let us look at an example:

EXAMPLE EXPLORING BIAS: IS BIAS ALWAYS BAD?

Are parents *biased* toward their children? They are typically interested in the welfare of their own children. Some parents treat their own children as exceptions, as though their children deserve special treatment, treatment they do not grant to other children, just because they are *their* children. Think of cutting in line at an amusement park. Parents might believe that their child shouldn't have to wait their turn while others should, or excuse the bad behaviour of their own child but not that of their child's friend. In such a case, they will *both* care about their children

2 https://plato.stanford.edu/entries/relativism/

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> *and* give them unfair preferential treatment. Of course, parents should care about their children; after all, they love them, and their children are deeply dependent on them.

So it is possible to both be "biased" (since parents *care*) and to give unfair preferential treatment. It isn't the bias *per se* that's the issue; it is the unfair preferential treatment. To treat your own children in an *unfairly* preferential way is not an acceptable consequence of parental love. It is wrong not because you are *biased*, but because it is a failure to universalize a simple moral rule: that we should be willing and able to put ourselves in the shoes of others. In other words, you've acted against reason. Any rule that a parent could apply to grant goods to *their* children could be used by any other parent to grant similar goods to *their* children; rules, whether intellectual or moral, apply *universally* or not at all. This is a *fundamental* starting point of critical thinking: don't distort reasoning by using *selective procedures* (i.e., I will apply rules when it works for my interests, not in any consistent way).

> Consider the cognitive bias illusory superiority,[3] where one overestimate's one's good qualities. A species of this is the "Lake Wobegon Effect,"[4] named for a fictional town where all the parents think their children are above average, which, of course, could not be true.

But this is all to point out that the very fact that people have interests, care about *particular* things or people, or have wants and hopes does not imply that people will always reason *badly*, treat others shabbily, or be "biased" in a *bad* sense. Having interests or preferences is not *by itself* bad; what is usually called "bias" in the negative sense is really an intellectual failure to deal properly with one's interests. We all have motives, desires, and preferences, but that doesn't mean every claim we make is woefully biased. To be good critical thinkers, we have to be open to *scrutinizing* the way that biases can distort our thinking, and we need methods for correcting or accounting for bias. One way to do this is to learn about them and remind ourselves and others of them in relevant situations. This is very different than dismissing all opinions as biased.

3 https://en.wikipedia.org/wiki/Illusory_superiority
4 https://en.wikipedia.org/wiki/Lake_Wobegon

The emotions and interests that human beings have provide us with motives for reasoning, and such motives are not *by themselves* sources of rationality or irrationality. And for the critical thinker, the incentives offered by emotion, interests, or hope will not be barriers to critical thinking but only guides for which problems to consider (we are motivated by truth, at least sometimes!). When we undertake a project of critical thinking, we have an aim. The aim is to pursue truth. For this, we need rules of clear thought and good cognitive practice. Selfishness and bigotry—like cheating, lying, and theft—are moral failures involving patterns of irrationality; they are not mere products of interest.

13.3 Stereotyping

Like biases, we are often told that to be a good critical thinker, we need to avoid *stereotyping*. However, when applied to reasoning, stereotyping is an important and powerful method of inference. The word "stereotype" also has a neutral origin and meaning that has become primarily negative. The root of the word lies in a process of manufacturing where one makes a model of something by means of a mould, and the objects produced by the mould *share the shape of the original*. This is a passive transmission of shape from one thing to another.

> Applied to reasoning, *stereotyping* is the kind of inference where we are led to expect that one thing will be like another because it is superficially like it; basically, it is the application of *analogy*.

Stereotyping provides hypotheses for future evaluation and testing. Of course, the dominant use of the word "stereotype" has a negative use that emphasizes the passive and superficial sides of the root meaning. After all, things that have the same shape need not *otherwise* be similar; chocolate coins, for example, are not genuine currency. Stereotyping has come to refer primarily to a settled and prejudicial belief and attitude. But notice again that the problem with stereotyping in this sense is explicitly *cognitive*—it is an error in thinking. The bigot who "stereotypes" others engages in (among other things) shoddy reasoning and holds on to dubious and implausible beliefs in the face of counter-evidence by *avoiding or discounting* available facts—they are ignoring relevant differences and they are not being sensitive to context. These are failures that good critical thinkers should avoid because they tend to produce false beliefs through flawed reasoning. Thus, we should be wary of our tendency to stereotype and be on the lookout for dissimilarities when we are undertaking analogical reasoning.

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In the long run, you are less likely to get what you want when reasoning badly. Correcting for bias, stereotyping, and emotional interference in your thinking will benefit you and others. Having said this much, let us end on a note of caution. None of this is to say that emotions are irrelevant and always lead us away from the truth. To begin, emotions give us information. They aim us at goals and highlight relevant features of a situation. Of course, emotions can make those features seem more important than they actually are and might hold your attention for too long, making you miss other important features of a situation. Add to this that bias can obscure important and relevant features, and it might seem like the goals of critical thinking are out of reach. But we should not despair.

The appropriate critical response to these difficulties is *care*; one steps back, thinks methodically about the whole issue, and attempts to take a more objective consideration of the facts. A useful approach is to shift perspectives. If other parties are affected by the issue, we can ask how the situation would be viewed by each other person involved. Others are similar enough to us such that we can learn from their experience. Indeed, their different interests will highlight different but equally relevant features of the situation in question—they will have a better view of some things, and you will have a better view of some things.

> If there is a purely rational case for intellectual cooperation, it rests in this: *everyone's view of the whole is likely to be partial, and real objectivity requires the contribution of many views*.

Notice how intellectual cooperation is not relativism; this is working together toward a careful consideration of perspectives. The traditional moral vices of pride, greed, and selfishness are barriers to critical thinking because they distort reasoning, and just because (and to the extent that) each person is vulnerable to these vices, good practices of critical thinking require vigilance against their effects. In short, bias is not intrinsically negative, but it does offer dangers, both in the first person and in others, which the critical thinker must solve in order to reason more clearly and well.

KEY TAKEAWAYS

- A fallacy, in the strict sense, is a form of argument that is invalid or else violates a relevance condition.

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- Fallacies appear in arguments—that is, they appear in the *transition from a set of premises to a conclusion* (which can contain a fallacy).
- Walton suggests five features of a fallacy: an argument that falls short of a standard of correctness and is used in the context of a dialogue that has a semblance of correctness about it and poses a serious threat to the realization of the goal of the dialogue (truth-seeking).
- The truth cannot be relative if critical thinking has a point. There is a difference between carefully considering other perspectives and declaring the truth to be relative.
- To be biased is to have a point of view, preference, or attitude. Bad biases are those that embody a preference for unfairness, inaccuracy, or irrationality.
- It is consistent to have emotions and interests and to still be rational and a good critical thinker.
- *Stereotyping* is the kind of inference where we are led to expect that one thing will be like another because it is superficially like it; basically, it is the application of *analogy*.
- Good critical thinkers are sensitive to critical differences, so they avoid the bad use of the term "stereotype."
- Good critical thinkers approach their thinking with clear values (such as the value of consistency), values that do not distort reasoning.

13.4 List of Fallacies Covered

Chapter 14. Fallacies of Ambiguity

Equivocation	*Equivocation* occurs when a key word is used in two or more senses in the same argument, and the apparent success of the argument depends on the shift in meaning. Or, two different words that look or sound the same that may become confused and lead to fallacious inference.
Amphiboly	The fallacy of *amphiboly* is when there is a *structural ambiguity* in the grammar of a sentence that the argument or claim depends on.
Accent	The *fallacy of accent* arises when there is an ambiguity of meaning because it is unclear where the stress should fall in a statement or what tone of voice is intended.
Composition	The *fallacy of composition* is when one argues invalidly from the properties of the parts of a whole to the properties of the whole itself and when one reasons invalidly from properties of a member to properties of a class.

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Division	The *fallacy of division* is when one argues invalidly from the properties of the whole itself to properties of a part and when one reasons invalidly from properties of a class to properties of a member.
Hypostatization	The fallacy of *hypostatization* consists of regarding an abstract word or a metaphor as if it were a concrete one.

Chapter 15. Fallacies of Emotional Bias

Personal attack (*ad hominem*)	An *ad hominem* fallacy occurs when we reject someone's claim or argument simply by attacking the person rather than the person's claim or argument.
Abuse	The fallacy of *abuse* is when name-calling and abusive words are used to direct attention away from the issue at hand and toward those who are arguing.
Poisoning the well	The fallacy of *poisoning the well* occurs when we criticize a person's *motivation* for offering a particular argument or claim rather than examining the worth of the argument or claim itself.
***Tu quoque* ("Look who's talking")**	In the fallacy of *tu quoque*, a person is charged with acting in a manner that is incompatible with the position he or she is arguing for.
Mob appeal	*Mob appeal* or *argumentum ad populum* can be described as attempting to sway belief with an appeal to our emotions, using theatrical language, or appealing to group-based or special interests.
Appeal to pity (*argumentum ad misericordiam*)	The fallacy of *appeal to pity* occurs when an arguer attempts to evoke feelings of pity or compassion in order to cause their dialogue partner to assent to their claim.
Appeal to force or fear (*argumentum ad baculum*)	The *appeal to force or fear* consists of the use of threats of force or unfortunate consequences to cause acceptance of a conclusion.
Two wrongs make a right	In *two wrongs make a right*, the arguer attempts to justify their claim or behaviour by asserting that the person they are trying to convince would do the same thing.

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Chapter 16. Fallacies of Expertise

Appeal to authority	The *appeal to authority* is a fallacy where we take something as fact *just because an expert claims it to be true* (without supporting considerations about their expertise and how that relates to their claim).
Snob appeal	The fallacy of *snob appeal* tries to motivate belief by saying that if the dialogue partner supports this claim, they will be a part of an exclusive and thus superior group.
Appeal to tradition	In the fallacy of the appeal to tradition, the fact that a social or cultural practice has been done a certain way in the past is taken to be reason for it to be done in the future.
Appeal to nature	In the fallacy of the *appeal to nature*, one argues that if something occurs in nature it is good, and if it is unnatural it is bad.
Appeal to anonymous authority	In the *appeal to anonymous authority*, claims are asserted on the basis of being held by an authority that is not clarified or given.
Appeal to ignorance	In the *appeal to ignorance*, one takes the failure to disprove a claim as an adequate reason to take the claim seriously. It inappropriately argues that negative evidence can prove a positive claim.

Chapter 17. Fallacies of Distorting the Facts

False analogy	The fallacy of *false analogy* is the comparison of two things that are only *superficially similar*, or that even if they are very similar are *not similar in the relevant respect*.
False cause (family)	The fallacy of *false cause* is actually a family of related fallacies that occur when an arguer gives *insufficient evidence* for a claim that one thing is the *cause* of another.
Post hoc, ergo propter hoc	*Post hoc, ergo propter hoc* is Latin for "after this therefore because of this." This fallacy occurs when we assume, without adequate reason, that one event *B* was caused by another event *A* because *B* happened *after A*.
Mere correlation	With *mere correlation*, we assume that *B* was caused by *A merely* because of a *positive correlation* between *A* and *B*.

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Reversing cause and effect — With *reversing cause and effect*, we conclude that *A* causes *B* when *B* causes *A*, so there is a causal connection but not the connection we believe.

Spurious correlation — In *spurious correlation*, we conclude that *A* is the cause of *C*, when in fact both *A* and *C* are the effects of some event cause *B*.

Slippery slope (wedge) argument — In this fallacy of *slippery slope*, a person asserts that some event or consequence must inevitably follow from another without any argument for the inevitability of the event in question.

Irrelevant thesis (*ignoratio elenchi*) — In the fallacy of *irrelevant thesis*, an arguer attempts to sidetrack his or her audience by raising an irrelevant issue and then claiming that the original issues has been effectively settled by the diversion. In short, the attempt is made to prove a thesis other than the one at issue.

Chapter 18. Fallacies of Presumption

Sweeping generalization (fallacy of accident) — The fallacy of *sweeping generalization* is committed when an argument that depends on the application of a generalization or rule to a particular case is *improper* because a *special circumstance* (accident) makes the rule inapplicable to that particular case.

Hasty generalization (converse accident) — The fallacy of *hasty generalization* is committed when an argument that develops a general rule does so in an *improper* way because it reasons from a special case (accident) to a general rule.

Bifurcation — The fallacy of *bifurcation* is when an arguer treats a distinction of classification as exclusive and exhaustive of the possibilities, when in fact other alternatives exist. In this fallacy, one confuses *contraries* with *contradictories*.

Chapter 19. Fallacies of Evading the Facts

Straw person — In the case of the *straw person fallacy*, an arguer constructs their dialogue partner's view out of "straw" (to make it easy to knock down), which effectively creates a new person, the "straw person" who is refuted (rather than the original dialogue partner).

Begging the question — The fallacy of *begging the question* is assuming what you intend to prove or should be proving. It is a failure of the support relationship.

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Question-begging epithets	*Question-begging epithets* uses slanted language that is question begging because it implies what we wish to prove but have not yet proved.
Complex question	The *fallacy of complex question* is when the arguer asks a question that presupposes the truth of the question at issue.
Special pleading	*Special pleading* is when we use slanted or loaded language for others, but when describing ourselves we use neutral or positive language.

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14

Fallacies of Ambiguity

14.1 Introduction to Fallacies of Ambiguity

In part 1 of this book, we discussed in depth how important it is to have clear definitions for rational arguments. Language maps the kinds of things we talk about, and to reason about the world, we need a precise map. In order to avoid talking past each other and other issues, **ambiguity** of one's ideas and terms must be addressed. Often, just by the nature of the language and phrases we use, ambiguity is present.

> Ambiguity is the condition of having more than one interpretation or meaning.

When an expression or set of words is ambiguous, it can be used to convey more than one meaning, which means the others participating in a dialogue do not have a way of knowing which meaning is intended. All parties must use the same terms in the same ways for an argument to work. One resolves ambiguity either by adding background information that rules out all meanings except the intended one or by using a different phrase that lacks the ambiguity in question.

> Fallacies of ambiguity are invalid because they contain words or phrases that can be understood in more than one way.

There are two *basic* ways in which ambiguity can arise in language. The first is *lexical* ambiguity or *equivocation*, in which a word or phrase has more than

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one definition and so can be understood in more than one way. Alternatively, two different words that look or sound the same may become confused and lead to fallacious inference. The second basic way ambiguity can arise is *structural* ambiguity or *amphiboly*, in which a string of words in a sentence have more than one legitimate grammatical interpretation and so can be understood in more than one way. Ambiguity can also creep into our language in terms of describing the kinds of things we are talking about and how we talk about them. We will examine six fallacies of ambiguity: the fallacies of *equivocation*, *amphiboly*, *accent*, *composition*, *division*, and *hypostatization*.

14.2 Equivocation

The fallacy of *equivocation* is due to *lexical ambiguity*. This means there is ambiguity about the meaning of a word or words. If we break down "equivocation" to its Latin roots, there's "equi/voc/at/ion," which is a noun that means speaking out equally or twice. Language is constantly changing, so it is important to check in on the meaning of words in our shared lexicon (meaning our vocabulary, which can be related to a person, a place, or a specific domain of knowledge or work).

> *Equivocation* occurs in two main ways: When a key word is used in two or more senses in the same argument and the apparent success of the argument depends on the shift in meaning. Or, when two different words that look or sound the same may become confused and lead to fallacious inference (fig. 14.1).

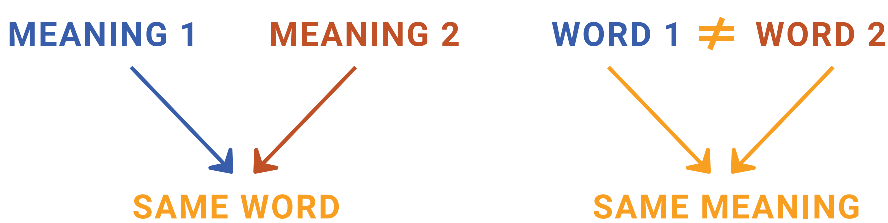

Figure 14.1 Two forms of equivocation. Artwork by Jessica Tang.

Before we get further into equivocation, we should briefly review syllogisms (covered in part 2, Chapter 8). A syllogism is a very general argument pattern that involves two premises, a conclusion, and three terms. There are many varieties of the syllogism pattern.

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EXAMPLES OF SYLLOGISMS

1. "Older than" syllogism	**2. Syllogism of containment**	**3. "Greater than" syllogism**
Hanna is older than Nasim. Nasim is older than Joe. ___________ Hanna is older than Joe.	Regina is in Saskatchewan. Saskatchewan is in Canada. ___________ Regina is in Canada.	Nine is greater than seven. Seven is greater than four. ___________ Nine is greater than four.

By now, you should be able to see that these arguments are valid. That is to say, if the premises are true, then the conclusion must also be true. What makes them valid? They have four common features that make them valid:

1. In each line, there are *two terms connected by a relation* (e.g., in the first one, the terms "Hanna" and "Nasim" are connected by the relation "____ is older than ____").
2. The two premises *share a "middle term"*: for example, in the first one, "Nasim" appears in both premises.
3. The relation is *transitive*. Transitivity is an ordering relation. A transitive relation, *R*, has the property that for every three things *a*, *b*, and *c*, to which *R* applies if *a is R to b* and *b is R to c*, then *a is R to c*.
4. Finally, the three terms are in the right places in the relation to make the conclusion valid.

We have reviewed how syllogistic arguments depend on transitivity in order to introduce a syllogistic fallacy of ambiguity, called the *fallacy of four terms*. What happens with equivocation is that a syllogism will look like it has three terms, but it will actually have four. Now if a syllogism uses a term equivocally or in two different senses, it can look valid. Consider the following example:

The argument:	**Looks like this:**	**But is really this:**
Only man is rational.	Only *A*s are *B*s.	Only *A*s are *B*s.
<u>No woman is a man.</u>	<u>No *C* is an *A*</u>.	<u>No *C* is a *D*</u>.
∴ No woman is rational.	∴ No *C* is a *B*.	∴ No *C* is a *B*.

The first premise says that only *A*s are *B*s (which is the same as saying that *if something is a B, then it is an A*), and the second premise says that no *C*

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is an A (which is the same as saying that *if something is a C, then it is not an A*); from these premises, it does follow logically that no C is a B. But since the two instances of "man" represent different terms in the two premises, we really have four terms A, B, C, and D and thus no middle term to tie the two premises together in a way that could support the conclusion.

A way to think about equivocation is that it *blocks transitivity*. If we are to take the premises seriously in this argument, the word "man" must mean *human being* in the first premise and *male* in the second. In short, although the two uses of "man" *look the same*, they are really different terms with different meanings. But the conclusion only follows from the premises if "man" is a single term having the same meaning in both premises so that it can tie them together.

We are hoping that no one would take such an argument seriously. The equivocation on the word "man" is obvious. And we hope no one would be deceived by an equivocation on the word "bank" (for example, in the phrases "bank of commerce" and "river bank"), since the two meanings are completely different. However, most words in the English language have more than one meaning, and in many cases, the meanings are closely related enough that it is easy to use them equivocally. Equivocation is especially likely when a key term in an argument is a *figure of speech*, a *theoretical term*, or a *metaphor*, and since many terms in our language are dead or dying metaphors, equivocation is a fairly common fallacy.

EXAMPLES OF EQUIVOCATION

1. The public is interested in choosing their own doctor, therefore it is in the public interest that people get to choose their own doctor.
2. Knowledge is power, and power corrupts, therefore knowledge corrupts.
3. The end of a thing is its purpose; death is the end of a thing, therefore death is the purpose of life.
4. "Sugar is an essential component to the human body" (an ad for sugar).
5. "Ask not what your country can do for you, but ask what you can do for your country" (John F. Kennedy [JFK]).

Example 1 shifts the meaning of "public interest." The phrase often means something like *public welfare*; it also often means *what the public desires*, and even *what the public takes an interest in*. Clearly something could be in the public interest in one of these senses without being in the public interest in

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either of the others. Indeed, the questions "What are various sense of 'public interest'?" and "How they are related?" are complex, subtle, and require study. Such questions constitute an important part of the subject matter of political studies. But here we can understand that just because it is *of interest* to the public doesn't mean it is in the public's *best* interest. There might be good reasons to allow people to choose their own doctor, but this isn't justified by the very fact that it is *of interest* to the public. The workings of the public health care system have many competing interests and organizational structures to balance, one of which is public interest.

Example 2 uses "power" in ambiguous ways. Knowledge is power means that if you know more things, you have increased abilities in some domains (fig. 14.2). Is "increased power in some domains" the way that "power" is used in "power corrupts"? No. In the second sense, they mean something more like unchecked force or sovereign power. It is hard to clarify exactly how power is being used in both senses, but it is clear that the argument makes a serious mistake by concluding that knowledge is corrupting.

Example 3 uses "end" in two ways that are related, but only loosely. First, "end" is used in an ordinary way meaning the conclusion or ceasing to be of something. This is the sense of "death is the end of life." But the second sense of "end" used in "the end of a thing is its purpose" refers to the use of "end" in the phrase "the ends justify the means." This sense of "end" is unlike the sense of "end" used in terms of "the end" that shows on the screen at "the end" of a movie. Death is "the end" in that sense, but it is not clear that is is "the end" of life in the sense of its purpose. In fact, it is not at all clear that life has a purpose in that sense.

Example 4 uses "sugar" to mean both blood glucose and the refined commodity used in baking, tea, and so on. Here we might respond, "I know my body needs glucose to function, but that doesn't mean I need literal sugar to function." Example 5 shifts meaning for the term "country." In one sense, it means government: "Ask not what your country can do for you." And in another sense, it means nation, homeland, or community: "but what you can do for your country." J.F.K. was not asking people to work for free for the government; he was asking people to orient themselves toward helping their communities

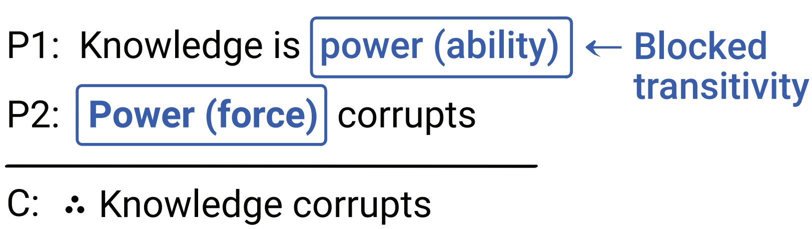

Figure 14.2 Equivocation. Artwork by Jessica Tang.

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rather than asking the government to help them. This is also a fallacy of *bifurcation*, which we discuss in Chapter 18.

Another kind of equivocation comes from the misuse of *relative terms*, which have different meanings in different contexts. The word "tall" is a relative term in the sense that a tall man and a tall building are tall relative to different tallness measures. A tall man is a man who is *tall for a man*, whereas a tall building is a building that is *tall for a building*. Forms of argument that are valid for nonrelative terms may be invalid for relative terms. Thus "An elephant is an animal, therefore a gray elephant is a gray animal" is valid, but "An elephant is an animal, therefore a small elephant is a small animal" is invalid. This is because when we use the word "gray" about animals, it picks out pretty much the same range of tones (indeed colour terms are typically like this); size terms however pick out different ranges of size for different animals, since the normal size of an animal *depends on what kind of animal it is*. Actually, it is not always easy to tell when a term has a relative use (for example, we use the term "red" for a range of natural hair colours that lie completely outside of the usual range of "red"); we have to think about whether we are using the word in the same way across different cases. No one would be taken in by the argument about small elephants, as everyone knows that an elephant is not a small animal, but there are relative terms that can be used equivocally without obvious error. Words like "good," "fun," or "hot" (as advertisers use them) are especially easy to misuse because they are used in so many different but *contextually relative* ways that it is often easy to use them equivocally without noticing that one is doing so. Consider the example of labels reading "Light Olive Oil." What is light about it?

14.3 Amphiboly

Not only can there be issues with the meaning of words, but there can be issues with the sentence construction itself in conveying meaning. We discussed in the introduction of this book that linguistic mastery is essential for reasoning since a lot of reasoning deals with tracing the consequences of our mastery of language—what follows from what has already been said or written? When we assert beliefs using statements, we must do so in a way that conveys meaning to those with whom we are dialoguing. This means, among other things, constructing grammatically correct sentences. If we don't, we have a lexical ambiguity (like equivocation), but one that instead arises from a structural ambiguity.

> The fallacy of *amphiboly* is when there is a *structural ambiguity* in the grammar of a sentence that the argument or claim depends on.

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Structural ambiguity is usually due to poor grammatical construction. The rules of grammar typically work to determine a single meaning from a well-formed linguistic string—at least they do in the absence of background information that may overrule that interpretation. A statement is amphibolous when its meaning is unclear because of the loose or awkward way in which its words are combined, or because insufficient contextual information is supplied to decide which meaning is intended. Amphiboly is especially common in advertisements and news writing. Consider the following three sentences:

EXAMPLES OF AMPHIBOLY

1. Clean and decent dancing, every night except Sunday (pub sign).
2. We dispense with accuracy (druggist's sign).
3. Killer says dead man was chasing him with drawn razor (headline).

In these three sentences, it is possible to find an *unintended meaning* as well as the intended meaning because of sloppy sentence construction. The rules of grammar weakly suggest that the unintended meaning is the correct one. Thus the pub sign suggests that the dancing on Sunday is indecent rather than that there is no dancing, which it obviously actually means. The druggist's sign can be read to mean either that accuracy is *dispensed with* (or done without) or that drugs are dispensed accurately; clearly the second meaning is the intended one. And of course, dead men cannot chase people, even though that is what the rules of grammar suggests. These three cases are examples where the rules of grammar suggest one meaning but our background knowledge overrules that meaning. Each of these sentences could be rephrased so that the unintended meaning could be ruled out.

Now consider these sentences:

MORE EXAMPLES OF AMPHIBOLY

4. I heard about them at the bar.
5. The children were eating good cake and candy.
6. Mary and Frieda are visiting doctors.

In these three cases, one simply cannot tell the meaning without added information. We need more information even to know how the parts of the sentence fit together properly. Thus in sentence 4, we don't know whether "at the bar" refers to the place where the speaker was when the speaker heard about *them* or where *they* were: Was *I* at the bar that I heard about them, or did I hear about what they did while *they* were at the bar?

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In sentence 5, we don't know whether it was *candy and good cake* that the children were eating, or whether *both the cake and candy were good*.

The explanation for this is quite straightforward. There is a rule in English grammar that says we can delete unnecessary words, and the sentence in 5 can be produced from that rule. Consider:

5a. The children were eating good cake and eating good candy.

By first deleting the second instance of "eating," we get

5b. The children were eating good cake and good candy.

And then by deleting the second instance of "good," we get

5. The children were eating good cake and candy.

But sentence 5 can also be produced by that rule from

5c. The children were eating good cake and eating candy.

The list goes on. The idea is that every time we delete words, we open the possibility that there will be ambiguous references amongst the elements of a sentence.

In sentence 6, the sentence either tells us that Mary and Frieda are doctors who are visiting *or* that they have gone to visit doctors. We need more information, for example, that "Mary and Frieda were not at the party that night. They were visiting doctors."

These cases show a *deep fact* about language, which we explore throughout this course—*that language comprehension is a knowledge-based process*.

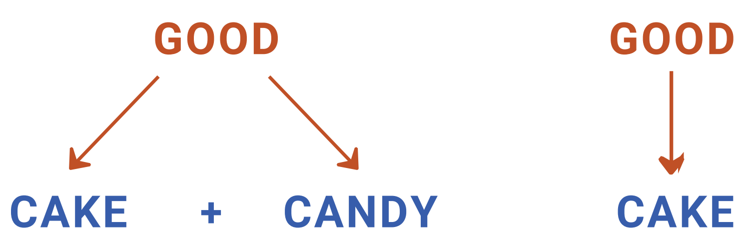

Figure 14.3 Example of lexical ambiguity. Artwork by Jessica Tang.

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Merely knowing the meaning of words is not enough; we typically need knowledge of the world (of what is being talked about) in order to process a sentence grammatically to understand what is said. In fact, the two versions of "Mary and Frieda are visiting doctors" are really two different sentences with different grammatical structures that have the same surface appearance. It all depends on whether "visiting" is an adjective that modifies "doctor" or a verb telling us what Mary and Frieda are doing. Consider two more sentences:

MORE EXAMPLES OF AMPHIBOLY

7. Bill became disgusted with Fred at Mary's party, so *he* went home in a funk.
8. Launching the ship with impressive ceremony, the admiral's daughter smashed a bottle of champagne over her stern as she slid gracefully down the slipway.

In 7, we have another kind of structural ambiguity that is called *ambiguity of cross-reference*. This occurs when a referring phrase refers back to something mentioned in the sentence, but it isn't clear to what. To see that it is ambiguous, it is only necessary to see that the statement could be an answer either to the question "Why did Fred leave?" or the question "Why did Bill leave?" (fig. 14.4).

In example 8, while we know perfectly well what the speaker intends to say, the rules of grammar that we intuitively apply to the sentence suggest another reading; normally the word "her" in a sentence refers back to the nearest linguistically female object (in the sentence above, that would be the *admiral's daughter*, not the ship). In this case, there is a mismatch between what the speaker *intends* to say and what grammar dictates.

Simple arguments that are amphibolous usually fool no one; they are simply funny or confusing. In speech situations, the speaker can wave her hands, point to things, and fix meaning in various non-linguistic ways, and the hearer can always ask the speaker what she means. But in writing, these opportunities to clarify meaning are not available, and so ambiguity in writing is a genuine and continuing danger. Amphiboly is most dangerous to understanding in extended passages of exposition or argument. Five or six sentences taken together may contain so much structural ambiguity that a reader doesn't know what the writer means at all. This is unfortunately a common failing in student essays, and it is difficult to avoid because the author knows what she means, and it may not occur to her that grammar tells the innocent reader something else. There is only one sure way to avoid this problem. It is to construct each

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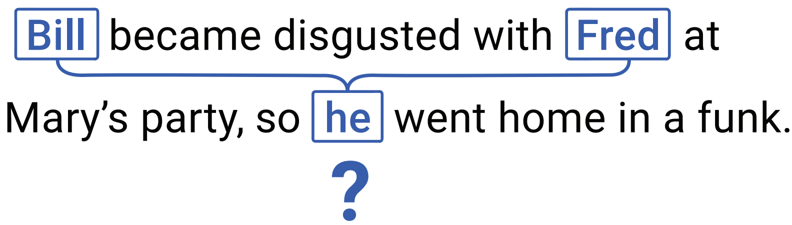

Figure 14.4 Example of the ambiguity of cross-reference. Artwork by Jessica Tang.

sentence with care and to make sure that enough context is provided to rule out all possible, or at least all the likely, unintended interpretations.

14.4 Fallacy of Accent

A speaker's tone of voice often conveys important information about background assumptions that the speaker makes and thus against which the meaning of an utterance is to be understood.

> The *fallacy of accent* arises when there is an ambiguity of meaning because it is unclear where the stress should fall in a statement, or what tone of voice is intended.

Since tone of voice cannot be conveyed directly in writing, we need to find other ways to convey what the underlying assumptions are. Consider, for example, the difference accent makes in the following statements:

1. Did *you* steal the butter? (Assumption: *Someone* stole the butter.)
2. Did you *steal* the butter? (Assumption: You acquired it *somehow*.)
3. Did you steal the *butter*? (Assumption: You stole *something*.)

In sentence 1, the accent on "you" in the question suggests that the speaker believes that *someone* stole the butter and is asking you for the information of whether that someone is you. In sentence 2, the speaker presumably believes that you have acquired the butter by some means and is asking you whether you stole it as opposed to, say, bought it. In sentence 3, it appears that the speaker believes or presumes that you have stolen something and wants to know whether it was butter that you stole (perhaps with the implied expression of astonishment that if you were going to steal something, why didn't you steal something valuable, say, a stereo system, instead).

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These examples reveal something about important about communication. Remember that a statement is the use of a sentence to make a claim that can be true or false. So a statement is a public vehicle for expressing beliefs and making claims. But communication, whether it takes the form of argument or merely conversation, is more than just the making of claims that express beliefs. It's a social process in which persons engage in a give and take of asking or answering questions, making assertions, and responding to one another.

There are two quite different ways in which conversations are more complicated than just claim-making. *First*, people can discuss topics and situations that they don't think are actually real: they can discuss imaginary situations or situations that could have been real had some event in the past been different; they can discuss future events that have not and may never come to pass. In short, human beings can think and talk about a vastly larger range of possibilities than those that are believed to be actual. They can also disagree deeply about what the actual facts are, and so a conversation may often have the form of asking which of several possible situations the actual one is. Human beings live in a sea of possibilities that extend beyond the actual, partly because they can imagine things being different than they are and partly because, being ignorant of the truth, they must attempt to determine which possibilities are more likely to be true.

The *second* important way in which communication is more complicated than simple claim-making rests on the fact that, to a large degree, people understand the world by way of stories, narratives, scenarios, and scripts. A story organizes a set of claims, real or hypothetical, into a structure that makes sense in terms of normal human interests and concerns. We live largely in a human-centred world, in which our beliefs and indeed the very words we know refer us to ways of living with which we are familiar. Let us give you an example.

We tell you that Joe went to Wendy's and had a burger. You have no trouble understanding that Wendy's is the name of a restaurant, that Joe is someone we know, and that people typically go to restaurants to purchase and eat food. And so given your background knowledge of "what one does at a restaurant," you interpret my statement as telling you that a person named Joe went to a particular restaurant because he was hungry and ordered and ate and paid for a burger. And of course, you know what a burger is, and so on. However, if you knew in addition that Joe had a friend named Wendy with whom he sometimes ate, you might be unsure of whether Joe went to Wendy's, the restaurant, or to Wendy's home to eat.

Part of the reason that you make these background assumptions is that human beings are creatures that periodically need food; we live in a culture

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in which food can be purchased at restaurants; people often go to restaurants, and on and on. All this background knowledge gives you the resources to understand the point and significance of a great variety of human stories.

If we told you instead that Joe went to Wendy's and had a baby, you would bring different knowledge structures or scripts to bear. "Had a baby" means "*gave birth to* a baby." People do not give birth to babies at restaurants, except by accident in very unusual circumstances. You will take "Joe" to refer to the person who gave birth, and so on. As a result of this, the meaning that a sentence has in an argument or conversation is more finely grained than the fact or proposition to which it refers.

The factual meaning of a statement plays a certain role in the story or narrative that is being told. Because you have a general sense of how narratives unfold, you will know what questions to ask regarding a situation under discussion and how to interpret the answers. Although these two dimensions of conversation are quite different, in practice we understand the meanings of utterances made in conversation in the same ways. We recognize certain cues as imposing constraints on what sorts of information is relevant to the conversation, and we can make these constraints explicit by laying out certain statements as relevant background information or presuppositions of the conversation. If our knowledge of the presuppositions is not adequate to determine what is meant, we ask questions. The questions we ask will themselves presuppose some background assumptions, and the answers we receive will fill out the background assumptions we need to know to see how the person with whom we are talking envisions the situation under discussion. We can put the point simply by saying that facts by themselves are inadequate; they provide information only as *answers to questions*.

To return to the three sentences we began with, the claim "I stole the butter" provides quite different information depending on which question was asked. In response to question 1, it provides the information that it was I who stole the butter; in response to question 2, it provides the information that it was by theft that I acquired the butter; and in response to question 3, it says what it was that I stole: butter.

The misuse of accent can often deceive, as is the case when someone tells a woman that her husband wasn't out with *Betty* last night (in the attempt to lead her to believe that her husband was out with some *other* woman), or when a child tells his father that he only ate *some* of the cookies in the package when he ate all but one.

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A fallacy of accent rests upon mistaking the intended accent of a premise and thereby deriving a conclusion incompatible with the intent of the premise.

Fallacies of accent are often used by newspaper writers who deliberately take quotations out of context to distort their meaning or write in large headlines "Revolution in France," and then in smaller type "Feared by Authorities If Inflation Continues to Rise." Movie magazines and supermarket tabloids are common places to find examples of abuse of accent.

EXAMPLES OF THE FALLACY OF ACCENT

1. *Who was Frankie seen with at the Gilded Nickel while wife Lona cries at home?*
2. The commandment says, "Thou shalt not covet thy neighbour's wife," so men should only covet wives of those living outside the neighbourhood.

Example 1 requires a lot of questions, the first of which is, What facts can be ascertained from the question? What do we actually know about Frankie and Lona? Not much, though we might feel like we do from how the question implies a story. It might imply there's an affair going on, but we don't know that. Consider that it could be the case that Lona asked Frankie to pick up a friend at the Gilded Nickel. While picking up the friend at the Gilded Nickel, Frankie and the friend are seen. At the same time, Lona is at home preparing dinner, cutting onions that make her cry as a result.

Example 2 is making a similar mistake in drawing a conclusion. It understands the issue with coveting to be about it being the *neighbour's* wife, not that it is *anyone outside of the marriage* at all.

Although the fallacy of accent is connected with distortion, it reveals something important about the way language works. Language comprehension is deeply dependent upon background information. We are active seekers for information that will confirm or disconfirm our hypotheses. To understand what people say, we need to see their sentences as part of structured conversations that presuppose both shared information between speaker and hearer and shared interpretations of that information. Writing is more anonymous than speaking, and the author loses control of the context. People who write for a living are very familiar with the need to set a context for the reader and know that the reader cannot know what is being talked

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about without this help. The lesson for critical thinking is this: when you write about a subject, you need to give the reader clear cues about the assumptions that you are making.

14.5 Fallacy of Composition

The fallacies of *composition* and *division* are closely related to each other, fallacies of division being the reverse of those of composition. These two fallacies are fallacies of ambiguity because they draw conclusions through ambiguous relations between parts and wholes. We often do reason from parts to wholes or from wholes to parts, but everything depends on the kind of thing we are reasoning about. We will look at fallacies of *composition* first. The term "fallacy of composition" is applied to *two* related types of invalid argument.

> The *fallacy of composition* is when one argues invalidly from the properties of the parts of a whole to the properties of the whole itself, and when one reasons invalidly from properties of a member to properties of a class.

In the *first*, one reasons fallaciously from the *properties of the parts of a whole* to the *properties of the whole* itself. For example, from the fact that every part of a machine is light, it does not follow that the machine is light. Of course, such a machine will be lighter than a similar one made of heavy parts, but the machine may be composed of a great many parts and so be very heavy. Similarly from the fact that every sentence in a book is well written, it does not follow that the book is well written. Such patterns are not always fallacious; some properties have what is called *compositional heredity*.

> A property *F* is *compositionally hereditary* with regard to a whole if and only if when every part of the whole has property *F*, then the whole does as well.

But whether a property has compositional heredity depends on what *kind of property* it is. Thus if *all* the parts of a machine are *made of iron*, then the whole machine is also made of iron. The property of *being iron* is, so to speak, an *absolute* property of a thing, and *its attribution to a thing is context independent*: if all its parts have that property the whole does as well. By contrast, the property of *being heavy* is a *relative* property. When we judge that something

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is heavy, we take that thing to be *heavy for an object of that kind (i.e., in relation to other objects of that kind)*. We saw in the discussion of relative terms, as used in a syllogism in Chapter 8, that a light elephant (which is light for an elephant) is not light *for an animal*, as even a very light elephant is heavy compared to many other animals. The class of comparison for a relative term typically varies from part to whole, so a relative term will not generally have compositional heredity. Consider the following fallacious inference regarding a hockey team: "Every player on the team is a superstar and a great player, so the team is a great team." The term "great" is a relative term, and so its application is dependent upon the context given by the comparison class. Consider the features that make a player great (relative to other players), and compare that with the features that make a team great—there is no need to think that if a set of players have great-making characteristics for an individual player they will form a team that has great-making characteristics for a team. A team must, for example, have players whose skills complement and balance those of other players; a team composed entirely of terrific goaltenders will not be a good team (fig. 14.5).

In the *second* type of fallacy of composition, one reasons incorrectly from the *properties possessed by the individual members of a class or collection* to the *properties possessed by the class or collection* itself. When we talk about the properties of collections or groups, we do so in two quite different ways that are not marked by a difference in grammar. There is no grammatical difference between "Dogs are mammals" and "Dogs are variable in size," but the properties of *being a mammal* and *being variable in size* are attributed to the class of dogs in quite different ways.

The members of a class can, as a class, have properties *distributively* (so that *each member* of the class has that property—i.e., *every* dog is a mammal).

Or:

The members of a class can, as a class, have properties *collectively* (so that the class as a whole has that property but not its members—dogs do *not* individually have the property of being variable in size).

Again, in "Rodents have four feet," we predicate the property of having four feet to rodents distributively (each rodent has four feet), but in "Rodents are widely distributed over the earth," we predicate the property of being widely distributed over the earth to rodents collectively. We certainly do not intend to say that each

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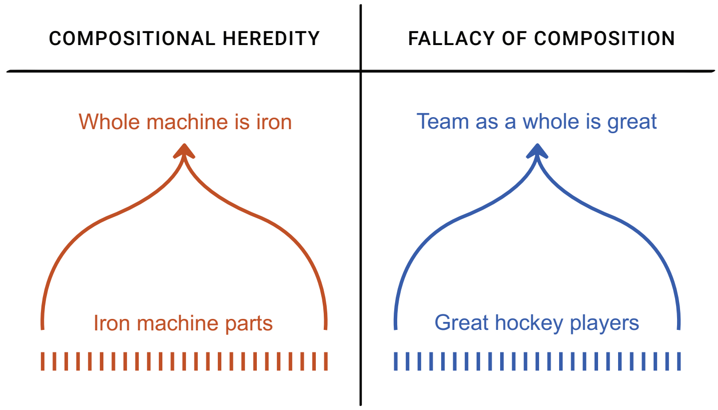

Figure 14.5 Example of compositional heredity (iron) and the fallacy of composition (greatness). Artwork by Jessica Tang.

and every rodent is widely distributed over the earth. This gives us a kind of test for distinguishing the two uses. Can we preserve the truth of the sentence if we replace the general term (applying to the whole class) by a phrase referring to each and every member of that class? For example, in "Cows are mammals," we can say "Each and every cow is a mammal" and say the same thing so the property of being a mammal is predicated of the class of cows distributively. But in "Cows are found in many countries," we cannot say "Each and every cow is found in many countries" and say the same thing because the predicate applies to the class of cows collectively only. The fallacies of composition and division involve ambiguity in the way predicates apply to general terms. Consider an example:

P1: Atoms are so small they are invisible.
P2: My arm is composed of atoms.

C: So my arm (is so small it) is invisible.

This foolish argument commits the fallacy of composition. It assumes that a predicate (is so small that it is invisible) that applies to a subject *distributively* (each and every) applies *collectively (all the atoms in my arm)*.

14.6 Fallacy of Division

The phrase "fallacy of division" is also applied to two related types of fallacious arguments that are the reverse of the two above. The *first* kind consists of reasoning invalidly from the *properties of a whole* to the *properties of its parts*.

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The *fallacy of division* is when one argues invalidly from the properties of the whole itself to properties of a part, and when one reasons invalidly from properties of a class to properties of a member.

"Exxon is a very important company, and Bill Speed is an official at Exxon, therefore Bill Speed is very important" is an instance of the fallacy of division.

A property *F* is *divisionally hereditary* with respect to some whole if and only if whenever the whole has property *F*, then its parts do as well.

We should note that there are special self-referential properties that are context independent but are not compositionally or divisionally hereditary. For example, every part of some whole *X* has the property of *being a part of X*, but *X* doesn't have this property. And similarly, every whole *X* has the property of *being the whole of X*, and no part of *X* has that property.

None of this discussion of fallacies of division and composition should lead anyone to believe that the part/whole relationship is easy to decipher. Philosophers have an area of philosophy dedicated to the metaphysics and ontology of parts and wholes called mereology.[1] If you are interested in how parts are determined or if wholes are the sum of their parts, maybe you are interested in mereology!

The *second* kind of fallacy of division consists in reasoning from the *properties of a class or collection of things* to the *properties the members of that class or collection*. Reasoning from "This vase is part of a very valuable collection of antiques" to "This vase is very valuable" is an example of that fallacy. Obviously, a collection can be made valuable by having a few very valuable members together with a large number of members of moderate value. Reasoning from "Dogs are common, and Japanese Spaniels are dogs" to "Japanese Spaniels are common" is equally fallacious, as the property of *being common* is true of dogs only as a class or collectively and does not imply that every (kind of) dog is common (fig. 14.6). The old riddle "Why do white sheep eat more than black sheep?" turns

1 https://plato.stanford.edu/entries/mereology/

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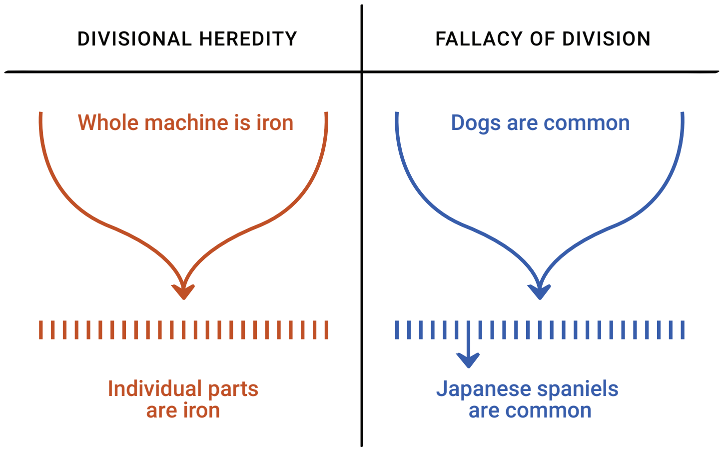

Figure 14.6 Example of divisional heredity (iron) and the fallacy of division (commonness). Artwork by Jessica Tang.

on a fallacy of division. The answer, "Because there are more of them," treats collectively what seemed to be referred to distributively in the question. The fallacy of division consists in assuming (wrongly) that a predicate that applies collectively must also apply distributively.

Here are two examples:

P1: The people in this class are half female.
P2: Jack is in this class.
∴ Jack is half female.

Here the predicate "is half female" is predicated on the members of the class collectively, not distributively (it is not true that each and every member of the class is half female!). This might seem silly, but statistical reasoning is often flawed in just this way. Consider this example:

P1: University graduates make 70 percent more per year than non-graduates.
P2: Kofi is a university graduate.
∴ Kofi makes 70 percent more per year than non-university graduates.

The problem with this reasoning is that averages are made up of a wide variety of individuals, thus we cannot "divide" the average onto particular individuals. We need to pay attention to the relevant features of the individual that differentiate their place in the group. For example, Bill Gates (billionaire

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inventor of Microsoft) does not have a college degree, and it isn't uncommon to meet a barista with a college degree averaging a yearly income of about $30,000 CAD/year. What these outliers suggest is the heterogeneity of members in a group, thus a group property cannot be divided onto individual members. And in our example above, we have no reason to believe Kofi makes 70 percent more than non-college grads by the very fact of what the average college grad makes.

14.7 Fallacy of Hypostatization

When we discussed language and definition, we talked about how successful communication requires that both people are using the same terms in the same way. Further, when discussing classification, we talked about how classification systems have embedded knowledge about the world. To put these two things together, we have to use words with the same meaning in the same way about the same things. What if the thing in question we are talking about is much more difficult to classify? Consider the difference between classifying Legos by colour and classifying virtues. They are quite different. That is because "virtue" is an abstract quality of humans or actions while Legos picks out physical items in the world. The fallacy of hypostatization confuses the abstract and concrete difference. Hypostatization is a big word meaning to treat something as *real*. An abstract word designates a general quality such as *virtue* or *roundness*. While roundness exists only in the particular objects that are round, we can talk about it without reference to the individual objects that possess roundness.

The fallacy of *hypostatization* consists of regarding an abstract word or a metaphor as if it were a concrete one.

The fact that we can talk about general qualities adds greatly to the power of our language and enables us to talk about things such as truth, goodness, and beauty; it also creates potential dangers. We may make the mistake of assuming that because we can refer to *general qualities, they name specific individual entities*. We may be misled, for example, into thinking that in addition to individual red Lego pieces there are also separate entities such as redness and Legoness. We are not likely to commit many intellectual errors talking about redness, but many general terms that are easy to misuse get their meaning by a similar kind of abstraction.

Think of the terms "science" and "the state." We are likely to use these terms without any sense of ambiguity or unclarity, and yet it would be a mistake to think

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that these terms referred to discrete objects in the world. When we say things like "Science is on the march" or "The state opposes anarchy," it sounds as though we are saying something with determinate truth conditions. But these statements are *metaphors* and have no clear truth conditions. If they do not have clear truth conditions, then we cannot form cogent arguments and solid conclusions.

However, we often forget this and thus talk and think as though there really are such entities as *science* or *the state* or *nature* that act and think. Often hypostatization takes the form of *personification*, as in the case of "Nature favours the survival of the fittest." Here the statement invites us to think that nature is a person, or at least person-like, and that it guides or directs the process of evolution.

EXAMPLES OF HYPOSTATIZATION

1. Whenever the state butts into private enterprise, it makes a mess of things.
2. The government has a hand in every business and the other in every person's pocket. We should limit government pickpocketing.
3. These issues give Canada a black eye.

Example 1 uses "the state" as if it were a concrete thing that can "butt" into people's private enterprises. Whatever intrusions particular areas of government might have, the state as a concrete entity cannot take on such actions as "butting into" enterprise.

Example 2 gives the government a metaphorical body—hands to pickpocket. But very few of us carry our money in our pockets anymore. There's also a kind of equivocation here between taking something from a pocket and literal pickpocketing. A pickpocket breaks the rules of a society against stealing, whereas the government collects taxes with the consent of the public (in an ideal social contract). In any case, the two are not equivalent even if the government had hands!

Example 3 gives Canada a face. This is an interesting rhetorical flourish that might mean that the government has made a moral transgression. But we would need to actually explain the "bruised eye" in concrete terms if we were to try to establish a claim about the government of Canada's behaviour.

Hypostatization is a danger to clear thinking because it blurs the distinction between metaphor and literal truth.

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Fortunately, the dangers of hypostatization can be circumvented. Ask what specific claims are being made by a sentence and whether they are adequately supported by evidence. In short, attempt to replace the metaphorical associations of the claim with literal commitments. When you come to a sentence that resists replacement, like "The state is the march of God through history," avoid it *like the plague*.

KEY TAKEAWAYS

- Ambiguity is the condition of having more than one interpretation or meaning. Arguments with fallacies of ambiguity are invalid because they can be understood in more than one way.
- *Equivocation* occurs when a key word is used in two or more senses in the same argument and the apparent success of the argument depends on the shift in meaning. Or, two different words that look or sound the same may become confused and lead to fallacious inference. Equivocation blocks transitivity.
- The fallacy of *amphiboly* is when there is a *structural ambiguity* in the grammar of a sentence that the argument or claim depends on. We need more information in order to properly interpret the sentences.
- The *fallacy of accent* arises when there is an ambiguity of meaning because it is unclear where the stress should fall in a statement or what tone of voice is intended. Arguments require statements that express claims. If a statement's meaning varies depending on where one puts an accent, it is too ambiguous to use in an argument.
- To adequately deal with the ambiguity of claims, we need opportunities to ask questions to fill in background assumptions to understand claims.
- The *fallacy of composition* is when one argues invalidly from the properties of the parts of a whole to the properties of the whole itself and when one reasons invalidly from properties of a member to properties of a class. The fallacy of composition improperly assumes compositional heredity.
- The *fallacy of division* is when one argues invalidly from properties of the whole itself to properties of a part and when one reasons invalidly from properties of a class to properties of a member. The fallacy of division improperly assumes divisional heredity.
- The fallacy of *hypostatization* consists of regarding an abstract word or a metaphor as if it were a concrete one. It is misleading because it makes something appear as if an indeterminate term is a discrete entity.

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EXERCISES

Ambiguity Practice

Identify the following fallacies of ambiguity and explain why the fallacy demonstrated undermines the argument.

1. Our X-ray unit will give you an examination for tuberculosis and other diseases, which you will receive free of charge.
2. The apartment building Neetu lives in is just huge! She must have an enormous apartment!
3. Whenever the state butts into private affairs, it makes a mess of things.
4. The owners of this laundromat should be arrested for indecency! Look at the sign over the washers: "People using washers must remove their clothes when the machines stop."
5. The font so generously donated by the Smith family will be placed at the east end of the church. Babies may now be baptized at both ends.
6. The MPs from Saskatchewan must have done a very good job last session because Parliament achieved a lot of good work.
7. The cost for the government to pay for the health care of a sick person is just a few thousand dollars a year on average. So health care can't be a big factor in the national budget.
8. Doctor: "I'm not sure what the disease you have is, but frankly I think it is due to drinking." Patient: "That's okay. I will come back when you are sober."
9. Don't let worry make you depressed and angry—let the church help!
10. Politician: "You may be wondering whether you should vote for me or my opponent. This is, of course, a difficult and weighty question of public morality, but you may wish to consider that at least I have remained faithful to my wife."
11. The only way our company will be successful is if every single one of us works as hard as possible.
12. People are always saying that the right wing is off base on the economy. That can't be true. They are always on the right side of the issue.
13. Very improbable events happen all the time. Whatever happens all the time is a very probable event. Therefore, very improbable events are very probable events.
14. The bald eagle is disappearing. This bird is a bald eagle, so it must be disappearing.

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15. The government needs to fight poverty.
16. I'm not saying he stole the money, but I am saying he "borrowed" it.
17. Let's take this problem by the horns and destroy it once and for all.
18. I checked every piece of machinery in the plane, and they all look new, therefore the plane is working like a new plane.

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15

Fallacies of Emotional Bias

What can we appeal to when making arguments? We often *do* appeal to emotions, but should we? They might be effective in getting someone engaged in a dialogue to change their mind, but is that logically optimal? No, because critical thinking is not about just using methods that *work* to sway. People who should be swayed by reason often aren't, and people often believe something based on irrational grounds. Critical thinking is not just about *what works*—it is about truth-seeking, which means we need to find good methods for thinking. This section will discuss uses of emotion in order to try to distract or sway a person who is engaged in a dialogue. While emotion is an important aspect of being human, and it gives us important information that we can use when reasoning, it is not an appropriate tool of argumentation itself. In this chapter we identify seven fallacies: three ad hominem arguments, the appeal to pity, the appeal to fear, mob appeal and two wrongs make a right.

15.1 Fallacy of Personal Attack (*Ad Hominem*)

Our first fallacy follows up on our discussion of bias and emotions. What do we do about the arguments of people we don't like or have a bias against? Often, speakers go on the attack rather than carefully considering the arguments of others. In this fallacy, you can see how a bias or dislike of the features of a particular person can obscure one's ability to think clearly about the arguments the person is making. And because of that, one responds inappropriately in the dialogue. This fallacy, also known as the *ad hominem* argument, which is Latin for "against the man," indicates that the attack is directed against the *speaker* or *arguer* rather than their argument (fig. 15.1).

An *ad hominem* fallacy occurs when we reject someone's claim or argument simply by attacking the person rather than the person's claim or argument.

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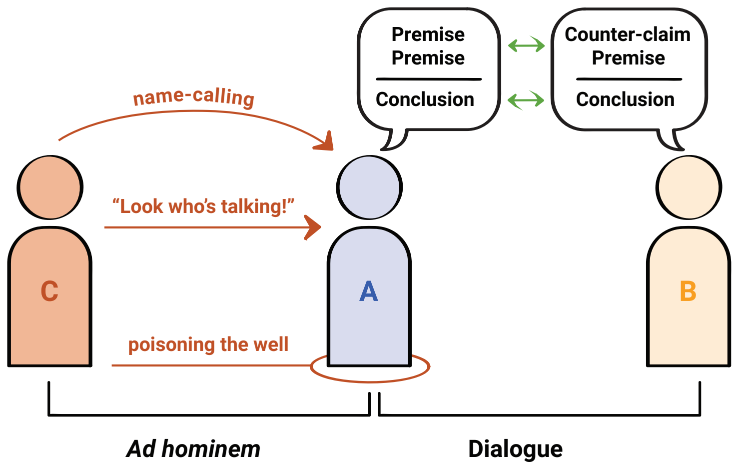

Figure 15.1 C is demonstrating three types of ad hominem against A, whereas A and B are having a dialogue. Artwork by Jessica Tang.

Personal attacks violate relevance conditions, since features of the speaker (the features that are under attack) are not relevant to the argument. Personal attacks are evidence that a view is not being carefully considered, and they are an expression of hostility against the speaker. To return to Douglas N. Walton's fifth condition for a fallacy (see Chapter 13), the *ad hominem* poses serious challenges for the realization of the goal of the dialogue because it derails the dialogue.

In short *ad hominem* arguments are forms of abuse. Here we look at three versions in more detail; abuse, poisoning the well, and *tu quoque* ("Look who's talking"). The illustration above (fig. 15.1) should demonstrate what the three forms of *ad hominem* arguments share in common. Arguer *A* is offering an argument, and arguer *B* is responding and offering additional argumentation. The green arrows between their arguments demonstrate that what they are each saying is relevant to each other's points. They are thinking critically about claims in an effort toward better reasoning and truth.

Sometimes a personal attack is pure "guilt by association." For example, some people attempt to invalidate a position merely by associating that position with Hitler, known as a reductio ad Hitlerum.[1] For example, imagine if someone is arguing for vegetarianism, and the response is to undermine their view by bringing up that Hitler was a vegetarian.

1 https://en.wikipedia.org/wiki/Reductio_ad_Hitlerum

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Arguer *C* is using an *ad hominem* because they direct their statements toward arguer *A*'s *person*, not their argument. For abuse, name-calling hurts, and in addition, it doesn't have a relevant, truth-seeking connection to arguer *A*'s argument. *Tu quoque* directs statements to past behaviour and essentially calls the person a hypocrite. And poisoning the well attacks the person's motivations by bringing up their position or identity factors. We will deal with all three of these so you can tell them apart.

15.2 Abuse

To return to Walton's second condition, "falls short of some standard of correctness," here abuse falls short because it just isn't an argument. Here we simply insult our opponent.

Fallacy of *abuse* is name-calling and abusive words that are used to direct attention away from the issue at hand and toward those who are arguing.

These examples demonstrate responses to arguments that may or may not be good. All we know is that the response is aimed at the person, not the claims at hand.

EXAMPLES OF ABUSE

1. I would never consider your view; you are an avowed Marxist!
2. I would consider your argument if you weren't a narcissist.
3. I don't like your face!

Example 1 is using a term that is not inherently abusive (one can even describe themselves as a Marxist), but the issue is the role of the claim. The arguer is viewing the identity of the person as inherently negatively affecting their argument. It is being used as an insult. Example 2 does something similar. It is not nice to be called a narcissist. And example 3 is pure mudslinging.

It is important to point out abuse where we see it, not just because it is bad arguing, but because it harms people and degrades the level of discourse we should be aiming for. In this case, one's response to an argument or a claim is *irrelevant* because it shifts the conversation to the character or identity of the person, violating an important condition of rational dialogue.

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Countering claims should be directed at the *claims being made*, not the person, and certainly not using abusive language.

In this case, while we can say this is a fallacy, it goes beyond a bad argument where we can offer ways to improve the argument. There's *no improving abuse*—it needs to stop. It doesn't even approach Walton's fourth condition—it doesn't have a semblance of correctness—or at least it shouldn't! We can tell the person they are distracting from the issue at hand by mudslinging, but it might be too late in that instance to correct their reasoning. They have already demonstrated they will name call.

15.3 Poisoning the Well

Sometimes a form of irrelevance can be to put our opponent into a position where they cannot reply because their legitimacy has been undermined. Whereas abuse is name-calling and mudslinging about the person, poisoning the well specifically directs the *ad hominem* to the person's motivations.

The fallacy of *poisoning the well* occurs when we criticize a person's *motivation* for offering a particular argument or claim rather than examining the worth of the argument or claim itself.

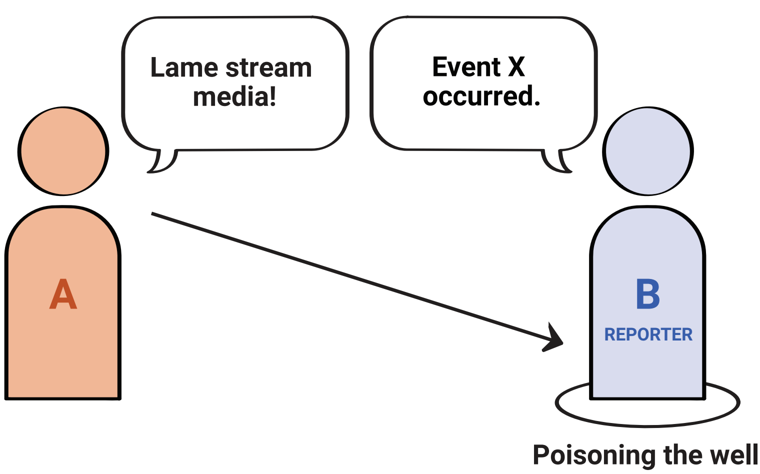

Figure 15.2 An example of poisoning the well. Artwork by Jessica Tang.

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This is another way of saying that the person's argument amounts to *mere bias*, so we don't have to listen to them. "Lame stream media" is abusive, but it is also poisoning the well (fig. 15.2). It rules out having to listen to anything they say by saying their motivations for what they say are so overwhelmingly biased, anything they say should be disregarded.

EXAMPLES OF POISONING THE WELL

1. Those who disagree with me when I say that humanity is corrupt *prove* that they have already been corrupted.
2. This person denies being a member of the Central Intelligence Agency (CIA), but you need not pay this any attention. Members of the CIA have been trained to lie to conceal the fact.
3. Parliament should not bother to consult with military leadership about the size of the budget for arms. As members of the military, they will naturally want as much money for the army as they can get, and their opinions will be worthless.
4. Doctors get paid by appointment, so of course they want to keep you coming back for more and more appointments.

Notice how both 1 and 2 absolutely rule out anything the person says. They're considered tainted and anything that flows from them is false (water from a poisoned well). Examples 3 and 4 are similar because they confuse interest with bias. Military leadership has an interest in their budget, but saying their opinions are *worthless* because of that is to attribute to them an unbridled desire for money and war (which you need evidence for beyond their position in the military). Doctors also could be trying to make more money, but maybe not—we don't know. But the argument in 4 states that *by the very fact* that doctors make money per appointment they cannot be trusted when they say you need to come back for another appointment. Poisoning the well directs the argument to the person (*ad hominem*) but specifically it attributes motivations that it then blows so out of proportion they are used to entirely dismiss what the person is saying. So just because someone has an interest doesn't mean we dismiss everything they have to say.

15.4 *Tu Quoque*

In Latin, *tu quoque* approximately means "Look who's talking." It is a kind of *ad hominem* because it directs the dialogue toward the person's actions rather than their argument. Like other *ad hominems*, it fails to achieve the rational goal of the dialogue (Walton's condition 5).

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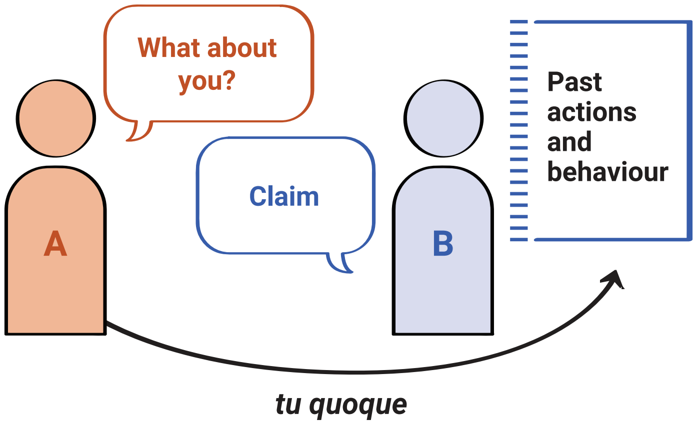

Figure 15.3 *Tu quoque.* Artwork by Jessica Tang.

In the fallacy of *tu quoque*, a person is charged with acting in a manner that is incompatible with the position he or she is arguing for.

Unlike *abuse* and *poisoning the well*, perhaps those who argue using *tu quoque* have a point? To revisit Walton's condition 4, perhaps *tu quoque* has more than a semblance of correctness? The thrust of the *tu quoque* fallacy is that the speaker fails to follow their own advice. Shouldn't their actions match their argument? Here is a good place to spend some time clarifying the goals of learning fallacies for critical thinking. We are identifying techniques for analyzing whether an argument is cogent by looking for and weeding out irrelevant information. So we ask, Is a person's behaviour relevant to the *cogency* of their argument? When we were studying *modus ponens*, did it matter *who* uttered the argument? Another way of asking this is whether it is required to know their behaviour to evaluate the argument? In terms of the goals of argument analysis, *no*. We adopt a technique of divorcing the speaker from their claims in order to analyze the claims directly (Are the premises true? Is the argument valid? Are there unstated assumptions? etc.).

This is not appropriate in all contexts. There may be significant cultural, linguistic, or spiritual reasons to keep the speaker and their behaviour connected. Also, consider a court of law. In a court of law, we rely on the testimony of others as support for an argument. Consider eyewitness testimony. In this case, their credibility is *very important*—their credibility is support for the truth of their claims (we have to "take their word for it" that something is true). But in critical thinking, we are evaluating an argument that's supported *with reasons*. Those reasons must be evaluated. One's behaviour is beyond the scope of evaluating reasons for argument analysis.

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EXAMPLES OF *TU QUOQUE*

1. You can't tell me not to smoke. You smoke like a chimney.
2. If you think living in a commune is so great, why aren't you living in one?
3. If you think burning fossil fuels is so bad, then I guess you should stop driving your car.
4. You mustn't be a very good dietitian; you are eating a donut.

There is something about these arguments (1–4) that might touch us. If you do think smoking is so bad, why *do* you smoke? But not withstanding this sympathy we may feel, it *is* invalid. Whether the speaker smokes or not has nothing to do with the quality of the arguments they might make that smoking is bad for you. It is pure distraction.

In examples 2 and 3, you see that someone has made prior claims, and the speaker's response to those claims is to change the topic to their behaviour. Here you need to imagine what the original speaker would have been suggesting. In example 2, you could imagine the person said, "We should live in communes (conclusion) because we are social creatures and communal ownership encourages better land stewardship." Would it be an adequate response to say, "If you think living in a commune is so great, why aren't you living in one?" We can imagine any number of reasons why the person doesn't or can't live on a commune, but those are irrelevant, and the speaker need not defend their actions at this time. The question for argument analysis ought to be "Are our social nature and land stewardship adequate reasons to support the conclusion that we ought to live in communes?" And in example 4, eating a donut is not related to one's credentials as a dietitian.

Putting all this together, let's look at an example of an ad hominem from a news article. In a discussion of why some people are not getting vaccinated for COVID-19, a person is quoted as saying, "I mean, they're mainstream, . . . They're just going to say what the government wants them to say. I'm not an idiot" (John Burnett, "The Number of Americans Who Say They Won't Get a COVID Shot Hasn't Budged in a Year,"[2] NPR, May 10, 2022).

Note how the person says, "I'm not an idiot." This is essentially saying anyone who disagrees is an idiot, which is abuse. They are also poisoning the well by saying that anything the mainstream media says is just what the government wants them to say, thus undermining their very ability to speak on the issue.

2 https://www.npr.org/sections/health-shots/2022/05/10/1091053850/the-number-of-americans-who-say-they-wont-get-a-covid-shot-hasnt-budged-in-a-yea

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There's also a slanted definition here. What does it mean to be "mainstream media"? This really sets up a dichotomy between mainstream and everything else. We always try to ask ourselves whether the people being described would agree with how they are being portrayed. Would the reporter say, "I'm part of the mainstream media," or would they say something more complex, such as "I'm a journalist with journalistic integrity, *and* I have an employer who expects specific outputs at given times"? What is true is often more subtle and complex. One way we think of terms like "mainstream media" is that they are terms of the prosecution and not the defence. They are defined in an adversarial way.

15.5 Mob Appeal (*Argumentum Ad Populum*)

Previously we saw that *ad hominem* is a larger term that incorporates at least three forms (abuse, poisoning the well, and *tu quoque*). Mob appeal, often called *argumentum ad populum* (Latin for "argument of the people"), is also a broader category that incorporates ways of arguing aimed at our emotions, desires, and identities.

> *Mob appeal* or *argumentum ad populum* can be described as attempting to sway belief with an appeal to our emotions, using theatrical language, or appealing to group-based or special interests.

One way of thinking about mob appeal is to literally think of a mob: you have a group using scare tactics or other emotional appeals trying to get you to conform. It can be plainly stated as well that mob appeal tries to use the beliefs or feelings of the majority or a group to make a claim to truth.

> You can watch this video[3] for a closer look at appeals to popular opinion.

For example, in mid-2022, one in six Americans are saying they will absolutely not get vaccinated for COVID-19 (Grace Sparks, Ashley Kirzinger, Liz Hamel, Melissa Stokes, Alex Montero, and Mollean Brodie, "KFF COVID-19 Vaccine Monitor: February 2022,"[4] KFF, March 1, 2022). While that is not the

3 https://www.youtube.com/watch?v=aF6EHTtyYqw&list=PLtKNX4SfKpzX_bhh4LOEWEGy3pkLmFDmk&index=16

4 https://www.kff.org/coronavirus-covid-19/poll-finding/kff-covid-19-vaccine-monitor-february-2022/

majority, it could be said to be a popular (enough) opinion, especially since it is about forty-three million adults. *Can forty-three million people be wrong?*

You might also hear people argue saying, "Can forty-three million people be right?" There's not only a bandwagon fallacy,[5] there's also an a reverse bandwagon effect,[6] which is more of a bias than a fallacy. A reverse bandwagon is when someone is more likely *not* to do something because a lot of people are doing it. This is closely related to *snob appeal*, which we discuss in Chapter 16.

Or, to put it another way, just because forty-three million people believe something, does that make it true? In this one story, a person against vaccinations says they only trust information from people who feel the same way they do (Burnett, "Number of Americans").[7] This is a form of mob appeal (and cherry-picking, and confirmation bias, etc.). Using a group-based feeling or identity as a sole reason for a belief is misguided.

Why is this a fallacy? Because the speaker is using something other than reason and evidence to try to convince someone that their argument is cogent. It violates a condition of critical thinking that arguments are evaluated for reasonableness, not for their mere ability to sway. Usually, examples of *mob appeal* are longer, but these shorter examples demonstrate the scope of the fallacy.

EXAMPLES OF MOB APPEAL

1. I'm a blue-collar worker myself, and I know how hard it is to pay bills when costs are rising.
2. Since you are a college audience, I know that I can speak to you about difficult matters seriously.
3. No one in this room wants to deny any child a decent education. But let us not forget that this school is *our* school, and it belongs to *our* children, and our first concern must be the education of our own.

For example 1, imagine that there's a city council budget meeting. A citizen is commenting on the proposed tax hikes. They say that taxes will be raised

5 https://www.fallacyfiles.org/bandwagn.html
6 https://effectiviology.com/bandwagon/
7 https://www.npr.org/sections/health-shots/2022/05/10/1091053850/the-number-of-americans-who-say-they-wont-get-a-covid-shot-hasnt-budged-in-a-yea

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so much so that they will not be able to afford their monthly power bill. Summarizing the argument, you might say that the person is saying that the tax hike is too large because people who are just making ends meet won't be able to pay for other important services. This is potentially convincing. Imagine that in response, the city councillor says, "I'm a blue-collar worker myself, and I know how hard it is to pay bills when costs are rising." They have *not addressed the issue of the cost of living*; they have just tried to locate themselves in a group-based feeling (the group is "blue-collar workers," and the feeling is the struggle to make ends meet). In a way, we don't even need to consult with the question of not being able to afford important services, since the arguer hasn't addressed it. Here, we would just need to say that the arguer is trying to put themselves in the same group as their opponent in an attempt to define and dismiss their struggle. Just because the person knows what it is like to struggle to make ends meet (assuming this is true!) doesn't mean that the tax hike is a good idea. The two are not related.

Example 2 does something similar. It puts the emphasis on the audience, attempting to flatter them (fig. 15.4). It essentially says, "We are all smart, so we will agree." This is fallacious because attempting to sway the audience with flattery is not a reason. Remember, it sets up the dialogue in a way that *if you don't agree, you are not a properly educated and serious group member*. It shifts the focus to who you are rather than what we have good reason to believe. Whatever the speaker is trying to get the audience to agree with, they should do so on the basis of the cogency of the argument, not group membership. We haven't been given reasons; we've been appealed to based on flattery and group interests.

Hopefully 3 will be a bit clearer by now. By saying that no one wants to deny a child a decent education, the speaker is creating a group of people imagined

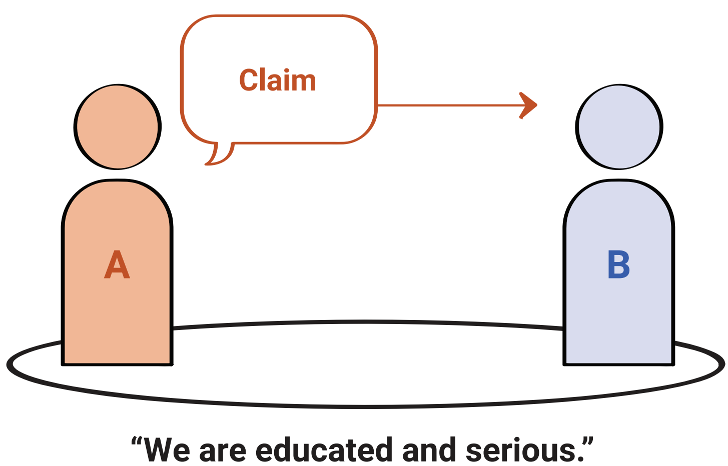

Figure 15.4 Example of mob appeal. Artwork by Jessica Tang.

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to agree on something, then leverages that group to prioritize "our school" over others. It also sets up a dichotomy between "those of us who care" and "anyone who would disagree"—isn't it possible to care and to disagree? As a reader, we might feel backed into a corner with this example: We care about our school, and we don't want to deny children a decent education. But we are being flattered, since we're being told we have *all the right values and care about the right things*, and we are being told what follows from these shared values.

Mob appeal is essentially flattery of a group or an appeal to special interests. As a consequence, it is almost always in the service of greed and ignorance. If an arguer has good reasons for their position, why use mob appeal?

15.6 Appeal to Pity (*Argumentum Ad Misericordiam*)

The *appeal to pity* is really a special form of *mob appeal*. Fundamentally, it exploits a single emotion, *sympathy* (fig. 15.5).

> The fallacy of *appeal to pity* occurs when we attempt to evoke feelings of pity or compassion in order to cause you to assent to our claim.

It is important to note that the appeal to pity is inappropriate, but it is also unlikely to be effective in a dialogue. Different things make different people feel certain ways. For various reasons, some people have to shut down emotions, and some people need a very drastic situation to be swayed by pity. When you rely on pity alone, you add in a very unruly variable.

At the same time, just because we are improving our critical thinking doesn't mean that emotions are irrelevant all the time. In fact, pity, like anger or any emotion, is appropriate in many circumstances. Emotions are important guides for how we can live well, but they need to be cultivated and developed. For example, anger is sometimes directed appropriately and sometimes not; it is also sometimes excessive or insufficient even if directed correctly. The issue with the appeal to pity is that the arguer is using pity as a reason for the audience to assent to the claim.

Let's consider two examples:

EXAMPLES OF APPEAL TO PITY

1. The following example is from *A Christmas Carol* by Charles Dickens: "Please Mr. Scrooge, my husband certainly deserves a raise. I can hardly manage to feed the children on what you have been paying

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> him. And Tiny Tim needs an operation if he is ever to walk without crutches."
>
> 2. Please, Professor Dayton, give me an *A*; I am trying to get into law school.

In example 1, the question is whether Mr. Cratchit merits a raise, not whether he has the need for more money. We can certainly establish that he needs more money (just ask Tiny Tim). But this is not by itself a reason for a raise.

> Example 1 is a version of the "Think of the children!"[8] TV trope. This is a narrower version of the appeal to pity, because it evokes sympathy specifically for children.

Usually, a raise is determined by merit, job description, responsibility, and so on. Now you might reply and say that there are unjust social conditions that Mrs. Cratchit is suffering under and that the suffering is a good reason for the employer to raise the standard of living for all the people working for Mr. Scrooge. In that case, collective reasons for changes in the standard of living go well beyond Tiny Tim's need for an operation—and we've just given reasons for our claim rather than relying purely on pity.

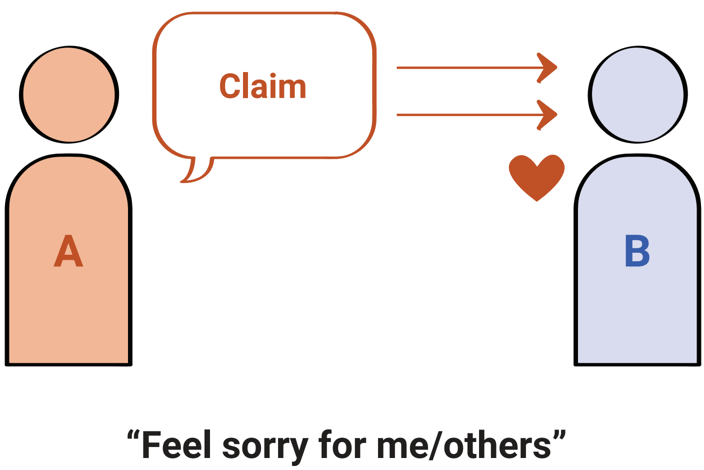

Figure 15.5 Appeal to pity. Artwork by Jessica Tang.

8 https://tvtropes.org/pmwiki/pmwiki.php/Main/ThinkOfTheChildren

Example 2 is a textbook appeal to pity. One's future education and career are highly charged with feelings of all sorts. The idea that a grade can make a difference in one's life is certainly worthy of sympathy. In this case, if grades mean anything at all, they have to be connected to the work on one's assignment, not on the sympathy of the professor. Essentially, one's potential misery is not relevant to the assessment of their work.

15.7 Appeal to Force or Fear (*Argumentum Ad Baculum*)

This fallacy, known as the *argumentum ad baculum* (literally "the argument of the stick") uses blatant or subtle threats to force the audience to agree with their claims. The idea is that if you don't agree, bad things will happen (fig. 15.6).

> The *appeal to force or fear* consists of the use of threats of force or unfortunate consequences to cause acceptance of a conclusion.

Perceptions of force and the use of fear can vary widely by context; the important point is that the person hearing the argument recognizes him or herself to be threatened. Much like the appeal to pity, the appeal to force or fear is unruly because different people will feel threatened in different amounts or not at all by the same threat. Threats are also not *rationally connected to the cogency of an argument*. They also shut down any possibility of considering other views.

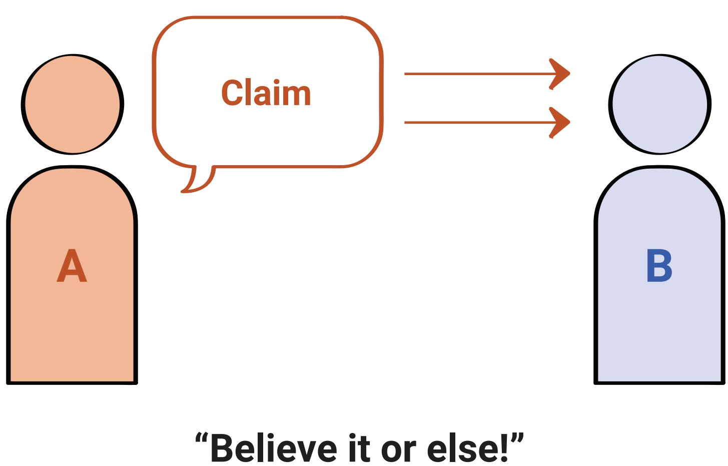

Figure 15.6 Appeal to force or fear. Artwork by Jessica Tang.

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To return to Walton's five parts of a fallacy, the appeal to force or fear has a semblance of correctness (part 4). Isn't it rational to avoid harm to oneself? For the most part, yes! But remember that we are deciphering standards of correctness in reasoning and critical thinking. Is a threat of injury, reputational damage, hardship, or otherwise *itself* rational grounds for accepting a conclusion? No, and the threats themselves should not be made in the first place.

The threat need not be of force on the part of the speaker. An attorney may commit the fallacy of the appeal to force by telling the jury, "If you don't convict this murderer, you may be his next victim." Here the fear of being the murderer's next victim is being used as a reason to send him to jail, but presumably, the reason for him to go to jail in this instance has to do with crimes already committed and the evidence to that effect.

EXAMPLES OF FORCE OR FEAR

1. Don't argue with me, young lady. Remember who pays your salary.
2. This university does not need a teachers' union, and any faculty member who thinks it does will discover his error at the next tenure review.
3. Mr. Editor, I hope you will agree that this little escapade by my son has no real news value. I know you will agree that my firm buys thousands of dollars of advertising space in your paper every year.

Example 1 is not only condescending but threatens the person's livelihood. Example 2 is similar. It is using threats to stop teachers from unionizing. And in example 3, the arguer is not giving good reasons for their son's actions not being news. They remind the audience of their advertising dollars to covertly threaten to rescind them.

The fallacy of appeal to force or fear has a particularly ugly ring to it. This is largely due to the fact that the other fallacies we have discussed *only work if you don't notice* that they are fallacious, but this one *only works if you notice its particular fallacious character*. The appeal to force or fear might bring up the idea of police officers or mobsters, but people in any group can make threats that don't have to do with physical harm at all. They could be for reputational damage, withholding goods that one deserves, or exposing personal information.

It is worth mentioning, however, that there are certain classes of disputes that are not so much disputes about the *facts* as disputes about who gets what piece of the pie. Here you might have two or more groups that both want the same thing, and no amount of arguing will help them find a solution. This is

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why many disputes escalate to appeals to force. Where there are substantially opposed interests and *prima facie* good claims on either side, a rational resolution of the dispute may be impossible to work out. There are many television shows that almost entirely demonstrate the use of threats to make claims to power and goods (*Game of Thrones*, *Damages*, *House of Cards*, and *Succession*, to name only a few). This of course does nothing to make such cases legitimate arguments. Threats of force are never okay.

15.8 Two Wrongs Make a Right

Another way that people will use emotions and personal attack is to suggest what a person would do as a reason to undercut their position. Certainly you've heard the phrase "two wrongs don't make a right," and yet, people argue this way often. Here, the arguer isn't addressing the claim under consideration, but rather, they are pointing the finger at an imagined version of the other person. Consider the example of cheating in school. Given the opportunity to do so, one might justify this to themselves, saying "Other people are doing it or would do it." Does this make it right to cheat?

> In *two wrongs make a right*, the arguer attempts to justify their claim or behaviour by asserting that the person they are trying to convince would do the same thing.

This fallacy uses a kind of false agreement. It says that you'd do the same, but even if that were true, is that a good reason for belief? The idea here is that the reasons for belief are independent of whether the other person would also act the way you have acted. The other person's behaviour isn't relevant. So two wrongs make a right, like most of the fallacies of emotional bias, violates an important relevance condition by not addressing the issue at hand.

EXAMPLES OF TWO WRONGS MAKE A RIGHT

1. Why would you say overturning *Roe v. Wade* is such a big deal? Lots of other countries don't have constitutional guarantees of access to abortion.
2. If you were president, you wouldn't want to release your tax returns either.
3. I don't see the big fuss about our oil spill. All pipelines leak at some point.

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In example 1, the fact that other countries also don't have guaranteed access is not going to move the conversation forward. The arguer is not addressing the issue, which is the benefits or drawbacks of abortion access. Pointing to what is done elsewhere distracts and undercuts the dialogue.

Example 2 doesn't address the rightness or wrongness of releasing tax returns; it changes the conversation to what the other person would do. This example appears to border on *tu quoque* except the person hasn't actually done anything; it is just using the hypothetical fact that a person *would do* a wrong thing to mean that it is okay for *them* to do a wrong thing.

Example 3 basically says oil spills are OK because there are other oil spills.

KEY TAKEAWAYS

- Emotion is an important aspect of being human, and it gives us important information that we can use when reasoning, but it is not an appropriate tool for proper argumentation.
- To be good critical thinkers, we adopt a technique of divorcing the speaker from their claims in order to analyze the claims directly (Are the premises true? Is the argument valid? Are there unstated assumptions? etc.).
- The fallacy of *ad hominem* (personal attack) occurs when we reject someone's claim or argument by attacking *the person* rather than the person's claim or argument. Personal attacks violate relevance conditions, since features of the speaker (the features that are under attack) are not relevant to the argument.
- The fallacy of *abuse* is name-calling and abusive words that are used to direct attention away from the issue at hand and toward those who are arguing. Countering claims should be directed at the *claims being made*, not the person, and certainly not using language that harms people and degrades the level of discourse.
- The fallacy of *poisoning the well* occurs when we criticize a person's *motivation* for offering a particular argument or claim rather than examining the worth of the argument or claim itself.
- In the fallacy of *tu quoque*, a person is charged with acting in a manner that is incompatible with the position he or she is arguing for. A person's past behaviour is not relevant to analyzing their argument.
- *Mob appeal* or *argumentum ad populum* can be described as attempting to sway belief with an appeal to our emotions, using theatrical language, or appealing to group-based or special interests. Arguments

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need to be evaluated based on cogency and logic, not whether they can convince on the basis of a group-based feeling.

- The fallacy of *appeal to pity* occurs when we attempt to evoke feelings of pity or compassion in order to cause you to assent to our claim.
- The *appeal to force or fear* consists of the use of threats of force or unfortunate consequences to cause acceptance of a conclusion.
- Threats and pity are not *rationally connected to the cogency of an argument*.
- In *two wrongs make a right*, the arguer attempts to justify their claim or behaviour by asserting that the person they are trying to convince would do the same thing. Reasons for belief are independent of whether the other person would also act the way you have acted.

EXERCISES

Emotional Bias

Identify the following fallacies of emotional bias and explain why the fallacy demonstrated undermines the argument.

1. How can the university president be against government interference? He was for it when it served his purposes.
2. No, if you don't mind losing a tire, going off the road, and killing yourself and others, you don't need a new tire.
3. They had a secret agenda the whole time, so if we come up with a secret agenda, we are just playing by their rules.
4. You are telling me not to litter? You use plastic water bottles all the time!
5. You better find the fallacies in these arguments, or you are going to fail this class!
6. I suppose you think you can give me study advice? You are always on your phone scrolling TikTok!
7. Don't listen to an unmarried couple's therapist! What do they know about marriage?
8. Don't listen to Joe about the right way to live—he's an atheist!
9. I know I was speeding, but I'm rushing to the hospital because my mother is sick. Please don't give me a ticket!
10. They were name-calling way worse than me, so I am well within my right to call them a loser.
11. Person *A*: Distracted driving kills. We need to bring in a law against cell phone use while driving. Person *B*: I saw Person *A* checking his GPS while driving here. How can we take his advice?

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12. Everyone knows how sexy it is to own your own house. So if you want to get a partner, you need to invest in real estate.
13. Do you want to go to hell? If not, you should be accepting Jesus as your saviour!
14. Kristin is a godless atheist with known communist sympathies—don't listen to her!
15. The party leader is opposed to capital punishment. She talks about it being cruel, but this is just the sort of liberal idea we can expect from a bleeding-heart-old grandmother.
16. Father Kim talks about how abortion is immoral, but don't listen to him; he has to say that because he is a Catholic priest.

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16

Fallacies of Expertise

When is it appropriate to appeal to information that others attest to? We cannot do all of our own science from the ground up, effectively trusting no one. But we also don't want to trust unconditionally any claims we hear or read—we need a way of deciphering when to take something as a fact on authority. When we are thinking critically, we are necessarily going to be engaging with the authority of others' experiences and testimony. Fallacies of expertise ask, When is it appropriate to appeal to the knowledge and understanding of others? We will discuss techniques for using authority appropriately.

Appeals to authority occur when we try to justify a conclusion by referring to some source or authority. We have to trust others if we want to know anything beyond what we have adequate evidence for ourselves. For example, you ask a clerk in the store how much something costs, or you ask your roommate what she had for dinner last night. When we ask you what time it is and you look at your watch and tell us the time, your authority is your watch, and our authority is you: we take you to have adequate reason for your claim even though we do not have any actual access to it. Testimonial knowledge—the knowledge we have because other people have told us something—is thus based on authority. Some of our memories do not give us access to the reasons that we originally had to believe what we remember; all that we now remember is that we think it is true. Much of what we learned as children is like this. We rely on the fact that we once had reason for believing what we now merely remember; we now believe on the authority of our memory and the authority of our past self.

Authority is socially distributed in the form of specialized expertise. An appeal to authority is therefore often legitimate; we typically are right to take a certain medicine because a doctor has advised it or to use the size of beam over a large window that an engineer advises.

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The *appeal to authority* is a fallacy where we take something as fact *just because an expert claims it to be true* (without supporting considerations about their expertise and how that relates to their claim).

In other words, just because an expert believes something, does not *by that very fact* (*ipso facto*) make it true. Thus a doctor who publicly supports a certain medicine because she is paid to rather than because she believes it to be good cannot be validly cited as an authority. But notice this refers back to Walton's fourth criterion in that it has a semblance of correctness—appealing to an authority has a semblance of credibility to it, but it falls short if the expert in question is paid to use their authority.

It is not enough to state that one is a doctor. Doctors can make baseless claims and act as paid stooges—for example, Dr. Oz.[1]

Tobacco is a case in point; the American Tobacco Institute (an industry institute) regularly publishes studies showing that it has not been conclusively proved that smoking leads to lung cancer. This is why it is so important to look to see who is conducting studies and whether they are neutral or if they are a special interest group. Similarly the nuclear industry hires scientists who regularly say that radiation doesn't pose a public hazard, and then they appeal to the authority of those scientists.

16.1 Genuine Appeal to Authority

An appeal to authority is often not only legitimate but completely necessary. Without our ability to trust the testimony of others on authority, human society in any form would be impossible. In complex societies where much knowledge is socially distributed in positions requiring study and specialized knowledge or skill, our dependence on authority takes on an edge: We need to be able to rely on the specialized knowledge of others—people for the most part who we don't even know. But people are not always knowledgeable, reliable, or honest, and

1 https://www.vox.com/2015/4/16/8423867/dr-oz-letter-columbia

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authority is not always legitimate. We need therefore to be able to distinguish genuine authority from its mere appearance.

Genuine authority is something that it is *justifiable* for us to rely on in our judgments.

If we are to appeal to an authority, that appeal must *genuinely support reasonable belief*. As a result, a genuine appeal to authority must meet several conditions:

1. The person in question must *really have expertise* or competence in the area.
2. The authority's claim must be within the scope of their competence.
3. The claim of an expert must be free of taint.
4. The subject matter must be one in which expertise actually produces agreement in judgment between experts because there is an independent matter of fact to investigate and acquire knowledge about.
5. Disagreement between experts can only be adjudicated by consensus.

Criterion 1 might seem silly to have to point out—that if a person claims expertise, *they actually have it*. But there are many cases of people claiming they have degrees that they don't. In fact, CBC's Marketplace was able to purchase 3 PhDs[2] online without doing any work at all. But this problem has predated the internet. This is why academic integrity is so important—we need standards to verify that our credentials mean something. So if a person is claiming expertise, it can be helpful to verify that expertise. We (Eric and Kristin) assure you that our PhDs in philosophy are real!

According to criterion 2, if a person actually has expertise, they need to *stay within the realm of that specific expertise*. The further people go in their education, their expertise usually becomes narrower and more specialized. Thus it is important to make sure not just that a person has expertise but that they are speaking within their expertise. Dr. Oz is a cardiac surgeon, but he regularly dispenses medical advice about all areas of health and medicine.

2 https://www.cbc.ca/news/business/diploma-mills-marketplace-fake-degrees-1.4279513

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For example, Dr. Oz has claimed that apple juice has unsafe levels of arsenic[3] in it. While you do want your surgeon to actually have a medical degree, specializing in surgery, you wouldn't want that same doctor to dispense public health advice about infectious diseases. They are different areas of expertise.

Criterion 3 tells us that we need to investigate authorities for taint. For the most part, the only way we can meet our basic needs is to work for money. This is true of most everyone, including most experts who have authority on specific areas of knowledge. Universities pay researchers and professors to create new knowledge and teach, but does the money they receive mean we can't trust what they say? In order for people to have the time and ability to develop expertise, they need money to meet their basic needs while studying, so the mere presence of money doesn't undermine credibility. But if an expert (who may be recognized and speaking in their area) is paid specifically to say that something is a fact, then that is considered taint. *Being paid to specifically assert a claim undermines authority.* For example, Dr. Oz has been paid to promote specific therapies.[4] This alone undermines credibility.

Criterion 4 might require some time to discuss. Not all domains of expertise are created equally. Firstly, the subject matter must be one in which expertise actually produces agreement in judgement because there is an independent matter of fact to investigate and acquire knowledge about. This can be a difficult matter to determine. It is difficult to figure out, for example, whether an oracle is an expert, and this is so precisely because there is no agreement on whether there is an independent way to determine whether the oracle gets things right. Most areas of expertise have wide swaths of agreement on matters of fact and some dispute or disagreement on less established areas of inquiry.

> Check out the CrashCourse on science versus pseudoscience.[5] It discusses how a scientific theory needs to be testable, refutable, and falsifiable.

Following a model of scientific inquiry, if areas of knowledge are tested and retested, then claims become more established. But there are areas of inquiry

3 https://www.nbcnews.com/health/health-news/fda-dr-oz-apple-juice-safe-after-all-flna1C9455326
4 https://www.businessinsider.com/how-much-money-drug-companies-have-paid-dr-oz-2015-8
5 https://www.youtube.com/watch?v=-X8Xfl0JdTQ

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where being an expert does not necessarily give the expert's claims authority. Agreement in the field might not be possible *in principle* because of the kinds of claims the field makes. The Long Island Medium, Theresa Caputo, claims to be an expert on talking to the dead. So does John Edward, who claims to be a psychic medium. These two "experts" might disagree on what a dead person's message is to their loved ones (imagine if we set up an experiment where they are to talk to the same person separately), but does their disagreement *really further the inquiry toward a fact of the matter*? No, because their disagreement is not the biggest problem. The problem is that the domain that they claim expertise in cannot *in principle* give authority to their claims.

> Comedian John Oliver did a deep dive into psychics on *Last Week Tonight* in 2019 (language warning). Check out the video![6]

Psychic or medium work of "talking to the dead" uses age-old techniques of deception, such as cold reading and shotgunning. Same goes for astrology, religion, palmists, extrasensory perception, creationism, faith healers, alternative medicine, homeopathy, and the list goes on. The point here is not to trash people who believe in these phenomena but to remind us that when we use a claim from an authority in our reasoning, it needs to be dialectically acceptable. It needs to withstand rational scrutiny. These claims cannot be used in arguments without meeting various criteria.

Criterion 5 is really the last step in validating an authority. If all other criteria are in place, then what do we do if there is disagreement? We have to rely on consensus among the right experts but realize that some claims will not (initially) generate consensus. The claim that "some claims will not generate consensus" needs to be clarified. Some claims have *not yet* generated consensus—more investigation needs to occur. But if consensus among experts is *in principle* not possible, then we are back at criterion 4. Imagine, however, a case where there is consensus among thousands of experts, but there is one outlier who doesn't agree. Does that undermine consensus? A couple of points here: First, political punditry often exaggerates the level of disagreement when an issue is "hot button." So it is always important to find out exactly who is disagreeing in this case. If it is one person who is paid (criterion 3) to produce the appearance of a disagreement, then the disagreement is not genuine. But if there are genuine disagreements among reputable experts, then we have

6 https://www.youtube.com/watch?v=WhMGcp9xIhY

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to say that when using claims. Criterion 5 rules out basing claims only on an outlier's view when genuine authorities have reached a consensus.

16.2 Fallacious Appeal to Authority

The fallacy of appeal to authority is committed when at least one of the necessary conditions of genuine authority is *not* met. You will notice that this means the fallacy of appeal to authority is a kind of a negative definition.

Here are *nine criteria* of the *fallacious appeal to authority*:

1. When the source cited is not a genuine authority on the subject under consideration
2. When there is reason to believe that the source is biased; when, for example, the person is paid to express a particular opinion rather than paid to offer an expert opinion
3. When there is reason to believe that the source's observations are inaccurate
4. When the source cited (e.g., a media source, reference work, or internet site) is questionable or recognized to be unreliable
5. When there is reason to believe the source has been cited inaccurately
6. When there is reason to believe that the claim has not been interpreted correctly or has been taken out of context
7. When the source conflicts with expert *consensus*. If two authorities disagree on a matter, then you cannot cite the claim one of them makes as an authoritative (since his claim conflicts with the claim of the other authority), and not being an authority yourself, *you* have no reason to cite one of the authorities instead of the other. By the same token, authorities can only resolve their differences of opinion by genuine consensus.
8. When the claim under consideration cannot be resolved by expert opinion. Some questions cannot be settled by expertise, since *direct evidence is not even in principle available*.
9. When the claim is highly improbable on its face

EXAMPLES OF FALLACIOUS APPEAL TO AUTHORITY

1. I'm not a doctor, but I play one on the hit series *General Hospital*. You can take it from me that when you need a fast acting, effective,

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and safe pain killer, there is nothing better than MorphiDope 2000. That is my considered medical opinion.
2. Jennifer Love Hewitt thinks the Porsche Turbo is the best car around.
3. Eat Cheerios for breakfast; Serena Williams does.

Example 1 should be clear that the speaker's medical opinion is not credible because he is merely an actor who plays a doctor on TV rather than an actual doctor. Jennifer Love Hewitt might be a car enthusiast and perhaps quite knowledgeable, but she is not a recognized car expert. And example 3 should alert us to at least two things: Serena Williams is not a recognized nutritional expert, and she is a paid sponsor, so we know that she is being paid to promote Cheerios.

16.3 Fallacy of Snob Appeal

Another way we might inappropriately appeal to an authority is using snob appeal. Social authority is conferred not just through expertise and degrees but also often through one's perceived prestige or membership in exclusive spaces or places. Snob appeal can be very insidious because it uses social pressure to try to motivate belief.

Snob appeal tries to motivate belief by saying that if you support this claim, you will be a part of an exclusive and thus superior group.

Snob appeal is one of the worst kinds of appeals to authority because it uses as an authority something completely inappropriate. Social superiority has no bearing on the truth of one's claim. This needs to be pointed out so much more in everyday contexts where people who have social clout can define the truth of situations.

EXAMPLES OF SNOB APPEAL

1. Camel Filters. They're not for everyone.
2. We make the most expensive car in the world. You probably can't afford to own it.
3. You are like me, we have fine taste. Thus we only drink Merlot.
4. Gwyneth Paltrow only uses chia seeds in her yogurt. If you want to look like her, chia seeds could help.

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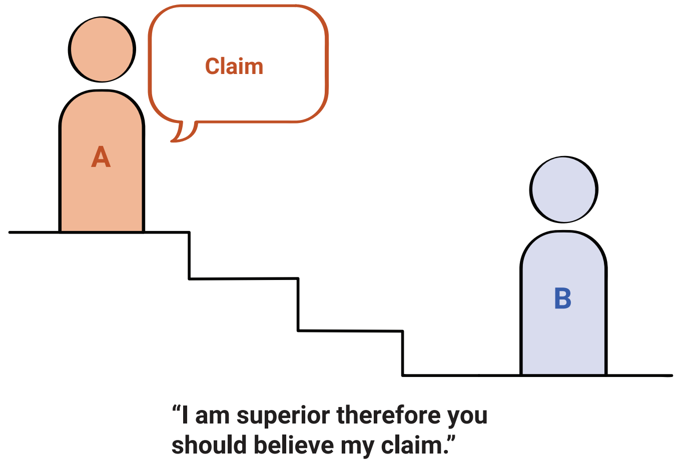

Figure 16.1 Fallacy of snob appeal. Artwork by Jessica Tang.

The fallacy of snob appeal is trying to play on vanity and special interest to motivate belief. It is no surprise that these techniques are often used by politicians and advertisers to motivate belief in claims. Donald Trump has said many things that amount to saying, "I'm rich, so believe what I'm saying." You would think we don't need to point this out, but his view is that he has been successful (we can question his business record), and that means he is an expert on the economy, a good way of life, the political structures we should adopt, and so on.

16.4 Appeal to Tradition

Tradition is often appealed to in everyday contexts, keeping social norms and customs in place. Sometimes this is fine—for example, we have always put brown sugar in our spaghetti sauce, therefore we should do it that way. Nothing really hangs on this recipe in terms of truth. It is more about a way of life that one wants to emulate and continue. But sometimes tradition is used as a form of adjudicating truth about the world or truth about right and wrong, both of which require justification and argument. Another way to think of this is, Why should we infer that something is right just because it has always been done that way? Tradition is fine in certain domains, but it isn't *by itself* (*ipso facto*) a reason to believe or to do something.

In the fallacy of the *appeal to tradition*, the fact that a social or cultural practice has been done a certain way in the past is taken to be reason for it to be done in the future.

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Argument form: *X* is true/correct by the very fact that *X* is a tradition or *X* is how something has been done in the past.

When we appeal to tradition, we use only the fact that something is a tradition as a reason to support a conclusion. This starts to look like cultural relativism, which we discussed in connection with biases. Consider these two different examples that both appeal to tradition:

1. We've always had an abortion ban. Therefore, abortion should be banned (moral).
2. We always put brown sugar in the spaghetti sauce, therefore it should continue (non-moral).

Example 2 gives us a reason to put the brown sugar in, but only if we want the sauce to taste the same. It isn't a moral argument like example 1, which is about abortion. Example 2 depends on what you already desire—how you want your sauce to taste. You might want it to taste traditional. But, when it comes to the morality of abortion, this is beyond individual preferences and needs a larger argument than the way things have always been done.

EXAMPLES OF APPEAL TO TRADITION

1. This family has always voted for the Democratic candidates. It's a tradition! So you should support them as well.
2. We've always dropped our fraternity pledges into a deep pool of mud. It's a tradition! So if you want to join, you have to be dropped in the mud too!
3. You think zoos are outdated and cruel? They had zoos in ancient Egypt, so I see nothing wrong with zoos.

All three of these examples share the same structure, the idea being that the very fact that something is a tradition (voting democratic, dropping pledges in mud, having zoos) at one time is used *by itself* as a reason to support a claim. Tradition is fine. It isn't *by itself* a reason to believe or to do something.

16.5 Appeal to Nature

The appeal to nature is perhaps a more narrow version of the appeal to tradition, but it deserves a moment of consideration. What is nature? We don't ask

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that with our tongues in our cheeks. When we think of nature, we might think of spaces untouched by human interference, but aren't humans natural? So then, is nature just all that there is in the world? Is nature good or bad? Marketers use "all natural" to market nature to us, but what does it mean for something to come from a "natural source"? These questions are underneath the appeal to nature, but so is the question of whether nature is good or bad. Usually nature is used to mean something is good—you don't want to go against nature (or do we?). We discussed how "nature" was used in a personified way with hypostatization. Here, nature is presumed to be an authority to justify claims.

In the fallacy of the *appeal to nature*, one argues that if something occurs in nature, it is good, and if it is unnatural, it is bad.

EXAMPLES OF APPEAL TO NATURE

1. It is natural for kids to rebel against their parents, so you shouldn't worry about your child driving your car without permission.
2. It is natural-source spring water bottled in the Alps. Of course it is good for you!
3. It is natural for humans to cheat on their partners; bonobo chimps are not monogamous.

All three examples highlight how "nature" is selectively used to justify something that needs reason. Nature cannot be appealed to without additional rational support. Remember that important concepts in our arguments need to be defined. This fallacy does not rule out that nature can be an authority, but this is just the start of a dialogue. It cannot be appealed to without independent reasons and an explanation of one's interpretation of specific natural phenomena.

16.6 Appeal to Anonymous Authority

Sometimes expertise is appealed to and the subject of that expertise is unnamed or doesn't exist. It may be some kind of amalgam of public opinion, but really it is made up. To say that "some people are saying" a certain claim is fallacious. There is no authority to that claim whatsoever. Some people could be saying anything at any time. Why is it relevant? Why is it appropriate? What is the justification for this appeal? Appeals to authority appeal to the testimony of an expert according to specific conditions. Appeals to an anonymous authority appeal to an unnamed or unnameable authority using words such as "some people are saying."

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In the *appeal to anonymous authority*, claims are asserted on the basis of being held by an authority that is not clarified or given.

At the time of writing this, a rumour is circulating that young people in schools are requesting the right to go to the bathroom in litter boxes. Sources are saying it is for children who "identify as cats." We are hoping this seems false on the surface, but it is widely believed.[7] When confronted with such claims, a quick check on snopes.com can often provide the remedy. They have been debunking urban myths and rumours since the early days of the internet. They continue to do so, including this rumour about children who identify as cats.[8]

Argument form: *X* is true by the very fact that some people have said it.

EXAMPLES OF APPEAL TO ANONYMOUS AUTHORITY

1. They say that you should drink a glass of wine everyday.
2. Some people are saying that the government is spraying us with mind control gases.
3. Demands for clarification are being made about multiple areas of concern.

Another way to put this is to say it's an appeal to rumour. We shouldn't accept rumour in everyday contexts, and we certainly shouldn't accept it in arguments. It is not dialectically acceptable. The anonymous authority doesn't necessarily say *X* is true; it says *X* is a valid claim worthy of consideration. Anyone can make up things.

Examples 1 and 2 both name the anonymous authority. "They" or "some people" are the subjects of the sentences, presuming there actually is a "they" or a "some people." Example 3 is even more shifty. It fails to offer a subject and just says that there is demanding going on but doesn't even tell us what or whom is doing the

7 https://www.nbcnews.com/tech/misinformation/urban-myth-litter-boxes-schools-became-gop-talking-point-rcna51439
8 https://www.snopes.com/fact-check/litter-boxes-bathrooms/

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demanding. This is why when we appeal to an authority, we must actually cite the authority. We have to point to an actual existing expert making the relevant claim.

16.7 The Appeal to Ignorance

This named fallacy might seem strange. How could *ignorance* ever make an argument anyway? Why would anyone argue this way? The appeal to ignorance has quite a bit of appeal in everyday rhetoric. Surely you've heard an exchange such as the one in figure 16.2.

Who has a better argument here? We have to think about the overall claim at issue. The dispute is about whether God exists. The arguers are having a dispute about *proving* God exists. What counts as proof? Can it count as proof that it can't be disproven? This is the appeal to ignorance. The burden of proof in an argument must always be on the person making the positive claim. Arguer B is the one holding the claim "God exists" because they are saying that A's inability to disprove that God doesn't exist is proof God exists. What's to stop anyone from assuming whatever they want and just demanding the rest of us disprove it?

The appeal to ignorance is often undetected, and pointing out its regular use can be very effective. Have you ever heard someone say you can't use a negative to prove a positive? It is likely they were pointing out an appeal to ignorance.

The *appeal to ignorance* fallacy uses solely the opponent's inability to disprove a conclusion as proof of the conclusion's correctness.

Let's take another tack. This really has to do with what is considered adequate evidence. Let's leave aside the question of what would count as adequate evidence of God. Let's just think about evidence for a cure for AIDS. Consider the following claims:

1. A cure for AIDS hasn't been found, therefore AIDS has no cure.
2. You cannot prove that AIDS has a cure, therefore AIDS has no cure.
3. You claim that AIDS has a cure, but you cannot prove that AIDS has a cure, therefore you must give up your claim that AIDS has a cure.
4. You claim that AIDS has a cure, and I claim that it doesn't, but you cannot prove that AIDS has a cure, therefore you must give up your claim that AIDS has a cure and acknowledge that I have a right to believe that it doesn't.

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Figure 16.2 Example of appeal to ignorance. Artwork by Jessica Tang.

Is the fact that AIDS does not currently have a cure by itself reason to believe it has no cure whatsoever? No, if something doesn't have a cure, this does not give us reason to believe a claim about it having or not having a cure. You certainly cannot demand that someone give up their belief that AIDS could be curable by the very fact that there is yet no cure.

In the *appeal to ignorance*, one takes the failure to disprove a claim as an adequate reason to take the claim seriously. It inappropriately argues that negative evidence can prove a positive claim.

The fallacy apparently originates with John Locke, who saw the argument in a weaker light as an attempt to establish or shift the burden of proof (see Douglas N. Walton, "The Appeal to Ignorance, or Argumentum Ad Ignorantiam," *Argumentation* 13 [1999]: 367–77). The speaker asserts a proposition that the listener must accept as proposed or offer an argument against. This suggests that there can be different grades of the fallacy.

John Locke (1632–1704) was an English philosopher, physician, and important supporter of the development of modern science. He was also a political theorist and proponent of the Glorious Revolution of 1688, which brought William of Orange to the British throne. His work on scientific method makes him the first of the British Empiricists, and his work on natural rights and the limits of state power and tolerance influenced both the American and French revolutions. The phrase in the American *Declaration of*

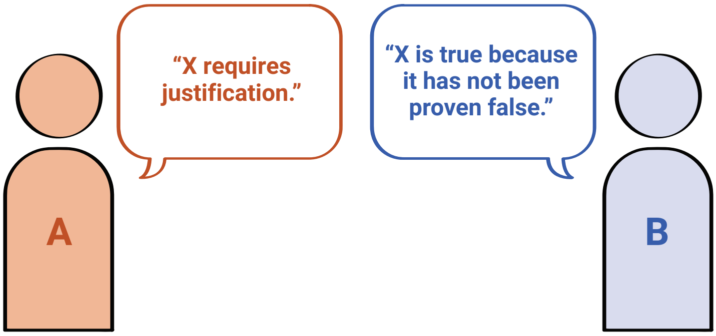

Figure 16.3 Appeal to ignorance. Artwork by Jessica Tang.

Independence defending the right to "Life, Liberty and the pursuit of Happiness" is a close paraphrase from Locke's writings. In his philosophy of mind, he proposed that at birth the mind is empty of ideas and that all knowledge derives from experience.

Let's look at each of the above claims more closely. Claim 1 is the simplest version:

1. A cure for AIDS *hasn't been found* therefore AIDS has *no* cure.

Claim 2 takes us into different territory. Technically then, the appeal to ignorance fallacy is an instance of irrelevant thesis (as discussed in Chapter 17), as the inability of a person to prove something is *not relevant* to the correctness of the thesis.

2. You *cannot prove* that AIDS has a cure, therefore AIDS has *no* cure.

Claims 3 and 4 we can put together, since they take the failure to disprove a claim as evidence that it is *possibly* true.

3. You claim that AIDS has a cure, but you cannot prove that AIDS has a cure, therefore you must give up your claim that AIDS has a cure.
4. You claim that AIDS has a cure, and I claim that it doesn't, but you cannot prove that AIDS has a cure, therefore you must give up your claim that AIDS has a cure and acknowledge that I have a right to believe that it doesn't.

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What do 1–4 have in common? They are all part of a strategy to circumvent the demand that one must possess evidence for the hypothesis they are putting forward. Because it comes in different strengths, in the fallacy of appeal to ignorance, one takes the failure to disprove a claim as evidence that:

1. it is *possibly true*,
2. it is *reasonable to think that it might be true*
3. *one has a right to believe it without further ado*
4. one ought to take it as *proof of the conclusion's correctness*.

We might argue that you have no right to criticize our belief if *you cannot show that it is wrong*; after all, you think it is wrong and we think it is right. So what should we do in the absence of evidence either way? Conclude that we are both equally authorized to believe what we do? No. Concluding that we can believe our favoured claim in the absence of evidence is still epistemically irresponsible. It abandons our serious commitment to seeking the truth, and it is a fallacy. To see this, look at version 4 of the fallacy again. The claim here is that you can't prove your point, so you have to give up your point and acknowledge that we have a right to ours. But of course, since there is no proof either way, you can offer the *very same argument* back to us. Version 4 is unstable because we can both offer it, and yet the conclusion is that we have a right (the right to believe) that you lack. The correct end point would be to acknowledge that *neither party has sufficient evidence* for belief and that therefore belief is *unjustified* for both parties.

The argument from ignorance has a special place in the arsenal of conspiracy theorists and bigots. Consider racist disputes or disputes about the Holocaust—where the racist or the Holocaust denier is really quite immune to counting anything as proof against their view—or cases where conclusive evidence is not ever likely to be available, as in the case of disagreement between a theist and an agnostic. The fallacy is best revealed by a consideration of more mundane examples that highlight the comparative unfoundedness of conspiracy theories.

To begin with, consider the question of whether there are exactly 271 Russian wolfhounds in Winnipeg. Wolfhounds are rather uncommon dogs; it is unlikely that you could find out how many there are, but Winnipeg is a pretty big city, and there are probably a fair number of wolfhounds in the city. So it is reasonable to believe that there are some Russian wolfhounds in Winnipeg but not too many; so how about 271? The evidence is so circumstantial and vague that we don't know what to say. There could be 271, but *in the absence of any adequate evidence*, it is much more likely that it is false than that it is true. Why

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is this? If it is true, there must be *exactly 271* wolfhounds in Winnipeg (so not 272 or 270 or 356 and so on). The point is that there are a very large number of ways it can be false and only one that it can be true. So my failure to prove that there are *not* 271 is *no reason at all* to believe that it is true.

Or consider this simpler example. If you were to toss a penny twenty times in a row, you might get heads twenty times. It could happen, so there cannot be proof that it won't. Still, you would be very wrongheaded to believe it. Since we multiply the odds of the individual tosses (1/2), the odds against it are 1/220, which is less than 1 chance in a million (it is 1/1,048,576)! Many things that *could* be true (and for which there would be a perfectly acceptable explanation if it were true) are nevertheless hugely unlikely and thus not belief-worthy at all. So let us bring this lesson to consider conspiracy theories.

Consider conspiracy theories such as claims that the earth is flat, the Apollo moon landing was a hoax, 9/11 was secretly planned by President Bush, or the Holocaust never happened. There are such conspiracy theories, and they are believed by a good number of people, but all of them require a large number of unproved and individually extremely unlikely assertions to be true simultaneously. For example, if the Apollo mission was a hoax, a very large number of people had to be in on the hoax, the video would have been shot somewhere and kept secret then and thereafter, and so on. It is not reasonable to believe, given the many opportunities there are for such hoaxes to be made public, that the conspiracy would be effectively managed by secret agencies all these years. Typically, conspiracy theorists attempt to isolate their views from the reach of counter-argument by concocting elaborate secret conspiracies for which there is no evidence but that are such that *if* those conspiracies *did* exist, their views would be "reasonable" since, of course, you can't disprove their secret conspiracies. Arguments from ignorance constitute only one of a variety of strategies that "true" believers use to put their beliefs beyond the reach of criticism. You may remember the movie *The Matrix*. If the hypothesis of that movie were actually true, then there would be no way to test or evaluate any belief, but of course, the hypothesis of the movie is preposterous; there is no reason to believe it to be true at all, and it is just one of a very, *very* large number of equally implausible hypotheses, all the others of which would have to be false if that one were true.

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The appeal to ignorance calls to mind the notion of falsifiability.[9] Falsifiability or refutability is the logical possibility that an assertion could be shown false by a particular observation or physical experiment. That something is "falsifiable" does not mean it is false; rather, it means that if the statement were false, then its falsehood could be demonstrated. "No human lives forever" is not falsifiable, since it does not seem possible to prove wrong. "All humans live forever" is falsifiable, since the presentation of just one dead human could prove the statement wrong (excluding metaphysical assertions about souls, which are not falsifiable).

The important thing about the fallacy of appeal to ignorance is that using the opponent's inability to disprove a conclusion as proof of the conclusion's correctness is a *transparently irresponsible piece of reasoning*. In taking a belief to be true, one needs *sufficient* evidence to make the claim belief-worthy; it is *not* enough just to have an argument against the claim of one's opponent.

Here are some examples of the fallacy in its strong and more easily identifiable form:

EXAMPLES OF APPEAL TO IGNORANCE

1. There must be life on other planets, since no one has been able to show that there isn't.
2. Chiropractors have failed entirely in their attempts to establish a scientific basis for their theories. The question can therefore be settled: chiropractic has no basis in science.
3. I have never heard a good argument for price controls; they are obviously a bad idea.
4. No reputable scientist has proved that the radiation from nuclear fallout causes leukemia. Therefore, we can disregard the alarmists and continue testing nuclear weapons with a clear conscience.

Example 1 is compelling—it has that semblance of correctness. But it goes too far. "No one has been able to show that there isn't" is only a reason for us to say we don't know either way. It is not evidence that there *is* life on other planets. This takes the negative evidence to prove a positive.

9 https://www.britannica.com/topic/criterion-of-falsifiability

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Example 2 is similar. The inability to prove is not a reason to conclude against; it is only a reason to keep investigating or be sceptical either way.

Versions of example 3 are *pervasive*. We've even heard philosophers say, "I haven't heard a good argument for *X*, therefore it shouldn't be considered." This is a problem because the truth is not dependent on what a person has or has not been exposed to. There should be significant humility in each of us to know that what we have and haven't heard can't determine what is possible. There is a lot out there that we just don't know and never will know. This means we keep an open mind, not that we can prove a negative.

Example 4 is not only an appeal to ignorance, but it is *question-begging epithets*, a fallacy discussed in Chapter 19. The use of "alarmist" and "reputable scientist" render us virtually unable to respond to the argument without being labelled as alarmist and disreputable. The fact that something hasn't been proved is not reason to believe there positively is no danger, just that we don't know.

There are some specific and well-defined situations where an appeal to ignorance is legitimate. In a Canadian court of law, a person is innocent if not proven guilty. Also, lawyers often use the term "negative evidence" to refer to the idea that there isn't supporting evidence for a claim put forth by the prosecution. For example, if the prosecution is claiming that someone was shot at a particular location at a particular time and there's a *lack* of appropriate blood splatter, that is considered negative evidence. But note that the claim being put forth needs justification (that someone was shot at a particular location and at a particular time). Here the claim lacks the appropriate physical evidence, thus the claim becomes less likely.

KEY TAKEAWAYS

- We need to be able to rely on the specialized knowledge of others.
- A genuine appeal to authority must appeal to someone with expertise; they must be making claims in their area of expertise, they must be free of taint, their subject matter needs to have facts, and there needs to be consensus on the matter.
- An appeal to authority is fallacious when the source is not a genuine authority, there's reason to believe there is bias, there's reason to believe the source is inaccurate or unreliable, the claim is out of context, it conflicts with expert consensus, or the claim is improbable on its face.
- Snob appeal tries to motivate belief by saying that if you support this claim, you will be part of an exclusive and thus superior group.

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- In the fallacy of the *appeal to tradition*, the fact that a social or cultural practice has been done a certain way in the past is taken to be reason for it to be done in the future.
- In the fallacy of the *appeal to nature*, one argues that if something occurs in nature, it is good, and if it is unnatural, it is bad.
- In the *appeal to anonymous authority*, claims are asserted on the basis of being held by an authority that is not clarified or given.
- Though it comes in varying strengths, the *appeal to ignorance* fallacy uses solely the opponent's inability to disprove a conclusion as proof of the conclusion's correctness.

EXERCISES

Identifying Fallacies of Expertise

Identify the fallacy of expertise, explain your choice and describe what is wrong with the statement.

1. This is the way that Kim Kardashian eats, therefore it is a good diet.
2. No one I know has improved by going to therapy. It is a waste of time.
3. My friend is a nurse, and she did not get vaccinated for COVID-19, so it must not work.
4. God must have created the universe. Have you noticed that no scientist or evolutionist has been able to explain where the power for the "big bang" came from?
5. We should support city council's bid for a nuclear reactor to be built in the city. Surely if there were any economic or safety problems, they would know about them and be against the proposal.
6. I've never heard a bad word about Bill Johnson, therefore he is a great person.
7. When you were little, we put toddlers in walkers all the time. You are fine to put your toddler in a walker.
8. People are saying you can't trust the chair of the parent board for the school. Sounds like the chair is corrupt.
9. Mothers now complain that there isn't enough parental leave! There was only three months parental leave when I had my children. Obviously, a year is more than adequate.
10. Our local city counsellor said that the only way to improve our tax base is to bring in new housing developments. So, I guess we need to bring in new housing developments.

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17

Fallacies of Distorting the Facts

Another kind of error of presumption we might make is to distort the facts. One of the ways to distort facts is by making them seem more or less significant or relevant than they really are. This section on distorting the facts discusses false analogy, fallacies of false cause, slippery slope, and irrelevant thesis (sometimes known as "red herring").[1] Fallacies of *false cause* occur in general when there has been faulty reasoning about causality. In other words, we could say that the fallacy of false cause distorts what actually occurs in a causal chain. In order to correct for these, we have to know a lot about causality to be able to make good causal claims. The fallacy of *irrelevant thesis* essentially changes the topic of an argument midstream or brings in claims that are beside the point. It is a kind of derailing, but it has some appeal, since the outside information it brings in can also be of importance or factual.

17.1 Analogy

A powerful method of illuminating *or* distorting facts is the use of an analogy. We use analogies all the time in explaining how the world works. If an analogy isn't fitting, it doesn't help. But if an analogy is fitting, it is very useful. Analogy is a powerful tool because it allows us to understand an unfamiliar or difficult thing or set of facts by comparing it to something that is better known or understood. In fact, we can hardly help doing this when we are in an unfamiliar situation; our first step toward orienting ourselves is to try to discover something that *seems* to be similar, in important or relevant ways, to something with which we are already familiar.

1 https://www.fallacyfiles.org/redherrf.html

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In an analogical explanation, one attempts to explain how something works or what something is like by comparing it to something else and claiming that it is like that other thing in an explanatorily relevant sense.

The aim of an analogical explanation is to *transfer* the understanding we have of the thing we are making an analogy to (the *explanans*) to the understanding we have of the thing we want to further explain (the *explanandum*) (fig. 17.1). We transfer understanding from one thing to another if the two are similar in the right ways.

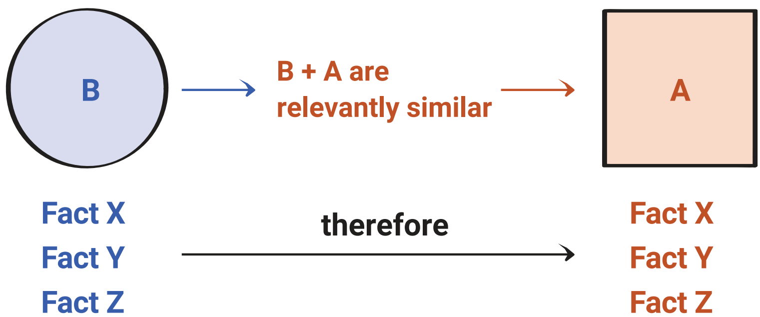

Figure 17.1 Analogical reasoning. Artwork by Jessica Tang.

A productive way to think about analogies is to see them as relying implicitly on explanatory models. Both parties to the comparison have features that can be explained using a similar story. In other words, if one thing or process is analogous to another in a way that is *genuinely explanatorily relevant*, then the two share a set of features that constitute an explanatory model of a set of phenomena of which they are both examples. By contrast, a *false analogy* offers such an analogical explanation when the purported similarity is *not relevant* and there is no explanatory model that fits both cases.

Unlike a valid deductive argument that pays its way by proving what is at issue, analogies can only offer the *promissory note* that there is an underlying account that explains what the analogy points to; it offers the mind a model or interpretation that makes something initially strange seem more familiar. As we will see through an in-depth discussion of analogies, they operate on all kinds of levels and do different kinds of intellectual work. Behind the analogy is always (in theory), some kind of hidden sameness or relevant likeness that gives it explanatory power. This just tells us that analogies are analogies, not explanations proper. They are incomplete by themselves even when they are

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good. As we will see in the coming discussion of how analogy fuels scientific discovery, analogies point to explanations that they do not themselves give.

The Water Closet Model of Instinct

Konrad Lorenz, the famous ethologist who received the Nobel Prize in 1973 (together with Karl von Frisch and Nikolaas Tinbergen for discoveries concerning organization and elicitation of individual and social behaviour patterns) posited a psychohydraulic model to explain instinctive behaviour in birds. He called this the "water closet (*a.k.a.* toilet) model" of instinctual behaviour. The model pointed to two similarities: once you flush a toilet by pulling the handle, all the rest follows in a rush, and then it takes the tank a while to fill again, so if you flush it again before the tank is full, the flushing response is much weaker. It is a *hydraulic* model because it compares instinctual motivation to the liquid in a water closet, whose accumulation and discharge influences behaviour. The time it takes for the tank to refill corresponds to the time between occasions of instinctually driven behaviours.

> Konrad Lorenz (1903–89) was an Austrian zoologist and Nobel Prize winner. Regarded as one of the founders of modern ethology, he studied instinctive behaviour, especially imprinting, in birds. Among his many books, *On Aggression* (1963) was especially influential.

Lorenz et al. were trying to understand the relationship of the *length of time* between instinctual motivation and the *strength* of the response. Thinking of instinctual motivation as hydraulic, as toilet-like, helps us understand, for example, how pressure builds after a release, and so on. The water closet model allowed us to organize a wide range of different behaviours together and was very fruitful in efforts to explain animal motivation. Of course, it is *just a model*. What we really need is an account of the physical structures that exist within an animal's brain, how they work, how the animal interacts with environments, and so on. But what was valuable about it was that it offered *an intuitive way of visualizing* how various unknown systems need to work together to organize an animal's response to its internal and external environment. What made the analogy fruitful in organizing research was that the phenomena under study *really do* stand in a set of relations that in a very simplified way *actually do operate similarly to how a toilet works*. So it was a good analogy because it was fruitful and helped animal behaviourists come to understand instinctual behaviour

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better. But the world might have turned out differently; instinct might have worked differently, in which case the analogy would have been a bad one. So in this case, the analogy was a hunch about a structural hypothesis or model that paid off because the world turned out to fit the hunch.

Archimedes and Heiro's Golden Crown

Here is a quite different example. In the first century BCE, Heiro II, the king of Syracuse, commissioned some goldsmiths to make a crown in the form of a wreath of laurel leaves as a religious offering and gave them a specific weight of gold. Upon receiving the finished crown, Heiro suspected that they might have replaced some of the gold with an equal weight of silver, a lighter (and importantly, *less dense*) and much less valuable metal. Heiro reputedly asked his friend, the famed mathematician Archimedes, to determine whether the wreath was pure gold or had been adulterated with silver. But because the wreath was dedicated to the gods and was thus a holy object, Archimedes could not melt it down or harm it. So how would he find out what it is made of?

> Archimedes of Syracuse (ca. 287–212 BCE) was a Greek mathematician, physicist, engineer, inventor, and astronomer. He is generally regarded as the greatest mathematician and scientist of antiquity and was responsible for the foundations of hydrostatics, statics, and the first explanation of the principle of the lever. He designed many machines to defend Syracuse from attack, reputedly including great claws that lifted attacking ships out of the water and systems of mirrors for setting ships on fire. He was killed by a Roman soldier during during the Seige of Syracuse (214–212 BCE).

As the story goes, Archimedes went to the baths, and upon entering the water, he noticed that the water level rose as his body displaced some of it; in a flash of analogical insight, he imagined that the wreath crown would, like his own body, displace liquid relative to its volume. Archimedes had a solution: take a *weight of gold equal to the crown* and determine how much water was displaced by the weight and the crown and compare them. Thinking analogously with his body, Archimedes thought that he would find out what the crown consisted of by how much water it displaced. He figured that, if the crown had been adulterated with silver, it would have a greater *volume* for the same weight and would displace a greater quantity of water. Since the relative *densities* of gold and silver were known, the precise amount of silver (if any) could be accurately calculated. Famously, Archimedes was excited by this insight and ran naked through the streets to his home crying, "Eureka!" ("I have found it!"), and the goldsmith who had indeed adulterated the gold got his head cut off. Now, the analogy in this case is quite different: the crown was like Archimedes's body not in its shape or size or weight but in its capacity to *displace a volume of water when compared to weight*. That reveals density, and in this respect, the two are *exactly* alike and so behave in *exactly* the same way. While this didn't by itself give Archimedes his solution to the problem—he needed also to know some mathematics and how to calculate the relative density of gold and silver—once he had entertained the solution, the rest was just measurement, and the analogy did not function merely as a *potentially* fruitful guide to research or a hypothesis that needed to be tested, but as an intuition into geometrical relationships.

Torricelli and the Sea of Air

Let us give one more example from the history of science that falls between the two prior examples, both historically and conceptually. Evangelista Torricelli lived in the first half of the seventeenth century and was a student of Galileo; his work on the motion of fluids and his invention of the mercury barometer initiated a flurry of scientific research into the nature of gases and atmospheric phenomena. Unlike Galileo, who believed that air was weightless, Torricelli conjectured that air, like water, has weight and that we live "immersed at the bottom of a sea of elemental air."

> Evangelista Torricelli (1608–47 CE)[2] was an Italian physicist and mathematician, best known for his invention of the barometer. A student of Galileo's, he contributed to the beginnings of atmospheric science and the study of gases.

The discovery came about as a result of a practical problem in mining. The miners in the late Middle Ages developed suction pumps to pump water out of mineshafts, but a suction pump will only lift water about nine metres.

2 https://www.britannica.com/biography/Evangelista-Torricelli

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Galileo Galilei (1564–1642 CE)[3] was the most important physicist, mathematician, and astronomer in the West and played a major role in the Western scientific revolution. His improvements to the telescope, astronomical observations supporting the hypothesis that the earth revolves around the sun, and subsequent imprisonment by papal authorities made him a world-famous martyr for the beginnings of European modern science. Perhaps you have heard of some of his contributions to the study of uniformly accelerated bodies and his discovery of the phases of Venus and the four largest satellites of Jupiter, named the Galilean moons in his honour.

Galileo attributed this limit to the cohesive strength of water. But Torricelli was able to show that the limit of nine metres of water in the suction pump was due to atmospheric pressure—the weight of the "sea of air" above us—which pushed the water up the pipe when air was sucked out of it. By experimenting with heavier liquids, first honey and then mercury, Torricelli showed that the height of a column of liquid in an evacuated tube placed in a bowl of the liquid was proportional to the density of the liquid (fig. 17.2). By using mercury, which has a density of 13.6 g/mL, Torricelli could observe the effect of a vacuum in reasonably short tubes sealed at one end. Torricelli could fill a tube about a metre long with mercury, put his finger on the open end, and then invert the tube in an open bowl of mercury. The column of mercury would drop partway down the tube, leaving an empty space (vacuum) at the top of the tube. By measuring the height of the mercury column (about seventy-six centimetres), Torricelli showed it to be proportional by weight to the nine-metre column of water at its limit in a suction pump. This in effect settled an important scientific debate of the time about the nature of the vacuum: the vacuum *does not pull mercury up the tube*; instead, the *weight of air* pushing down on the dish of water prevents the mercury column in the tube from falling out of the tube.

Later Pascal, with the help of his brother-in-law Périer, designed an experiment taking a tube of mercury to the top of a local mountain to determine whether the height of the column would drop (as one would suspect if Torricelli's explanation were correct, since the "sea of air" would be "shallower" at the top of a mountain), which confirmed Torricelli's account (and showed at the same time that a barometer and an altimeter are really the same instrument calibrated and used for different purposes). The analogy of the sea of

3 https://plato.stanford.edu/entries/galileo/

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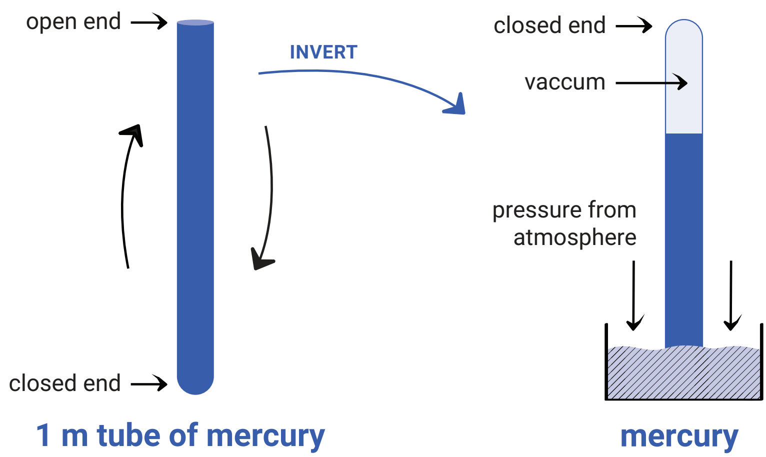

Figure 17.2 Toricelli's experiment proving the weight of air. Artwork by Jessica Tang.

air proposed that *gases are like fluids* in relevant respects and thus opened up a number of important questions for empirical study. In addition to suggesting an explanation of air pressure and why the miners were having issues pumping water, this analogy opened up the empirical study of weather.

This analogy is unlike the water closet model because it proposes an *actual identity* of explanatorily relevant properties in gases and fluids, whereas Lorenz's analogy proposes nothing about the causal structure of the mechanisms of instinct but merely a certain formal structure. It also differs from the Archimedes example in two important ways. First, it both proposed and required very precise *empirical confirmation*. For all Torricelli and Galileo (and everyone else of the time) knew, the world might have been as Galileo believed; air might have had no weight, and the problem of the limits on suction might have been explained as being due to limits of the cohesive force of water. Had that explanation been correct, then the height of columns of different fluids in suction pipes could not have been expected to vary with the density of the fluid but instead with some *other* property having to do with cohesive force. As it turned out, Torricelli was right and Galileo was wrong, so the sea of air hypothesis was a *genuine bet with empirical consequences* that further research could confirm or refute. The second way it differed from the Archimedes example was that the analogy is explicitly *partial*. Gases are not *literally* fluids and Torricelli knew this. In particular, gases are highly compressible and liquids are not, and although Boyle's law was not discovered until twenty years after Torricelli's death (and probably could not have been without Torricelli's work as a backdrop), Torricelli was well acquainted with the fact that gases expanded when heated and made use of that fact in his study of weather.

Scientific theories can be seen as precise theoretical models, where certain phenomena—the ones captured by the model—stand in exact mathematical

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relationships to each other. We saw that Torricelli's sea of air hypothesis had precisely confirmable predictions. Two columns of fluids of different densities will have heights exactly proportional to their densities; by showing that the height of the column of mercury stood in relation to the height of a column of water—the water was 13.6 times as high—Torricelli effectively settled the issue of what mathematical model (or more properly, what class of models) governed the behaviour of gases. The design of an experiment offering empirical confirmation of a model will depend on facts about the model and may be very complicated, but usually the epistemic character is rather simple.

Torricelli and Galileo suggested that there were explanations to be found in a certain direction of study that, when found, could stand on their own. Analogical reasoning, therefore, is like writing a cheque from the bank of empirical explanations: if the explanation is in the bank, the cheque can be cashed, but otherwise it bounces. Analogies are members of a large family of suggestive concepts: metaphor, analogy, hypothesis, model, proposal, and so on. Their utility is partly a function of whether they can be cashed. Of course, now we have used the metaphor of a cheque to explain analogies! We are not suggesting that we can or should always attempt to cash the analogical and metaphorical structures in our thinking by turning ourselves into unrelenting scientists. Life is too complicated and fleeting to make quantifying everything a remotely attractive epistemic policy. But at the same time, we want the feelings of explanatory success we experience when we use a good analogy or metaphor to be grounded in some promise of genuineness.

Let us summarize some of the properties that good analogies have:

1. When attempting to explain or understand one thing by saying that it is like another in certain ways, those ways must be *relevant* ones.
2. To say that they must be relevant is to require of them that those respects give *some insight* into the issue to be explained or understood.
3. Analogies are always partial, and that means that there are always dis-analogies. Relevant dis-analogies undermine relevant analogies because they suggest that although the two things may be like each other in relevant ways, they are at the same time *unlike each other in ways that are also relevant*.
4. Analogical reasoning is always provisional, meaning that additional information can undermine the conclusion one draws.
5. Analogical reasoning is best when the analogy is *fruitful, meaning it tells us more than we previously knew*.

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17.2 False Analogy

Given that we have discussed how analogies can be useful, our discussion has pointed the way toward limits of analogical reasoning. Sometimes analogies are not contextualized in terms of their provisional nature or their relevant dis-analogies. Sometimes they are presented in quite the opposite way—full of certainty and as if they are comparing two things that are completely alike.

The fallacy of false analogy is the comparison of two things that are only *superficially similar* or that, even if they are very similar, are *not similar in the relevant respect*.

One way analogies go bad is that they drastically *oversimplify* a complex process by comparing it to something simple. Look for cases of false analogy in the speeches of politicians and cranky letters to the editor. American President Reagan, for example, was especially fond of comparing complex international events to homely events that the ordinary person could "figure out" using common sense. The first key to identifying cases of false analogy is to notice when an explanation makes *use of a comparison with something else*.[4]

All that is needed is to examine the comparison to see whether the explanation is based on a relevant likeness. Here are a few examples:

EXAMPLES OF FALSE ANALOGY

1. We must make other people accept the true religion, by force—if necessary—just as it is our duty to prevent a delirious person from leaping off a cliff by any means necessary.
2. We should not sentimentalize about the impact of colonization, which occurred when our great civilization was being built. It was unfortunate, of course, but you can't make an omelette without breaking a few eggs.
3. What is taught at university should depend entirely on what students are interested in. After all, they are consumers of knowledge; the teacher is the seller and the student the buyer. No one knows better than the consumer what he or she wishes to consume;

4 Here's an absurd example comparing gay marriage to a plane: Pat Cross, "'Same-Sex Marriage' Just Won't Fly," National Catholic Register, July 21, 2022. https://www.ncregister.com/cartoons/pat-cross-20220720-42m8ef5b

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the idea that the seller should determine what he or she buys is ridiculous.

4. Why should mine workers complain about working ten hours a day? Professional people often work just as long without any apparent harm.

In example 1, another's disbelief in the religious views of the speaker is inappropriately compared to insanity. The comparison is between delirious people and people who are non-delirious who do not accept the speaker's version of religion. Even on the assumption that it is justifiable to use force against the will of a delirious person to save their life, this gives no reason to think that one is justified in using force against a person's will. There are not enough relevant similarities between preventing self-harm and holding different religious beliefs.

Example 2 uses an offensively simplistic analogy. There is no way it could be relevant, since there are *no relevant comparison classes at all*. We may notice, however, that this argument also contains a double standard between "our great civilization" (the delicious omelette) and "the other culture" (the eggs that need to be broken to make the omelette). False analogy is the friend of bigotry and special privilege.

Example 3 compares students to consumers. There are two levels of difficulty with this analogy. First, is the question of whether the situations of students and consumers are relevantly similar, and second is the question of whether consumers are accurately portrayed. In response to the first question, one might point out that while a consumer knows what goods he or she is purchasing beforehand, the student does not know the subject before learning it. This suggests at least one relevant difference. In response to the second question, one must ask whether what the consumer buys depends entirely on what the consumer is interested in. When you think about it, it begins to look as though the consumer has to buy more or less what is available, or at least there are important constraints operating in the background that limit what that consumer can buy. In addition, there are enormous pressures acting on consumers telling them what they want—pressures that are largely absent in university. In fact, the comment that the consumer knows what goods they are purchasing beforehand is not completely true. You can buy a television set or a computer for the first time and only after you take it home can you really begin to understand the effects that your purchase has on your life. In fact, it begins to look as though consumers are rather more like students in the sense of not knowing the effects of learning in advance.

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Example 4 attempts to make a claim about *fairness*. The two crucial considerations are the difference in the danger and physical difficulty of the two kinds of work and the difference in the rates of pay. It is not appropriate to compare physically exhausting and dangerous work for low pay to well-paid, prestigious, physically easy work, at least not without an argument. As one looks at claims like this, one begins to see that there are many different considerations that are relevant to the judgment of what is fair and what is not; the claim in 4 looks more like a way of shutting down thinking about fairness rather than furthering it. We saw that good analogies should be fruitful—they should open up our understanding to better and more complete explanations. The bad analogies we have just looked at seem to function most successfully in negative gossip and pseudo-explanation situations that entrench the speaker in their views by isolating them from scrutiny. Prejudice and bigotry thrive on a rich diet of fallacies that work together to buttress and fortify bad opinions from being challenged, and one of the best ways to combat prejudice is to have a number of ways of point out and dissolving fallacies at the ready.

17.3 False Cause

Many arguments rely on causal reasoning to establish conclusions. Usually in causal reasoning, the conclusion takes some form of "*X* caused *Y*." But it is very difficult to know what causes events in the world. Causality is complex, and usually these causal arguments are wrong just by virtue of identifying single factors, especially when the claims have to do with populations or events. Many arguments that try to establish causal chains do not have adequate evidence to isolate the particular cause being argued for.

It is difficult to know what causes events in the world, especially if you are trying to make a definitive statement. For example, What caused the Titanic to sink? Take the distinction between a proximal (immediate) and distal (further) cause. Most people would identify the iceberg as having been responsible for the Titanic sinking. But what about the captain's inattention? The design of the watertight compartments? Often causal stories oversimplify and identify the most proximal cause. This cuts the causal chain somewhat arbitrarily and brings the focus to one cause just because it is proximal.

In addition to issues isolating causes, there are also issues of identifying causal factors from correlated factors. Fallacies of false cause generally derive from the fact that not every *correlation* between events (and of course there are all sorts of correlations between events) has *explanatory* power in accounting for those facts. Many superstitions depend on the fallacy of

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false cause ("I was thinking of you, then you called me on the phone"). So do many advertisements (beautiful women draped on a Camaro in an advertisement asks you to believe that buying a Camaro will attract beautiful women to you). Also, a newspaper might make claims that reading their paper makes you wealthier. In one sense, if you are more informed about certain things, you might be able to make better decisions. But this is a very different claim than "reading our newspaper *makes* you wealthy." We might equally consider that a certain demographic of people with wealth are already more likely to subscribe to a particular newspaper, since they are looking for advice and information on investing. So actually, it is the fact that they are already wealthy that causes them to read a particular newspaper, not the other way around.

The fallacy of *false cause* is actually a family of related fallacies that occur when an arguer gives *insufficient evidence* for a claim that one thing is the *cause* of another.

All these examples demonstrate how causal reasoning makes the case that one event or event-kind is an *explanation* for the *occurrence* of another event or event-kind. Causes do not occur in isolation: every event that occurs depends on a set of conditions being satisfied, and a person requesting a causal explanation typically knows some of these conditions and not others. As a result, an appropriate answer will depend on the set of interests and background information that sets the question. Here are four common kinds of false cause fallacies.

Post Hoc, Ergo Propter Hoc (Latin for "After This, Therefore Because of This")

Post hoc, ergo propter hoc is a mouthful. It means that a relationship of time is confused with a relationship of causation.

Post hoc, ergo propter hoc: This fallacy occurs when we assume, without adequate reason, that one event *B* was caused by another event *A* because *B* happened *after A*.

Argument form: *A* occurred and then *B* occurred, therefore *A* was the cause of *B*.

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Compare the three different causal claims below:

1. "I took Echinacea for my cold, and a few days, later my cold was gone. Therefore the Echinacea cured my cold."
2. "I got a cold after using Bill's hankerchief."
3. "I have a cold because I used Bill's handkerchief to wipe my nose; cold viruses can be transmitted through nasal membranes, and Bill had a cold."

Since colds typically clear up in a couple of days anyway, identifying taking Echinacea as the sole reason it cleared up in a few days is fallacious. Maybe it would have cleared up faster without it. A single instance is a usually risky basis for making a causal generalization. Compare statement 3 above with the following:

4. "It is reasonable to think that I may have caught my cold by using Bill's handkerchief because cold viruses can be transmitted through nasal membranes."

In the case of 4, the event is *not* cited as the reason to believe that colds are transmitted through contact with the virus through the nasal membrane, but rather given the implicit assumption that the causal generalization is true, the event of my cold is explained as an instance of it. Good causal explanations always refer at least implicitly to causal laws or structures, and this can be made *explicit* by expanding the explanation to contain the law or structure supporting it.

Mere Correlation

Mere correlation. Here we assume that *B* was caused by *A merely* because of a *positive correlation* between *A* and *B*.

Mere correlation is essentially the idea that things that are associated together must have a causal relationship. Unlike in *post hoc, ergo propter hoc*, here we have two things that may be occurring simultaneously with some kind of trend or fact that is considered important enough to posit a causal relationship. There are a lot of memes made based on mere correlations. For example, there was a graph circulated online that compared the age of the women that Leonardo DiCaprio dates (stagnate at about twenty-four to twenty-five years old for the last twenty-five years with the age of Leo himself trending upward each year). See "Leonardo

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DiCaprio Only Dates Below 25—Correlation Between Leonardo DiCaprio's Dating Pattern and Productivity and Average Real Earnings,"[5] Know Your Meme, August 31, 2022.

> Argument form: *A* and *B* have a positive correlation, therefore there is a causal relation between *A* and *B* (either *A* caused *B* or *B* caused *A*).

This graph shows one line going straight up from twenty to his current age, which is over forty, and a line that stagnates at about twenty-three/twenty-four years. Next to this graph was an almost identical graph with one line that's identified as "major sector productivity" going up just like Leo's age and the stagnated line is identified as "real wages of goods-producing workers." Here the *x* and *y* axes are *basically irrelevant* because no one would think that there's a causal relation behind this positive correlation. How could the facts about Leo's life and wages/productivity be related? This demonstrates that when we do hear about positive correlations, we are assessing causality against what we know about how the world works. Since we are often uninformed and/or acting out of confirmation bias,[6] we often mistake *correlation* for causality. Or, to make this point more subtly, we often mistake mere correlation (meaning there is no relation at all) with there being some kind of causal connection (when there isn't).

EXAMPLES OF MERE CORRELATION

1. Variations in the death rate in Hyderabad, India, between 1911 and 1916 match the variations in the membership of the International Association of Machinists in the United States during the same period almost perfectly.
2. As the allowances of teenagers continue to rise, juvenile delinquency has gone up as well. Obviously to reduce delinquency, we must reduce teenagers' allowances.

Example 1 is a case of *mere* correlation: it would be a mistake to infer from the correlation that either was the cause of the other. There are at least two reasons for this. First, no *reasonable causal mechanism* can be assumed, since the events are

5 https://knowyourmeme.com/photos/2430978-leonardo-dicaprio-only-dates-below-25
6 https://www.britannica.com/science/confirmation-bias

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spatially unconnected and no causal laws have been proposed. This is why it is so important, as a critical thinker, to have an accurate model of how the world works. Second, an enormously large number of population-related variations occurred between 1911 and 1916 (the number of left-handed people born in Mongolia, the number of widows of cowboys killed in Argentina, the number of children born in Montreal to bilingual parents, and so on endlessly). If one looked hard enough, one could find *many near-perfect correlations that are completely accidental*, so it is reasonable given the first point to think that this is one of them.

> If you are interested in how appearances of mere correlation can look like causation using statistics, check out this article on p-hacking[7] or this CrashCourse video on p-hacking.[8] Essentially, p-hacking is manipulating data or analysis to assert a significant connection between effects.

Example 2 tries to reverse a trend by reversing a presumed causal connection. This just won't work, since the positive correlation identified in this example is not indicative of a causal mechanism; there are no doubt *many factors* that have changed involving teenagers in some way or another, and absolutely no reason has been suggested to think that the factor mentioned is a causally relevant one. We should ask ourselves whether anything else explains these two rises (which are themselves vague).

Reversing Cause and Effect

This brings us to reversing cause and effect. This false cause fallacy is where someone notices a positive correlation and posits a causal relationship but gets the direction wrong.

> *Reversing cause and effect*: Here we conclude that *A* causes *B* when *B* causes *A*, so there is a causal connection, but not the connection we believe.

It might seem unlikely to *reverse* cause and effect, but it does happen. Causal mechanisms are complicated, and we have to have very sophisticated models

7 https://statisticalbullshit.com/2017/07/17/p-hacking/
8 https://www.youtube.com/watch?v=Gx0fAjNHb1M

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of how the world works in order to get causal directions right. Here we are pointing out that there is a causal connection (and we are right) but that it has been misidentified. Kristin's grandmother is famous (in her family) for saying, "If you want to get sick, go to the doctor," or "The hospital kills people." This, of course, is a kind of superstition that gets the causal direction wrong: people go to the doctor because they are sick, and people are admitted to the hospital and put in palliative care because they are dying.

EXAMPLES OF REVERSING CAUSE AND EFFECT

1. The people of the New Hebrides have observed, perfectly accurately, that over the centuries, people in good health have body lice and sick people do not. They concluded that lice make a person healthy.
2. The spouses of successful executives wear expensive clothing, so to help your spouse become successful, buy costly clothing.
3. Twenty-five years after graduation, Yale graduates have an average income that's five times the national average. So if you want to be wealthy, enroll in Yale University.

Example 1 is the fallacy of reversing cause and effect: apparently lice do not like the body they live on to be too warm, so in the example, when a person had a fever, their lice would depart to search for cooler bodies to live on. Since lice were common in the New Hebrides, there was a positive correlation, and the correlation was indicative of a causal connection, but the conclusion reverses the cause and effect.

Example 2 and 3 are related (fig. 17.3). In example 2, the causal connection depends on the fact that (financially) successful executives can afford to buy their spouses expensive clothes and that doing so is part of a more opulent lifestyle that, given they can afford it, they prefer. In example 3 (also a fallacy of division, discussed in Chapter 14), a disproportionate number of people who enroll in Yale are from wealthy families, so Yale graduates may tend to be wealthy, but wealth is the relevant causal factor in graduating from Yale in the first place rather than the other way around. It might depend on what/who we are talking about (trends or individuals), but generally speaking, this claim seems to get the causal direction wrong.

Spurious Correlation

Spurious correlation: Here we conclude that *A* is the cause of *C* when in fact both *A* and *C* are the effects of some event cause *B*.

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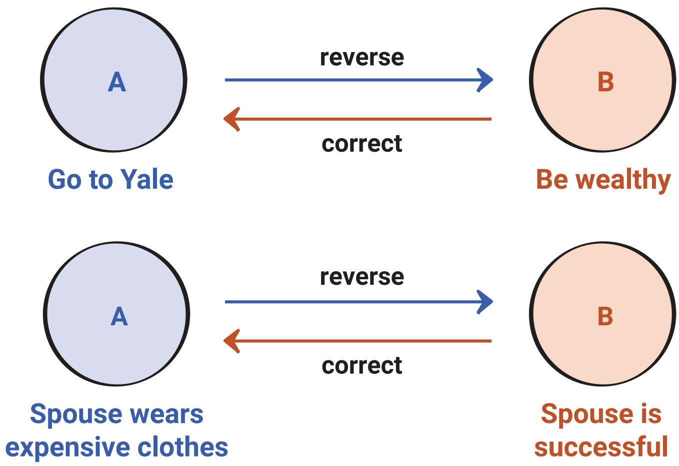

Figure 17.3 Examples of reversing cause and effect. Artwork by Jessica Tang.

EXAMPLES OF SPURIOUS CORRELATION

1. A survey on factory absenteeism found that married women had a higher rate of absenteeism than single women. So, we should fire women when they get married.
2. Married people were found to eat less candy than single people. Clearly, getting married makes you eat less candy.
3. Since women have entered the workforce, family life has deteriorated, the number of divorces and broken homes has soared, children have become disrespectful, and drug abuse has become commonplace. To cure these ills, we must get women back into the home.
4. When people get severe migraine headaches, they get nauseous and feel faint, so nausea makes people feel faint.

For example 1, after investigation, it turned out that the rate of absenteeism depended entirely on the fact that married women had more housework in the home due to gender inequality. So, the causal connection was correct, but it is importantly mediated by a fact about who does more housework. Thus, being married *did* cause more absenteeism, but this tells an incomplete story. The incomplete story matters because now we have more tools for understanding what can be done (more help at home).

For example 2, upon examination, it was found that the rate of candy consumption was actually strictly a function of age and that married and single people of the same age had the same rates of candy consumption. So getting married was *not* the cause of a decrease in the consumption of candy—the correlation is *spurious*. The causally relevant factor was age; aging both increased the likelihood of marriage and decreased the consumption of candy. This case makes a causal claim that initially looks like *A* caused *B*, but really *C* causes both *A* and *B*. This is visualized in figure 17.4.

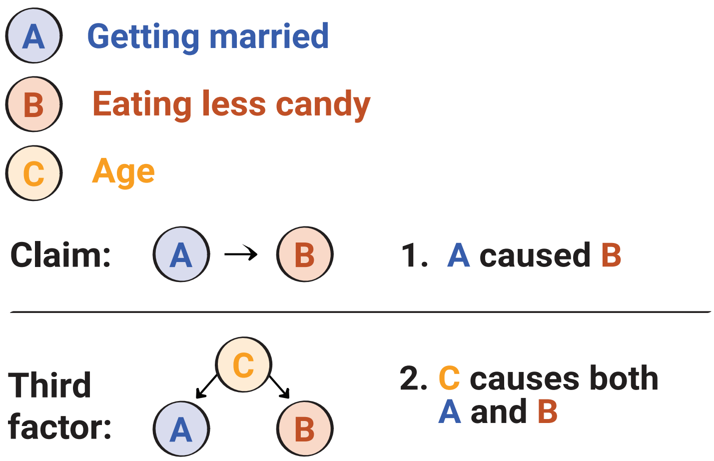

Figure 17.4 Example of spurious correlation. Artwork by Jessica Tang.

In example 3, the fact of women entering the work force is not the cause of the other changes in family life, but like them, it is the effect of broader underlying changes in the structure of society; in example 4, migraine headaches cause both the nausea and the feeling of faintness.

17.4 Slippery Slope (Wedge) Argument

In the slippery slope argument, a person will reason improperly from a claim that it has a terrible result or consequence and use that terrible consequence as evidence against the initial claim (fig. 17.5). In season 5, episode 4 of *Parks and Recreation*, in response to a character's advocacy for sex education for seniors, a disgruntled citizen claims, "If you teach grandpa how to use a condom, next thing you know, you will have babies in thong underwear. Is that what you want?" This comedy is (hopefully) making fun of slippery slope arguments, but you must recognize the form of the argument. Something relatively reasonable is proposed (sex education for seniors), and it is presented as the beginning of a chain of dominos leading to a terrible conclusion (babies in thongs). In the sense of fearing negative consequences, the slippery slope shares features with the *appeal to force or fear* (discussed in Chapter 15). The slippery slope argument has appeal because the terrible conclusion is usually terrible,

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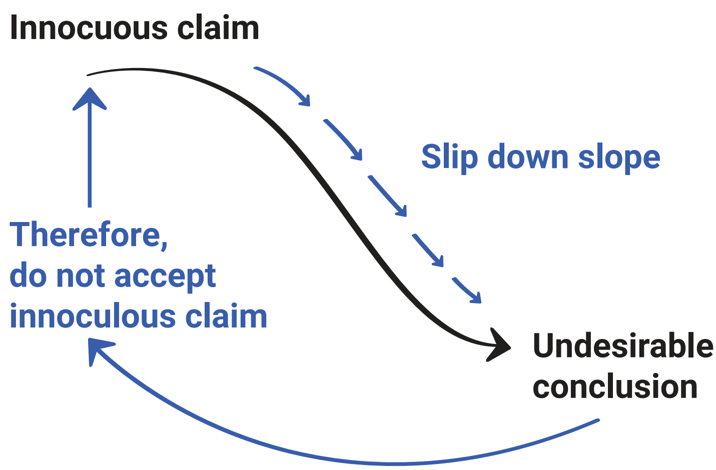

Figure 17.5 Fallacy of slippery slope. Artwork by Jessica Tang.

and if it is in fact the logical consequence of what is being proposed, then there is a good reason to reject the initial claim. So the question then becomes, Is the terrible conclusion *necessary*? That requires more argumentation.

> In the *fallacy of slippery slope*, a person asserts that some event must inevitably follow from another without any argument for the inevitability of the event in question.

In the *Parks and Recreation* case, it should be clear that there are no necessary dominos connecting the two happenings. But the fallacy of slippery slope presupposes without sufficiently demonstrating the necessity of a series of steps between events or ideas and rushes to an end. Let's look at a commonly occurring example:

EXAMPLE OF SLIPPERY SLOPE ARGUMENT

A governing political party wants to implement a new benefit for parents; let's call it a daycare subsidy. In opposition, the critics of the daycare subsidy could say that if we start helping people with daycare costs, we are essentially telling parents they need to use daycare, and thus the state will start telling parents how to raise their children.

Here, the negative consequence is government overreach, which is presented as an inevitable consequence of the daycare subsidy. Here we can ask a few things. First, is a daycare subsidy the same thing as *telling* parents to use

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daycare? Is this a good characterization? And even if it was, does this mean all aspects of parenting will inevitably be under state control? Usually in a slippery slope argument, there are a series of questioning points where something presented as inevitable is not inevitable. Each step needs to be justified and explained. Usually there are a series of steps (such as the steps between a daycare subsidy and state control of parenting) and each step presents an opportunity for rational debate and questioning. For example, the government might demonstrate that a subsidy does not at all *make* parents use daycare, but rather it makes it a more affordable option for some, and overall, daycare use might go up *by parental choice*.

EXAMPLES OF SLIPPERY SLOPE ARGUMENTS

1. We have to stop the tuition increase! The next thing you know, they'll be charging forty thousand dollars a semester!
2. The US shouldn't get involved militarily in other countries. Once the government sends in a few troops, it will then send in thousands to die.
3. Socialized medicine cannot be allowed because then the government will be involved in making health care decisions. They will decide who lives and dies, and they will start euthanizing people to save money (i.e., through "death panels").
4. If we allow gay marriage, we will have to allow polygamy, and then people will want to marry their animals.

Example 1 might seem like it needs contextualizing. Let's imagine that tuition at the time of writing this for undergraduate studies is about eight thousand dollars a year. It definitely depends on where you are and what school you are attending. But at least in Canada, the amount of money a post-secondary institution can increase fees is set at a determined rate. Governments are also able to set a "tuition freeze," so that tuition must remain at the same dollar amount per year. So in this case, imagine the government is proposing that tuition goes from eight thousand dollars a year to nine thousand dollars a year (when this fallacy is called a "wedge argument" this is considered the thin edge of the wedge). This is no small change. But it is very unlikely that the very *next* thing that happens is that tuition is forty thousand dollars a year (this would be the wide end of the wedge). If there are good reasons to stop the increase to nine thousand, then those reasons need to be laid out. The conjecture that it will immediately and necessarily be forty thousand dollars a year is not established. The arguer should talk about cost of living, access to education,

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fairness, social justice, and so on. Arguments against tuition increases can be made much more successfully than using a slippery slope!

> Have you heard of Godwin's Law?[9] It refers to the ways in which comparisons to Hitler (who was objectively morally reprehensible in every way) are made on the internet. Godwin's Law suggests that the longer a conversation proceeds online, the more likely a reference to Hitler becomes. This speaks to the frequency of the use of Nazi Germany in slippery slope arguments.

Example 2 uses "send in thousands to die" as a necessary conclusion of getting involved with other country's militaries. No one here is advocating for military intervention, but we need more information. We do not know the military intervention that is being discussed. It could be providing training and equipment but no soldiers. How, then, could thousands be sent to die? Again, we have to consider step by step how there are moments of pause and discussion within the military governance and ideally also with the public they are accountable to. Example 2, while best described as a slippery slope, also has an element of an *appeal to force or fear* because it relies on a scare tactic of the disastrous conclusion.

Example 3 starts with the government being involved in health care decisions and slides down the slope to death panels. "Death panels" is a kind of *question-begging epithet*, since it is unlikely that anyone would advocate for a death panel (and it is a prejudicial term or, minimally, we can only hope they wouldn't actually call it that).

Example 4 was a very common argument in the political discourse in Canada, especially before 2005. It is possible that people still make this argument in Canada and other places, but hopefully we can see that not only has the disastrous consequence (people legally marrying animals) has not occurred, but the argument itself was, in addition to being homophobic and discriminatory, an appeal to force or fear.

With a slippery slope, the arguer suggests that one move (of any size) toward a particular direction starts something down a path that slips all the way down to an inevitable terrible conclusion. This metaphorical slope is irrational because an arguer can just add consequence after consequence without

9 https://www.oxfordreference.com/view/10.1093/oi/authority.20110810105009431

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sufficiently arguing that each consequence is absolutely necessary. Slippery slopes are bad arguments *par excellence*.

17.5 Irrelevant Thesis (*Ignoratio Elenchi*)

The fallacy of irrelevant thesis is, along with straw person and inappropriate appeal to authority, perhaps one of the most common fallacies you will spot out in the world of argumentation. This fallacy is often called *ignoratio elenchi* (ignoring a refutation) or *red herring*. A way to characterize irrelevant thesis is that it violates a core relevance feature that both arguers have to be talking about the same thing. Recall Walton's five features of fallacies: irrelevant thesis has all five! Without listing them all, the important part is that in a dialogue aimed at truth, we must stay on topic. In addition, irrelevant thesis does carry some semblance of correctness because the place that it derails you to might also be of importance—it just needs to be of importance in another dialogue. The persuasive power of this fallacy derives from the fact that it often *does prove something*, and people simply fail to notice that the thing proved is *not the thing at issue*. The fallacy of irrelevant thesis is often used intentionally to sway people, sometimes by good arguments, to positions that have nothing directly to do with those arguments. Politicians and advertising designers are usually experts at this sort of thing.

In the fallacy of *irrelevant thesis*, an arguer attempts to sidetrack their audience by raising an irrelevant issue and then claims that the original issue has been effectively settled by the diversion.

Irrelevant thesis is a very common feature of call-in shows. Many years ago, the CBC radio program *Cross Country Checkup* (a call-in show) featured a discussion about health care policy, specifically about what to do about wait times for surgery. Most of the discussion centred on whether it would be fair to implement a two-tier system, which was suggested as one of the leading options to fix the issue. One caller called in and essentially said that wait times are not an issue because there are people dying of starvation in other parts of the world. The host said it was "a good point" before heading to the next caller. This is irrelevant thesis in action. Should we have a discussion about global food supply and the harms of global poverty? Absolutely. This is why the caller's point had rational force. They are correct that this discussion should take place. Where they were arguing incorrectly is that the initial discussion of wait times is effectively ended by bringing in another topic.

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EXAMPLES OF IRRELEVANT THESIS

1. Advocates of conservation contend that if we adopt ecological principles, we will be better off in the long run. But they are wrong, for it is easy to show that an ecological lifestyle will not produce an Eden on earth.
2. I fail to see why hunting should be considered cruel when it gives so many people great pleasure and gives employment to others.
3. Obviously fourteen-year-olds should be eligible for driver's licenses. They are every bit as intelligent as most adults.
4. "Mr. Scrooge, my husband certainly deserves a raise. I can hardly manage to feed the children on what you have been paying him. And Tiny Tim needs an operation if he is ever to walk without crutches" (Mrs. Cratchit in Charles Dickens's *A Christmas Carol*).

Example 1 offers us a shift of topic from being better off in the long run to producing an Eden on earth. Even if it were easy to show that an ecological lifestyle will not produce an Eden on earth, that isn't the topic. This is *inflationary* irrelevancy. *Being better off* has been inflated to mean having *an Eden on earth*—which would be *much harder* to prove than the original conclusion.

Example 2 is a very common form of irrelevancy. The original claim being argued is that hunting is cruel (let us assume that this is discussing sport or trophy hunting, versus subsistence hunting). The respondent shifts the topic to pleasure and economic goods, which are different subjects. There is a subtle connection; people who profit from hunting and those who enjoy it will not wish to feel that they are engaging in a cruel sport and so they will have an emotional reason to want to reject the conclusion that hunting is cruel. But the question of whether hunting is cruel or not has to do with how the animals suffer (or not) and not with how hunters feel, so it is irrelevant thesis. The only way to repair this issue is to make a further argument that the pleasure and economic benefit outweigh the harm to animals, which requires justification.

Example 3 violates relevancy also, since the issue is not whether fourteen-year-olds are as smart as adults but whether they meet sensible conditions of eligibility for having a driver's license (being responsible, having a need for transportation, etc.). Infants are also intelligent (in fact, they are excellent learners), but they do not meet sensible eligibility requirements for having a driver's license. The claim is therefore *irrelevant* to the issue in question.

We saw example 4 when we discussed *the appeal to pity*. This example is also an irrelevant thesis. Here the question is whether Mr. Cratchit merits a raise for his work, not whether he has need of more money.

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KEY TAKEAWAYS

- Analogy is a powerful tool because it allows us to understand an unfamiliar or difficult thing or set of facts by comparing it to something that is better known or understood. A *false analogy* offers such an analogical explanation when the purported similarity is *not relevant*.
- Good analogies are relevant, insightful, partial, provisional, and fruitful.
- The fallacy of false analogy is the comparison of two things that are only *superficially similar* or that, even if they are very similar, are *not similar in the relevant respect*.
- The fallacy of *false cause* is actually a family of related fallacies that occur when an arguer gives *insufficient evidence* for a claim that one thing is the *cause* of another.
- *Post hoc, ergo propter hoc*: This fallacy occurs when we assume, without adequate reason, that one event *B* was caused by another event *A* because *B* happened *after A*.
- *Mere correlation*: Here we assume that *B* was caused by *A merely* because of a *positive correlation* between *A* and *B*.
- *Spurious correlation*: Here we conclude that *A* is the cause of *C* when in fact both *A* and *C* are the effects of some event cause *B*.
- In the *fallacy of slippery slope*, a person asserts that some event must inevitably follow from another without any argument for the inevitability of the event in question.
- In the fallacy of *irrelevant thesis*, an arguer attempts to sidetrack his or her audience by raising an irrelevant issue and then claims that the original issue has been effectively settled by the diversion.

EXERCISES

Identifying Fallacies of Distorting the Facts

Identify the fallacies of distorting the facts, and explain why they are the particular fallacies you identify and what is wrong with them.

1. God must exist, since if everyone believed that there was no God, then we would have no reason not to obey the law, and the world would be in chaos.
2. It was forty-three degrees Celsius when Albert finished the eighteenth hole on the golf course. He drank seventeen glasses of water in quick

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succession. Then he drank a beer and immediately passed out. Albert should not have had that beer.

3. Climate change is not warming the globe. It was warm yesterday, and now today it is cooler. It is cooling down!
4. Tuition prices keep going up. But you have to also consider how housing and food prices are going up too.
5. Students are using ChatGPT to write essays, therefore university has no point anymore at all.
6. Anger is like steam under pressure. Keep it bottled up and let it build, and the next thing you know, someone might get killed.
7. When people get severe migraine headaches, they get nauseous and feel faint, so nausea makes you feel faint.
8. Journalist: "How will you address the education crisis when you are elected?" Politician: "I am glad you asked that. My new unemployment legislation will bring jobs to Alberta."
9. If we allow medical assistance in dying (MAID) to those with terminal illnesses, then not only will doctors just be deciding to off people whenever; citizens will be taking MAID over any minor inconvenience.
10. When Joe drinks, he is no fun to be around. He is unhappy, he hates his job, and Marcia picked up with another guy. Really, Joe should stop drinking. Drinking makes him a real bummer, man.
11. Recent studies show that the death rate in Canadian hospitals is considerably higher than the overall Canadian death rate. Obviously Canadian hospitals are failing to care for patients, if not making their situations worse.
12. I wore knee-high socks to the last Oilers game, and after that they won. They will surely lose unless I do the same this evening.
13. Children have more screen time than ever. Inflation is also on the rise. If children were being raised without screen time, we would curb inflation.
14. I got COVID-19 two days after I got the COVID-19 vaccine. Obviously, it has the live virus in it, since the vaccine must have given me COVID-19.
15. I sell so much more ice cream when the weather is hot. These warm temperatures are great for my ice cream business.

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18

Fallacies of Presumption

We will look at *three* fallacies of presumption. In *sweeping generalization*, the fallacy involves assuming that what is true in general applies even in special circumstances. In the fallacy of *hasty generalization*, the problem lies in assuming that the evidence on which the argument is based is sufficient to warrant the conclusion, when the evidence is unrepresentative or insufficient. And in the *fallacy of bifurcation*, one incorrectly assumes that the alternatives presented exhaust the field, when in fact other alternatives exist.

Fallacies of presumption are unsound because of unfounded or unproven assumptions embedded in them.

By smuggling in such presumptions, these fallacies give the impression of being valid arguments. The fallacies of presumption are pervasive and require special vigilance. There are some *general reasons* that fallacies of presumption are so deeply entrenched. One reason is that human beings often have epistemically inappropriate attractions to certain beliefs; in belief, we are a certain kind of "social conservative" and believe what others do often for no good reason at all *other than that others believe them*. We want to believe that certain ideas are true and tend to protect them from rational scrutiny by systematic inattention to relevant facts and by isolating them from counter-argument.

Not only do we tend to believe a claim because other people believe it; we also tend to believe a claim because we falsely believe it is what other people also believe. This is the false consensus

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effect.[1] It is a cognitive bias that existed long before we formed echo chambers online that exaggerate the agreement of our social groups.

Prejudice and bigotry function largely through subtle processes of protection and defence against clear reasoning. We are also likely to believe what our parents and peers do, and not always for very good reasons. So we have various *non-rational motives* to engage in subtlety fallacious forms of reasoning that protect us from having to be critical and clear. Another reason that the fallacies of presumption are pervasive is that human beings have limitations of attention and focus. Human reasoning capacity is not a single unified process but a hodgepodge of special-purpose mental powers and mechanisms each having a natural history and origin that may be quite remote from their present functions. Being a critical thinker involves harnessing the uses of these separate capacities and minimizing the problems they pose for each other.

We have seen that a way to clarify and correct reasoning is to bring implicit processes of reasoning into our awareness by making them explicit; by doing this, we can ameliorate their deficiencies and perfect them. But we cannot make everything explicit because we cannot pay attention to everything at once. Most of the basic mechanisms of belief production work, automatically, and unless we have reason to distrust their reliability in a particular case, we pay very little attention to them and their presuppositions. We have already suggested that we become better reasoners by regimenting our belief-forming processes in a way that allows us to monitor how well they are working. For example, by becoming skilled at seeing argument patterns like modus ponens, we become more certain that our reasoning proceeds correctly, leaving us energy and attention for other aspects of our reasoning. Later in this chapter, we will see examples of reasoning failures that depend largely on inattentiveness to relevant information. But let us give an especially clear example right now, generally known as the conjunction problem.

The conjunction problem, in which subjects attribute higher probability to the truth of a sentence of form *P-and-Q* than to the sentence *P* (a result that is logically impossible), was first presented by A. Tversky and D. Kahneman in “Judgments of and by Representativeness” (in *Judgment Under Uncertainty:*

1 https://www.simplypsychology.org/false-consensus-effect.html

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Heuristics and Biases, ed. D. Kahneman, P. Slovic, and A. Tversky, pp. 84–98, Cambridge: Cambridge University Press, 1982) and is often presented as follows.

Subjects in the study were given the following paragraph:

> Linda is thirty-one years old, single, outspoken, and very bright. She majored in philosophy. As a student, she was deeply concerned with issues of discrimination and social justice and also participated in anti-nuclear demonstrations.

They were then asked to rank the following statements by their probability, using one for the most probable and eight for the least probable.

(a) Linda is a teacher in elementary school.
(b) Linda works in a bookstore and takes yoga classes.
(c) Linda is active in the feminist movement.
(d) Linda is a psychiatric social worker.
(e) Linda is a member of the League of Women Voters.
(f) Linda is a bank teller.
(g) Linda is an insurance sales person.
(h) Linda is a bank teller and is active in the feminist movement.

When a group of ordinary subjects with no background in probability and statistics was given this task, 89 percent judged that statement (h) was more probable than statement (f), despite the obvious fact that one cannot be a *feminist bank teller* without being a bank teller. When the same task was given to a group of graduate students in the decision science program of the Stanford Business School (students who were acquainted with statistics), 85 percent made the same judgment! This conclusion is striking because, as just mentioned, to be both a bank teller and a feminist, one must be a bank teller, so the choice that Linda is a bank teller *cannot* be less probable than the choice that she is both a bank teller and a feminist. Results of this sort are very robust and have been repeatedly confirmed by other researchers; it is referred to as the conjunction problem because subjects attribute higher probability to the truth of a sentence of form *P-and-Q* than to the sentence *P*, even though it is logically impossible for this to be true.

Subjects conclude that option (h) is more likely than option (f) because the biographical sketch they are given *fits the stereotype* of being a feminist more closely than being a bank teller. When subjects compare the likelihood of two scenarios, they typically use *stereotypical likeness* or *fit* as a measure. (Recall our discussion of stereotype in Chapter 13.) Some researchers have

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seen this as evidence that people are not good at measuring probabilities, but of course this does not fit the facts; the students at Stanford Business School did badly, and they may be presumed to be very good at measuring probabilities. What seems more likely is this: the subjects in the experiment implicitly make the reasonable assumption that the eight choices they are given form a coherent classification of the possibilities (a set that has genuine alternatives to each other) and so "is a bank teller" is implicitly taken to mean "is just a bank teller" (i.e., is a bank teller who *is not* a feminist). But the eight choices are not genuine alternatives. The researchers have rigged the choices so that they do not form a coherent set of alternatives; the set violates the conditions of being both exclusive and exhaustive. As a result of what is normally a reasonable assumption—that they have been given a genuine set of alternatives—the subjects *don't even notice* that the two alternatives (h) and (f) stand in the relation of *P-and-Q* and *P*; they are just *oblivious to that feature of the set*.

We can draw two lessons from this study beyond noticing that participants reasoning using stereotypical likeness. The *first* is that it is very important when one is considering a set of alternatives for comparison that they are *genuine alternatives* for purposes of comparison. One cannot notice everything when thinking about a problem, so one should begin by setting the problem up as clearly as possible. *Second*, when one engages in an argument with others, it is important to be as charitable and clear as possible. In a psychological experiment, it may be acceptable to ask a trick question of the subjects to see whether they catch on, but in ordinary decision-making where you are trying to find out the truth, using trick questions would be a fallacy (as in the *fallacy of complex question*) and would simply cause others to reason badly. Let us now return to a discussion of the fallacies of presumption.

In fallacies of presumption, the facts relevant and necessary for the argument are not correctly and clearly represented in the premises. In this chapter, we deal specifically with how generalizations and other statements misconstrue relevant features of claims.

18.1 Sweeping Generalization (Fallacy of Accident)

Generalizations are commonly used in reasoning. Some generalizations are grounded in or explained by natural processes governed by causal laws of nature; other generalizations are probabilistic or dependent on local features of a subclass. There are typically exceptions even to strong generalizations, which makes reasoning using generalizations non-monotonic, which just means they can be overturned by evidence.

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A **generalization** is a statement made about a property of all or most members of a class.

We used generalizations with categorical logic when we made universal statements, such as with *A statements* and *E statements*. These rules, however, were without exception. Often if we add information, it will cancel the force of a generalization. Laws and rules, like generalizations, have boundary conditions beyond which the rule does not apply. For example, the legal system of precedent is a system of figuring out like cases and whether generalizations hold over various differences.

The fallacy of *sweeping generalization* is committed when an argument that depends on the application of a generalization or rule to a particular case is *improper* because a *special circumstance* (accident) makes the rule inapplicable to that particular case.

In general, when we express general rules or universal laws, we do not state the boundary conditions of these rules or universal laws. This is due partly to the fact that to do so would be cumbersome and lengthy. But it is also often due to the fact that while we agree on the general characteristics of the concept, we may *disagree* about where to draw boundaries, or else we are not exactly sure ourselves where the boundaries lie. So to state the boundary conditions would be itself controversial and potentially arbitrary. Take the right of free speech. Most people would agree that this right guarantees freedom of religious and political beliefs (at least under ordinary conditions) and that it does not guarantee the freedom to yell "Fire!" in a crowded theatre. But there is considerable social disagreement about whether a person has the right to advocate overthrowing the government or to use obscenities in public. So although we might all agree that everyone *has* the right of free speech (and all agree that certain things are *not* covered by the right), there may be no generally agreeable way to state all the boundary conditions on the right. The fallacy of sweeping generalization violates a boundary condition on the application of the rule. Let's look at some examples:

EXAMPLES OF SWEEPING GENERALIZATION

1. Everyone has a right to advance their ideas, so judges and other public officials have a right to use their official positions to further their religious views.

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2. Everyone has a right to own property, so even though Mary is a violent psychopath, we have no right to take away her weapon collection.
3. Since cross-country skiing is healthful exercise, George ought to do more of it because it will help his heart condition.

Example 1 uses a generalization "Everyone has a right to advance their ideas" and applies it to the religious views of public officials. Is this an appropriate application of a rule or generalization? Can you think of a boundary condition that makes this "sweeping"? The generalization cannot be applied to certain public officials because *it is a condition of their holding legitimate office that they refrain from using that office as a platform for their own views*. So the fact that you are talking about judges and public officials creates a special circumstance or "accident" that blocks the inference.

Example 2 uses the generalization that we have a right to own property (which, of course, is true but is very limited—not everyone can own a nuclear reactor, human persons, a tiger, and so on; we have special social processes and limits in place for different types of ownership). When we look at how Mary is a violent psychopath, this doesn't undermine her right to own property in general, but we might be able to make a good argument that we can take away specifically her weapons.

Example 3 gives us cause for concern. What is healthy and safe for someone in normal health is not necessarily healthy or safe for someone with special health problems. Let us not sweep over George's special circumstances.

The fallacy of sweeping generalization isn't really concerned with the truth of the conclusion. We can see from these examples that what makes sweeping generalization a fallacy is not that the blocked conclusions are *false per se* but rather that you cannot correctly draw the inference given the information you have. It might be that cross-country skiing would be good for George, and even *because* of his heart condition. Still, the argument is a fallacy because one cannot infer that what is generally healthful will be healthful for a person with a heart condition.

Just because something is a generally accepted rule doesn't mean that there aren't legitimate times when that rule doesn't apply.

When we make a generalization, we often have some information that allows us to make a reasonable inference given that information, but additional

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information can block that inference. Always ask whether the application is sweeping over a relevant difference. You hear that Pierre is from Quebec, so you might wonder whether he speaks English. Then you hear that he is a professor of English literature, and your prior wonder is no longer reasonable. Or your neighbours ask if you can look after their child for a while and you agree; had you known that they planned a six-month holiday in France, you would rethink your agreement.

18.2 Hasty Generalization (Converse Accident)

This fallacy is the reverse of the one above and is sometimes called the *converse fallacy of accident*, *over generalization*, or *secundum quid* (which in Latin means "in a certain respect"—to indicate that what is true "in a certain respect" need not be true in all relevant respects). It consists in arguing incorrectly from a *special case* to a general rule. Often the reason we overgeneralize is that we draw a conclusion from an evidential sample that is either is too small or biased and therefore not representative of the target population.

> The fallacy of *hasty generalization* is committed when an argument that develops a general rule does so in an *improper* way because it reasons from a special case (accident) to a general rule.

One common form of hasty generalization occurs where the issue in question is complex and there are arguments on both sides. Although it is invalid, people often select only the arguments that are favourable to their own opinions and present them as though they were all that there was to say on the matter. Of course, if one's objective is only to *convince* another person, this strategy may be effective. But as a piece of reasoning that establishes the truth (or even the probability of truth) of a conclusion, the method is fallacious.

EXAMPLES OF HASTY GENERALIZATION

1. Large scale polls were taken in Florida, California, and Maine, and it was found that an average of 55 percent of those polled spent at least fourteen days a year near the ocean. So we can conclude that 55 percent of Americans spend at least fourteen days near the ocean each year.
2. Mary Olsen crashed her car, and because she had her seat belt on, she couldn't get out quickly and was badly burned, so wearing seat belts is more dangerous than going without.

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> 3. During the war, enemy espionage rings were exposed by tapping the telephone wires of suspects. So the authorities should tap the phones of all suspicious persons.

Example 1 commits the fallacy of hasty generalization because the states of California, Florida, and Maine are all coastal states and most states are not, thus they do not represent an unbiased sample of "all Americans" with respect to spending time near the ocean. As a result, they represent a special case of Americans from which the conclusion cannot be legitimately drawn.

In example 2, the arguer takes the rare case when an accident is made worse by a seat belt and makes a rule ignoring the overwhelming majority of cases where seat belts are more helpful. So they are "special" cases (in fact, they are *exceptions* to the general rule) and cannot support the generalization that wearing seat belts is more dangerous than going without.

One way to combat a hasty generalization is to think of a "just because" statement. So, you can think that just because there was a special case that happened doesn't mean it is statistically common enough to ground the creation of a rule.

Example 3 is a hasty generalization because wartime is a special circumstance, during which it is widely (although not universally) agreed that some peacetime rights can be temporarily ignored. Whatever one's view on the conclusion, this fact blocks the generalization made in the argument.

18.3 Difference Between Hasty and Sweeping Generalization

Both hasty and sweeping generalizations deal with the relationship between generalizations and special cases (rules and boundary conditions).

In the above image (fig. 18.1), you have a relevantly similar group to which a specific rule applies. The line between the group members and the members in special circumstances represents the different conditions that block the application of the rule. Imagine the group members are "cars on the road" and the rule is the speed limit. But the vehicles in special circumstances are ambulances. They do not have to follow the speed limit (when they are actively responding to an emergency). So their special circumstances block the application of the rule.

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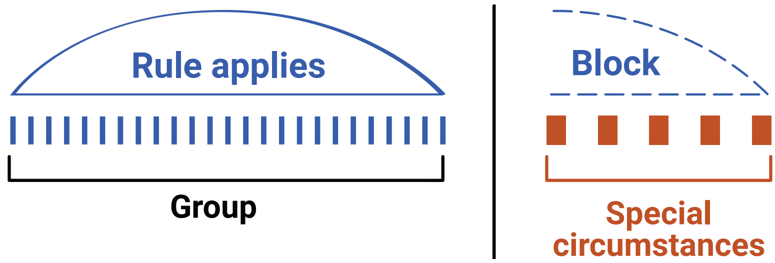

Figure 18.1 A group with a rule and the special case where it doesn't apply. Artwork by Jessica Tang.

18.4 Difference Between Hasty and Sweeping Generalization and Composition and Division

Students sometimes confuse the fallacies of *hasty generalization* and *sweeping generalization* respectively with the fallacies of *composition* and *division*. *Hasty generalization* improperly generalizes from an unusual specific case, whereas *composition* involves an inference from the possession of a feature by every member of a class (or part of a greater whole) to the possession of that feature by the entire class (or whole). So the difference is between "this *X* is *Y*, therefore all *X*s are *Y*" and "Every *X* in G is *Y*, therefore G is *Y*." For the fallacy of composition, the central fact is that even when something can be truly said of each and every individual member, it does not follow that the same can be truly said of the whole class. Similarly, *division* involves an inference from the possession of some feature by an entire class (or whole) to the possession of that feature by each of its individual members (or parts), and this differs from *sweeping generalization*, which mistakenly applies a general rule to an atypical specific case (fig. 18.2).

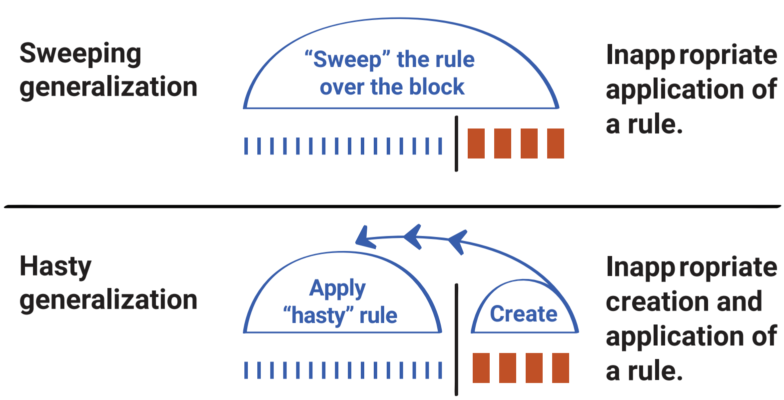

Figure 18.2 Difference between hasty and sweeping generalization. Artwork by Jessica Tang.

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Examples of the Difference

Fallacy	Example	Explanation
Division	The old have many health problems. Martha is old. __________ So: Martha has many health problems.	"Many health problems" is a feature of a group that cannot be divided down to an individual such as Martha. "Many" is vague and is likely speaking to a statistical average, which of course means there is a distribution of health indicators within that group.
Sweeping generalization	Poodles are popular dogs. Ditzy is a poodle who bites people. __________ So: Ditzy is a popular dog.	Poodles as a group are popular, this is for certain. But Ditzy, who is a poodle, bites people, which acts against their popularity. Thus we cannot take the rule that poodles are popular and apply it to Ditzy. Ditzy's biting blocks the application of the rule.
Composition	Every player on the team is excellent. __________ So: The team is excellent.	Here a property of each player is attributed to the team as a whole. This is fallacious because, as many fans of team sports will tell you, teams have dynamics that are different from the abilities of each individual player.
Hasty generalization	Emil, the star centre of the team, is excellent. __________ So: The team is excellent.	Notice how Emil is identified as a "star centre." This is a special circumstance that blocks the inference to a generalization about the team.

18.5 The Fallacy of Bifurcation

The fallacy of bifurcation is sometimes called the *either-or* fallacy, false dichotomy, "excluded middle," or false dilemma. Bifurcation is the fallacy of treating a distinction or classification as exclusive and exhaustive of the possibilities when in fact *other alternatives exist*. Here the arguer presents two exclusive options to force a choice in the dialogue partner. Another way to explain this false choice is to say that this fallacy confuses *contraries* with *contradictories*.

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Two statements are contradictories if the first is false then the second is true and vice versa. With two contradictory statements, one is always true and the other false. But contrary statements don't always have opposing truth values. **Contraries** can both be false. (Recall we discussed contraries in our discussion of categorical logic, Chapter 11.) You might remember this from our discussion of inclusive versus exclusive "or" with the *disjunctive syllogism*. Student papers often suffer from the fallacy of bifurcation. Often a paper will have the argument form that either *A* or *B* is true, and since *A* is false, *B* must be true. If *A* and *B* are only contraries and there are other possibilities (*C*, *D*, . . . , etc.), the effect is that the paper as a whole fails, even though the individual arguments may be acceptable.

Let us look at the difference between a contrary and a contradictory:

1. (Contradictory) Either a human is alive, or he is not (can't have someone be alive and dead at the same time).
2. (Contrary) Either it is Wednesday, or it is Thursday (can't be both Wednesday and Thursday at the same time).

For 1, ask yourself, can both statements be true? Can some be alive and not alive? No. But 2 should hit differently at this point. Let's ask the same questions: Can they both be true? Can it be Wednesday and Thursday at the same time? No. But can they both be false? Yes, because whenever it is Sunday, Monday, Tuesday, Friday, or Saturday, both statements are false.

The fallacy of *bifurcation* is when an arguer treats a distinction of classification as exclusive and exhaustive of the possibilities when in fact other alternatives exist. In this fallacy, one confuses *contraries* with *contradictories*.

Have you ever heard the phrase "You can't be a little bit pregnant," implying that you are either pregnant or you are not pregnant? This is because the statements "you are pregnant" and "you are not pregnant" cannot both be true (they are contradictory). But there are other uses of "or" in life that are much more forgiving. I (Kristin) like to think about my years as a waitress. Breakfast specials often have a complex array of "ors" operating. You can have eggs, bacon, or sausage (both are possible!) and hash browns and toast or pancakes (all three are possible, but it costs extra!).

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Argument form: There are two exclusive and exhaustive options: *A* and *B*. *B* is false, therefore *A* is true. Or, *A* is false, therefore *B* is true.

Because our language is full of opposites, we have a strong tendency to bifurcate and argue *either (the first) . . . or (the second)*. But many situations do not present us with opposites like this. In fact, most opposites are not genuine contradictories but simply *contrast classifications*. Take "weak" and "strong" for example. Quite apart from the fact that there are different respects in which things can be weak or strong, it is quite possible for something to be neither weak nor strong in whatever respect one considers. Weak and strong represent boundary cases between which there is a normal range. Thus one cup of coffee could be weak, another normal, and a third strong.

EXAMPLES OF BIFURCATION

1. If you know BMWs—either you own one, or you want one.
2. If we were going to buy a car, we would have to buy either a good one or a cheap one. We cannot afford a good one, and we don't want a cheap one, so we will just have to do without a car.
3. We must choose between safety and freedom. And it is in the nature of good Americans to take the risk of freedom.

Example 1 is definitely trying to sell us something with a false choice. These are presented as one or the other, but really, a person might not own one or want to own one.

Example 2 presents "cheap" and "good" as contradictory, but they are really contraries. Other options exist, so the argument is fallacious.

Example 3 is very common among political speeches and rhetoric. Here the speaker has used an "or" between two terms, "safety" and "freedom," when the two are not even *contraries*.

Like many fallacies we will discuss, a good place to look for the fallacy of bifurcation is the editorial page of the newspaper. Letters to the editor are also frequently fallacious in this way. A good example is President's Bush's famous November 2001[2] claim that "You're either with us or with the enemy." In short, the fallacy of bifurcation is easy to identify because an assertion is made that there are *only* two possibilities when there are three or more (or at least the arguer hasn't provided a *reason* to think otherwise).

2 https://youtu.be/-23kmhc3P8U

KEY TAKEAWAYS

- *Fallacies of presumption* are unsound because of unfounded or unproven assumptions embedded in them.
- The fallacy of *sweeping generalization* is committed when an argument that depends on the application of a generalization or rule to a particular case is *improper* because a *special circumstance* (accident) makes the rule inapplicable to that particular case.
- The fallacy of *hasty generalization* is committed when an argument that develops a general rule does so in an *improper* way because it reasons from a special case (accident) to a general rule.
- The fallacy of *bifurcation* is when an arguer treats a distinction of classification as exclusive and exhaustive of the possibilities when in fact other alternatives exist. In this fallacy, one confuses *contraries* with *contradictories*.

EXERCISES

Identify Fallacies of Presumption (and Ambiguity)

Identify the fallacies of presumption, and explain why they are the particular fallacies you identify and what is wrong with them. Note: There are also examples of composition and division mixed in.

1. Each oil company is perfectly free to set its own price for gas, so there can be nothing wrong with all the oil companies getting together to fix a common price for gas.
2. Diamonds are rarely found in this country, so be careful not to misplace your wedding ring.
3. The New Democratic Party was booted out of government in the last provincial election in Saskatchewan, so the New Democratic MLA Pat Atkinson must have lost her race here in Saskatoon Broadway.
4. Traffic accidents are on the increase. Collisions between Model T Fords are traffic accidents, therefore collisions between Model T Fords are on the increase.
5. Yes, I know Mike had surgery, but that was a month ago, and he should have recovered by now. The point is that his term paper ought to have been in by now. That’s enough to show me that nobody can ever count on Mike to do his work.

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6. Anyone who cares about their appearance would never wear sweatpants. I just picked up Marcia from the gym, and she is wearing sweatpants, so we can see she has chosen not to care about her appearance.
7. Marcia loves pepperoni and olives, and she is crazy about butterscotch swirl ice cream, so she is sure to love the pepperoni and olive butterscotch swirl sundae you made her.
8. Consider why you should accept Jesus into your heart as your personal saviour. Do you want to go to hell? You have a choice, salvation or endless suffering. If you accept Jesus and change your life, you will be saved. If you don't, you will go to hell.
9. Terminally ill people in hospital are often given morphine drips when they are in pain, so morphine must be a good pain reliever for my headache.
10. Dogs are harmless companions, therefore this 110-pound Cane Corso that hasn't eaten in a week is harmless.
11. Athletes are physically fit, so this strong-man competition winner should be able to run a 40-kilometre marathon.
12. Birds can fly, so penguins can fly.
13. In life, you either choose to dedicate yourself to your family or your career. You choose.

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19

Fallacies of Evading the Facts

We may *overlook* significant facts or relevant features of a problem entirely; we may *evade* them or attempt to isolate them, or in the class of fallacies that evade the facts, the arguer appears to be dealing with the relevant facts, but they actually do not. “Evade” means to avoid being direct and potentially to do so with trickery or cleverness. This is not to ascribe mal intent to the arguer—many of these argument forms are considered good because they haven’t been analyzed properly—but, rather we use the word “evade” because the arguer is presenting the information too favourably for them. Remember that one of the key features of a critical thinker is to provide members of the dialogue with sufficient relevant information to understand their claims. When we evade the facts, we give an argument with a semblance of correctness, but it falls short (conditions 4 and 2 of Walton’s definition of fallacies).

The fallacies we deal with here are straw person, begging the question, question-begging epithets, complex question, and special pleading.

19.1 Straw Person

Straw person arguments were previously called a “straw man” argument. You might have already guessed that the term “straw” is used to name the fallacy because straw is weak and there’s a weakness in the argument. This is partially right. When we are engaged in a dialogue, the person we disagree with might have presented a few claims and a conclusion. The effectiveness of our response to those claims depends on how we track what they are claiming and what it means. If we respond—even with a good argument—to something they didn’t say or mean, then our response fails to meet the relevance condition of good arguing. Keep in mind that the straw person fallacy is neutral

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about whether the person doing the distorting is doing it intentionally or unintentionally.

In the case of the *straw person fallacy*, an arguer constructs their dialogue partner's view out of "straw" (to make it easy to knock down), which effectively creates a new person, the "straw person" who is refuted (rather than the original dialogue partner).

The fallacy of straw person has a semblance of correctness (Walton's part 4) because the arguer *actually does* knock down the straw person's argument (because it is weak). But they don't actually accomplish anything in their dialogue because the original dialogue partner doesn't hold that view. Let's discuss an example.

EXAMPLE OF STRAW PERSON FALLACY

Imagine a company meeting:

Person *A*: We are bringing in new systems to deal with technology to make it more efficient in our company. Technology *Y* is efficient, so we should adopt it.
Person *B*: I am looking forward to technology *Y* being implemented. If it will make our systems more efficient, that is good.
Person *A*: Technology *Y* is documented to make systems more efficient.
Person *B*: Sounds good. Efficiency is an important goal of our organization. Another goal of our organization is to educate the citizenry. How does this systemic change affect our ability to educate the citizenry?
Person *A*: The goal of our organizational change is not to "save the planet."

Notice how person *B* hasn't even made an argument, and they've been smacked down. *B* merely asked a question about how efficiency relates to educational goals. Surely an organization can have more than one goal. Person *A* simultaneously mischaracterizes *B* as wanting to "save the planet" and refutes them, since this is not an achievable goal by a technology system change in a limited organization. These kinds of dialogues are common and often don't get addressed, especially if the person in position *B* has less power than person *A*. Not only has *B* been shot down, *A* didn't do anything to strengthen their position.

So what do we learn from the straw person fallacy? In order to be a good critical thinker, you have to be fair.

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The straw person fallacy essentially has an antidote, which is the principle of charity.[1] This is an approach to ideas where you assume your dialogue partner's view is strong, so your response is also strengthened. Here's a video about how to apply the principle of charity in your writing.[2]

You have to ask yourself if the person you are arguing with *would endorse the view you are attributing to them*. This means being sceptical that *you've* fully understood your dialogue partner. A key feature of improving one's critical thinking capacities is to be able to reconstruct arguments, which means we have to be thorough and work through arguments step by step, including and *perhaps especially* the arguments of others. If person *A* had asked person *B* above what they meant, person *B* might have said they're worried that efficacy might undermine the experiences of those on the other end of the change and thus the change will be efficient in one way but undermine other goals. Notice how there's nothing here about saving the planet! This is actually raising an important point about how change affects an organization.

EXAMPLES OF STRAW PERSON FALLACY

1. Person *A*: Everyone deserves equal pay regardless of gender. Person *B*: So a mother who stays home with children should make the same as a brain surgeon?
2. Person *A*: Human beings' actions are the cause of climate change. Person *B*: How can you say that I personally killed all the bees?
3. Political party *A*: We need to raise taxes to better fund health care. Political party *B*: Party *A* just wants to take all your money and throw it away on executive salaries.

In example 1, *B* misconstrues *A*'s point. *B* takes an uncharitable interpretation of *A*'s view to the extreme and easily refutes it. Of course, *A* might mean that everyone deserves equal pay for equal work. In example 2, person B is attributing a silly view to person A and thus it is easy to refute. In example 3, B has greatly weakened the view of party A by misconstruing it.

1 https://effectiviology.com/principle-of-charity/
2 https://www.youtube.com/watch?v=Ix1VTiMXph4

https://doi.org/10.15215/remix/9781998944057.01

While constructing a straw person is wrong, some arguers don't even address a person's view; they rule it unworthy of consideration. This is known as the "pooh-pooh" fallacy or hand-waving.[3] Hopefully we don't have to go into too much detail about why this is a bad way to argue.

19.2 The Fallacy of Begging the Question (*Petitio Principii*)

People often use "beg the question" in everyday contexts to mean that we need to ask a question. This is not how philosophers generally mean this phrase, and it is not necessarily connected to the definition of the fallacy of begging the question.

> The fallacy of *begging the question* is assuming what you intend to prove or should be proving. It is a failure of the support relationship.

Another way to think of this is that begging the question "stacks the deck" in your favour by essentially putting your own conclusion into your premises. Because of this, begging the question violates the condition that premises support the conclusion. What does begging the question look like? It comes in at least 3 different forms:

3 DIFFERENT FORMS OF BEGGING THE QUESTION

Statement *P* is true.

———

Therefore, statement *P* (restated in a different language) is true.

Statement *P* is true.

———

Therefore, statement non-*P* is not true.

Statement *P* is true.
Statement *Q* is true.
Statement *R* is true.

———

Statement *P* is true.

3 https://en.wikipedia.org/wiki/Pooh-pooh

https://doi.org/10.15215/remix/9781998944057.01

This is why begging the question is also called the fallacy of circularity. *Petitio principii* is a Latin term that means "little circle." The argument resembles a circle. Let's consider an example: "The belief in God is universal because everyone believes in God." Here's how it makes a circle:

Figure 19.1 Example of circular reasoning (begging the question). Artwork by Jessica Tang.

Ask yourself, What would support the claim that the belief in God is universal? You'd need some kind of poll on all humanity, which would be impossible. You certainly can't support it with another claim that repeats itself.

EXAMPLES OF BEGGING THE QUESTION

1. Joe is the rightful possessor of that bike because they own it.
2. Free trade will be good for the country. The reason is obvious. Isn't it patently clear that unrestricted commercial relations will bestow on all sections of this nation the great benefits that result from an unimpeded flow of goods between countries?
3. Government ownership of public utilities is dangerous because it is socialistic.

Example 1 is similar in form to the question of the universal belief in God pictured above. Here the claim that Joe is the rightful possessor of the bike is supported by the fact that they own it. The problem is that ownership is essentially being the rightful possessor. Sometimes to analyze an example of begging the question, it can help to ask, What would support the claim that "Joe owns the bike"? Maybe if they had a receipt, or the testimony of the salesperson, or other witnesses to Joe's rightful acquisition of the bike. But what doesn't support that Joe owns the bike is that they are the rightful possessor of the bike.

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Example 2 is a bit more difficult to spot. Here you have a claim that free trade is good for the country. First of all, always be suspicious of the use of the terms "obvious" and "patently clear." These are words that make it seem like anyone who disagrees is missing what is obvious and clear, which can be an *ad hominem*. Either way, it doesn't actually strengthen the claim. This example is circular because each word in the conclusion is just an extended phrase meaning the same thing as the premise. It basically says free trade is good because free trade (unrestricted commercial relations) is good (great benefits).

Example 3 is a slightly different version of the fallacy of begging the question. It uses an unfounded (or at least controversial) generalization to support a conclusion that *would* fall under the generalization if it were true. If the generalization that socialism is dangerous were true, then the conclusion would follow, but *the larger generalization is what is at issue*—it needs support. Therefore, it is question begging to define socialism that way in the first place.

> I once overheard three brothers dividing two candy bars. The oldest one gave each of the two younger ones half of a candy bar, and kept a whole bar for himself. When asked why he got more candy, he said he was the smartest. A few minutes later, one of the younger ones asked why he was the smartest, and in reply the oldest said "Because I have more candy." (Ernest J. Chave, *Personality Development in Children*, Chicago: University of Chicago, 1937, p. 151)

Begging the question violates the rule that premises must support the conclusion. Recall that **justification** is a *dependence* relation of support (the conclusion depends on the premises). Circularity gets it wrong because it violates this dependence. It asks that the conclusion support itself, which doesn't work. For an argument to be dialectically acceptable, the conclusion must be in some sense *independent* of the premises. One way to think of this is that dialectical acceptability supports the premises and the premises support the conclusion. The conclusion is not identical to either premise, nor does it follow from either premise alone. The conclusion requires its premises in order to follow.

We suspect that examples we have given do not deceive anyone because they are easier to detect. In a long argument, it is often easy to miss circularity. This is why looking for the logic of longer passages (What is the thesis [conclusion]? What are the arguments in support [premises]? Are they dialectically acceptable? Why or why not?). One way to get started is to look for repetition and see where the support and dependency relationships are.

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Interestingly, a circular argument is not necessarily *unsound*—for example, it might be a sound argument from the definition. Consider:

> Rome is the capital of Italy, therefore Rome is the capital of Italy.

To muddy the waters, this argument is *valid*. But recall that validity is a formal property of arguments where if the premises are true, the conclusion must also be true. Here, if the premise is true, then the conclusion is also true. And the premise and conclusion are both true, making the argument sound. The problem with the argument is when we start thinking about dialectical acceptability. Does this argument give a reason to *believe* "Rome is the capital of Italy" to someone who doesn't know this fact? In order to make it a truly supportive argument, you'd need to say something about what makes it true for a city to be a capital of a country. You'd need to demonstrate that this is accepted by the proper granting authorities in Italy and perhaps even internationally (since that is part of being recognized as a country). You might also need to check to make sure that this fact hasn't changed in the last stretch of time because you could be wrong. Keep in mind that arguments need to give reasons for belief. While this argument is *valid* and *sound*, it fails to give reason for anyone to believe it, which is again a problem of circularity.

19.3 The Fallacy of Question-Begging Epithets

There are other ways in which arguments can achieve circularity. One is to use such prejudicial and suggestive words that you've delineated a claim with the conclusion smuggled in. Here, we are question begging using epithets. An epithet is a descriptive word or phrase used to characterize something, generally in a negative way. This fallacy has a number of names in other descriptions of fallacies: loaded words, mudslinging, verbal suggestion, and others.

> *Question-begging epithets* use slanted language that is question begging because it implies what we wish to prove but have not yet proved.

Notice the definition draws our attention again to the support relationship. Slanted language does not prove a claim, and it certainly doesn't make it *dialectically acceptable*. Here are some examples:

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EXAMPLES OF QUESTION-BEGGING EPITHETS

1. This criminal has been charged with a terrible crime.
2. You shouldn't listen to this dangerous radical's ideas.
3. It would be disloyal to believe that scurrilous doctrine, as it is a traitorous tissue of lies.
4. Of course the husband ought to support his wife and family, as it is the duty of the breadwinner.

Example 1 is a question-begging epithet not only because it is negative to be referred to as a "criminal" but also because the person has been called a criminal only by the fact that they have been charged with a crime. We do not actually know if they are a criminal, just that they were charged. This is prejudging guilt.

Example 2 uses as an epithet that the person is a dangerous radical, and it is question begging to imply at the same time that the ideas themselves are dangerous and radical. This example also overlaps with *abuse* and *poisoning the well*.

Example 3 barely makes sense, but what it is doing is using slanted language in place of an argument. If something is a bunch of lies, then there must be proof we can point to. This is much better than just declaring something as a lie—that is question begging.

Example 4 gives a kind of slanted language that is using a positive spin. Here, we have the prestige and uplift to be called a breadwinner. This is basically saying the husband should be the breadwinner because he should be the breadwinner (support family). It repeats but does not justify a claim.

19.4 The Fallacy of Complex Question

This fallacy is essentially a *question form* of the fallacy of *begging the question*. One way to think of it is that it is a question that fails to properly be a question. This fallacy can go by many names, some of which are trick questions, leading questions, and false questions. The exemplar that is used a lot is the question, "Have you stopped beating your dog?" Why is this a trick question? Because you affirm the premise (that you beat your dog) whether you say no or yes. Notice how this assumes the very thing that should be in question (whether you beat your dog). Of course, you could answer in other ways, such as changing the subject, but in a way that doesn't follow what we are doing when we pose and answer questions.

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The *fallacy of complex question* is when the arguer asks a question that presupposes the truth of the question at issue.

Identifying this fallacy requires understanding the logic of interrogative inquiry, including why we do it and its purpose. Interrogative inquiry is a form of structured argumentation that hangs on the asking and answering of questions. You are likely familiar with the ways in which lawyers question witnesses in a legal examination.

British comedy *Yes, Prime Minister* has a scene[4] that demonstrates the use of leading questions for skewing a public opinion poll.

The aim of legal examination is and should be to reveal the truth. The form of inquiry requires at least two conditions: one, that witnesses answer truthfully, and two, that the questions that are asked are relevant. To ensure these conditions, witnesses are asked to swear to tell the whole truth and judges make sure that the questions asked are relevant by ruling lawyers out of order when the questions aren't.

At the same time, scientific inquiry can be seen as constituted in part by a structured exercise of truth-seeking questions. A series of questions about the world can be asked (hypotheses, perhaps), and nature "replies" with a truth about the world. Or we can think of proper interrogative inquiry as a kind of game with a number of rules:

1. Questions must be answered truthfully.
2. Lying or refusing to answer will be considered a breakdown of the game.
3. Questions are asked one after the other.
4. Later questions depend on answers to earlier questions.
5. The process builds a case that reveals the truth about some matter.

Recall that with the *fallacy of accent* (discussed in Chapter 14), when we ask a question, we presuppose certain background assumptions. These background assumptions are about what is true but also about what the point of the question

4 https://www.youtube.com/watch?v=G0ZZJXw4MTA

even is. Even open-ended questions presuppose that you know something. Consider the following: "What do you know about bread making?" presupposes that you know something. Contrast that with "Do you know anything about bread making?" We can note here that questions are usually instructive toward certain answers. This is why people make jokes with questions such as "Why anything?" or "Who cares?" These questions don't really instruct; they are just expressions of certain feelings. Typically, a question asks the respondent in effect to choose from a number of alternative direct answers. For example, the question "Is it time for dinner yet?" invites the respondent to answer "Yes, it is time for dinner" or "No, it is not time for dinner." Both questions and both alternative answers assume dinner will be soon.

> The high-profile case of the conviction of Brendan Dassey in the death of Teresa Halbach in 2005 is the subject of the Netflix documentary *Making a Murderer*.[5] Dassey's lawyers contend that his confession is false and coerced. In his interrogation, the police asked him, "Who shot her in the head?" Dassey's lawyers contend this is "fact-feeding," since he didn't know how Halbach died at the time. Dassey's response was to point the finger.[6]

Consider how "Are you still angry with me?" invites the respondent to answer "Yes, I am still angry with you" or "No, I am not still angry with you." Both answers imply the proposition in the question is true (I was/am angry with you). Appearing by itself, the question "Are you still angry with me?" is an example of a complex question *because the only allowable direct answers to it imply that I was angry with you*, which may or may not be true—and in any case, that has not been independently established. Go back to the previous rules of questioning. If the question follows a prior question to which the answer already established that I was angry (rules 4 and 5), then it is a legitimate part of a course of interrogative inquiry. It is not an accident that a complex question is called a "trick question"; asking a trick question violates the rules of interrogative inquiry.

Let's look at some examples:

5 https://www.imdb.com/title/tt5189670/
6 https://innocenceproject.org/brendan-dasseys-confession-highlights-importance-of-recording-interrogations/

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EXAMPLES OF COMPLEX QUESTION

1. What is the explanation for mental telepathy?
2. Where did you hide the murder weapon?
3. When should you buy your first Cadillac?

Example 1 presupposes that there is an explanation for mental telepathy and merely asks the respondent what that explanation is. Example 2 presupposes you hid the murder weapon. Example 3 assumes everyone buys a Cadillac; they just have to decide when. Going back to the rules of good questioning, recall that these questions in the examples are not given with context. We don't know if they are building a larger case of inquiry. So let us just say that good critical thinking using questions takes time to establish anything of value. This is why many philosophers and educators hold Socratic questioning[7] in such high regard.

19.5 The Fallacy of Special Pleading

The fallacy of special pleading is to apply a *double standard*, one for ourselves and another for everyone else. It is a special kind of question begging also, since the prejudicial language is just as much about painting the opponent in negative terms as it is to relieve oneself of any negative meaning. Bertrand Russell once illustrated this fallacy by his "conjugation" of the verb *to be firm*: I am firm; you are stubborn; he is pig-headed. The idea here is that the same behaviour (presumably) is described as "being firm" when I do it, but when others do it, it is stubborn or pig-headed (with apologies to pigs). Why is this a fallacy? Recall our discussion of definitions in Chapter 5. We talk past each other when we have different definitions, but here we are doing so not by accident but for prejudicial reasons.

Special pleading is when we use slanted or loaded language for others' actions but when we do the same thing we use neutral or positive language.

We're sure you've heard someone say their opponent is harsh and rude while *they* are just engaging in "real talk." This is extremely common. But how do we differentiate between being rude and "real talk"? What are the circumstances

7 https://iep.utm.edu/socrates/

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that differentiate our behaviour, other than our own special interest in not looking bad?

Consider another example: the ruthless tactics of the enemy, his fanatical suicidal attacks, have been foiled by the stern measures of our commanders and the devoted self-sacrifice of our troops. Here, stripped of *motive* language, we and the enemy *are doing exactly the same things*, but somehow when we do them, they are *great*, and when the enemy does them, they are *terrible*. Good examples of special pleading are easy to find in political speeches, news stories, and political commentaries, which are often aimed less at the truth than at persuasion or self-congratulation.

We have evidence that a double standard is operating when *literally* correct words are replaced by emotionally charged words that are similar in meaning.

It is a feature of our language that almost every action and human attribute can be referred to in numerous ways, some of which are positive, some negative or neutral.

Consider the following examples:

Neutral	Special pleading
Enterprising plan	Opportunistic scheme
He smiled engagingly at her.	He leered suggestively at her.
Reserved	Secretive
Boisterous group of young fellows	Rowdy gang of juvenile toughs
Group	Gang

Consider the numerous double standards involved in sexism. Imagine someone saying, "Teaching is no longer seen as a woman's job. Teaching is now seen as a tough, exciting place where things are happening." Here by contrasting a "tough, exciting place where things are happening" with a "woman's job," the speaker is appealing to a double standard where what "the men" do is exciting and tough, whereas what "the women" do is not.

Double standards often reflect differences in prestige or power. They often operate covertly and without notice. Indeed, there are usually barriers in place to prevent their notice, especially by those whose advantage they serve. It is

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convenient for those who are advantaged and powerful not to have to notice double standards, since this saves them the embarrassment of having to justify the *advantages* they have. Of course, many of our attitudes toward foreign and unfamiliar people, groups, cultures, and religions are grounded in ignorance, or at least limited and stereotypical beliefs, perhaps acquired as children. When thinking about people or customs of whom we have only a superficial knowledge, it is easy to imagine differences that do not exist and apply double standards without knowing it. A certain humility in judgment coupled with a commitment to the truth is probably the best remedy to the danger of applying double standards involuntarily. At the end of the day, double standards distort the facts. Because of that, they pose a very serious threat to the realization of a dialogue (Walton's criterion 5), which is to inch closer to the truth.

KEY TAKEAWAYS

- In the case of the *straw person fallacy*, an arguer constructs their dialogue partner's view out of "straw" (to make it easy to knock down), which effectively creates a new person, the "straw person" who is refuted (rather than the original dialogue partner).
- The fallacy of *begging the question* is assuming what you intend to, or should be, proving. It is a failure of the support relationship.
- *Question-begging epithets* use slanted language that is question begging because it implies what we wish to prove but have not yet proved.
- The *fallacy of complex question* is when the arguer asks a question that presupposes the truth of the question at issue.
- *Special pleading* is when we use slanted or loaded language for others when we do the same ourselves and use neutral or positive language.

EXERCISES

Part I. Identifying Fallacies of Evading the Facts

Identify the following fallacies of evading the facts, and explain why they are the particular fallacy you identify and what is wrong with them.

1. Of course things like bribery are illegal; if such actions were not illegal, then they would not be prohibited by law.
2. "The elemental composition of Jupiter is known to be similar to the sun. . . . The core would be composed mainly of iron and silicates,

the materials that make up most of the earth's bulk. Such a core is expected for cosmogenic reasons: If Jupiter's composition is similar to the sun's, then the planet should contain a small portion of those elements" (J. Wolfe, "Jupiter," *Scientific American* 230, no. 1: 119).

3. In the context of an interrogation with no cause of death currently identified: Detective: "Who shot her in the head?"
4. I understand you support a government-funded health care system, but we cannot have the government control every aspect of our health.
5. I paid my taxes for years, and this year I can't afford it. So everyone else must pay their taxes so I can take a little tax vacation.
6. Joe: That Lefty is a crook.
   Moe: What makes you think that he is?
   Joe: Just look at the crooks he hangs out with.
   Moe: Oh. How do you know that they are crooks?
   Joe: Well, anyone who hangs around a crook like Lefty has just got to be a crook.
7. I'm not hoarding. I am only stocking up on everything before the *hoarders* get it all.
8. Alice should get a 95 because she deserves a really high mark.
9. I won't listen to any liberal on gun control. They want to punish legal gun owners, especially those who use guns for subsistence hunting.
10. Listen, I know I'm not a doctor or pharmacist, but I know my body, and I can use this medicine without a prescription. Everyone else though needs to consult a doctor.
11. Big tax exemptions for wealthy investors are absolutely justified because people who spend large sums of money in the market should be excused from paying large parts of their income tax.
12. When will these leaders stop spending money in any way that suits them?
13. You can be sure that we will give you an honest deal on a used car, since we will always deal with you in a forthright and honest way when you purchase a used car from us.
14. When will you abandon your support of hate speech?

Part II. Fallacy Practice with Explanations

In this group of questions, you are given a choice of four answers for each question. You may find that more than one choice has some merit, but you should identify which answer is the *best*. Some of the explanations are inaccurate, so make sure the fallacy and the explanation are correct when choosing.

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1. Objects with a specific gravity less than that of water will float when you put them in water. The reason is that such objects won't sink in water.
   - **A.** Poisoning the well against people who don't believe in gravity
   - **B.** Begging the question because it just restates the same claim but uses "the reason that" as though it supports the next claim
   - **C.** Equivocation on the word "gravity"
   - **D.** Appeal to authority because it doesn't have a qualified expert
2. "There has been a major accident, and we have closed this street to regular traffic, so we cannot allow you to drive your ambulance down it."
   - **A.** Irrelevant thesis because traffic has nothing to do with the accident
   - **B.** Appeal to authority because the ambulance has authority to drive
   - **C.** Sweeping generalization because the fact that the vehicle is an ambulance is a special case that blocks the rule that no traffic is allowed
   - **D.** Hasty generalization because it makes a generalization without enough information
3. "Why should I take your pro-vegetarian arguments seriously? You wear a leather belt and leather shoes. You are just a hypocrite."
   - **A.** Abuse because it is not nice to call someone a hypocrite
   - **B.** *Tu quoque* because it is dismissing their argument on the basis of an action. It is saying "look who's talking."
   - **C.** Appeal to ignorance because it is saying if they don't wear a leather belt, it is proof of arguments for vegetarianism
   - **D.** Complex question because it is assuming they are wearing a leather belt without really asking
4. Students who get help from tutors get lower scores on average than students who don't; this shows that tutors are a waste of time.
   - **A.** Hasty generalization because not all students who use tutors have lower scores to begin with
   - **B.** False cause spurious correlation because poor ability is the common cause of low grades and needing a tutor
   - **C.** False cause reversing cause and effect because it is the low scores in the first place that are bringing students to use tutors
   - **D.** False cause *post hoc* because it fails to establish that the students used the tutors before they had low scores
5. I got a bad mark on my midterm. I can't believe it. The material was so easy that there was no point studying. My prof must have just had it in for me.

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- **A.** False cause mere correlation because you don't know if the prof lowered the grade on purpose
- **B.** Question-begging epithets because it is slanted against the professor
- **C.** Appeal to ignorance because you can't say that it wasn't the professor
- **D.** Hasty generalization because it takes a special case (not studying) and generalizes it to being about the professor

6. It really doesn't cost much for the government to pay for the medicare costs of a sick person. It's just a few thousand dollars a year on average. So medicare can't be a big factor in the national budget.

- **A.** Equivocation because "medicare" is being used in two different ways
- **B.** Hasty generalization because it applies a rule where it shouldn't apply
- **C.** Composition because the property of "not costing much" is not compositionally inherited by the whole of the medicare budget
- **D.** Sweeping generalization because it makes a rule out of an improper case

7. Prosecuting attorney in court: "When is the defence attorney planning to call that guilty-as-sin Hunk Beedle to the stand? Okay, I'll rephrase that. When is the defence attorney planning to call that liar Hunk Beedle to the stand? Sorry, Your Honour. I withdraw my remarks."

- **A.** Poisoning the well because it undermines Beedle's ability to speak
- **B.** Question-begging epithets because it uses loaded language to assume what it needs to prove
- **C.** Special pleading because it applies a double standard
- **D.** *Tu quoque* because the lawyer did the same thing as Hunk Beedle

8. "There are two types of people in this world: the rich and the suckers. Do you want to get rich, or are you happy to remain a sucker?"

- **A.** Force or fear because it is trying to scare you away from being a sucker
- **B.** Bifurcation because it confuses contraries with contradictories. There are more ways of being than being a sucker or being rich.
- **C.** Complex question because it asks a question with an unstated assumption
- **D.** Appeal to ignorance because it uses negative evidence

9. You must believe that God exists. After all, if you do not accept God into your heart, then you will face the horrors of hell.

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- **A.** Appeal to authority because it assumes God decides who goes to hell
- **B.** Force or fear because it tries to compel belief using fear
- **C.** *Tu quoque* because the speaker doesn't believe in God either
- **D.** Poisoning the well because it attacks your motives

10. Some people argue that sport fishing is wrong because fish can feel pain and they suffer. But that is nonsense. Fishing is a wonderful sport. It's relaxing and fun for the whole family, and you get to eat what you catch!

- **A.** Appeal to authority because it appeals to the authority of experiences of relaxing
- **B.** Poisoning the well because it says the people against it believe in nonsense
- **C.** Irrelevant thesis because it changes the topic to recreation and doesn't address the actual argument, which is about pain and suffering
- **D.** Appeal to ignorance because it suggests that we don't know that fish feel pain

11. My boyfriend just dumped me for another woman. Men are such jerks!

- **A.** Hasty generalization because it generalizes from a special case
- **B.** Abuse because it is harmful to name-call
- **C.** Irrelevant thesis because it changes the topic from a boyfriend to men in general
- **D.** Appeal to ignorance because it doesn't prove that men are jerks

12. At a certain point, a car gets old enough and breaks down so frequently that it is no longer reasonable to fix it and we junk it. In the same way, when a person gets old and decrepit enough, they should be mercifully put to death.

- **A.** Abuse because it calls people "old and decrepit"
- **B.** Appeal to authority because it appeals to the science of mechanics without citing the proper expert
- **C.** Hasty generalization because it generalizes from the special case of one old person to all
- **D.** False analogy because it improperly draws an analogy between people and cars where there are important relevant dissimilarities between them

13. Don't even bother to watch the Toronto Maple Leafs this spring. What a bunch of overpaid, under-talented losers!

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- **A.** Abuse because it is simply name-calling
- **B.** Question-begging epithets because it uses slanted language to support a conclusion instead of proving it
- **C.** Poisoning the well because now anything the players say won't be listened to
- **D.** Force or fear because it threatens to fire the players

14. You don't need to ask Joseph what he thinks about the Liberal Party. You know what he will say—he's from Alberta.

- **A.** Hasty generalization because it makes a generalization from one person
- **B.** Special pleading because it applies a double standard
- **C.** Slippery slope because it reasons to a disastrous conclusion
- **D.** Poisoning the well because it uses a person's identity to undermine their ability to speak

15. Every open-minded historian agrees that the Bible is relatively historically accurate and that Jesus actually existed.

- **A.** Straw person because it characterizes the opponent as having a weaker view than they do
- **B.** Abuse because it is name-calling
- **C.** Special pleading because it uses a double standard—the speaker is open minded, but their opponent is not.
- **D.** Appeal to anonymous authority because it doesn't name the historian

16. This is the way we have always done things. You must teach Descartes in Introduction to Philosophy.

- **A.** Abuse because it is calling anyone who disagrees unintelligent
- **B.** Bifurcation because it is saying it is either Descartes or no one
- **C.** Appeal to tradition because it uses "the way it has always been done" as a reason to continue to do it in the future
- **D.** Slippery slope because it predicts bad consequences if you don't teach Descartes

17. I wouldn't expect someone from Saskatchewan to understand the nuances of the film festival. If you are from a bigger city like us, it is possible to really understand all of the cultured ideals.

- **A.** Abuse because it is name-calling someone from Saskatchewan
- **B.** Snob appeal because it is using a sense of superiority to dismiss the other viewpoint
- **C.** False cause (mere correlation) because it just so happens they are from Saskatchewan; it is not the cause of their understanding of the films.

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D. Straw person because it gives a weak characterization of people from Saskatchewan

Part III. Using Fallacy Definitions (Multiple Choice with Fill in the Blank)

Here is a group of questions where you have a choice of four answers for each question. Fill in the blank for each explanation of the definition, and then identify which answer is the best.

1. We need to give the criminals who use violence in committing their crimes especially long sentences because it is the violent criminals who must be incarcerated the longest.
   A. Equivocation because it ______ the meaning of the word
   B. Begging the question because it just restates the premise instead of ______ the conclusion
   C. Force or fear because it uses ______ to force agreement
   D. Poisoning the well because it uses a person's ______ to undermine their ability to speak
2. It doesn't seem that there is any room for debate here. Either we start selling cigarettes to boost our profit margin, or we drift into bankruptcy when we can't pay our bills. So which would you prefer?
   A. Slippery slope because it uses a ______ consequence to try to force agreement
   B. Force or fear because it uses ______ to try to force agreement
   C. False analogy because it ignores ______ differences between profits and cigarettes
   D. Bifurcation because it confuses ______ with contradictories
3. You wonder which of us to vote for, me or my opponent? It is, of course, a weighty question of public morality, but I ask you to consider that at least I have remained faithful to my spouse.
   A. Two wrongs make a right because it is suggesting that it is ______ to cheat if they both do
   B. Bifurcation because it confuses ______ with contradictories
   C. Appeal to ignorance because it uses the opponent's inability to ______ as proof of its truth
   D. Accent because it relies upon an ambiguity that comes from ______ a particular word
4. Buses use much more gasoline than automobiles, so the proposal that we all take the bus to work instead of driving a car is completely irresponsible. We would use so much more gas if we did that.

A. Hasty generalization because it uses an improper case from which to build a ______
B. Appeal to ignorance because it uses the opponents inability to ______ as proof of its truth
C. Division because it improperly reasons from the property of a whole (all buses) to the property of a ______
D. Composition because it improperly reasons from the property of a part to the property of a whole ______ (all buses)

5. Is psychology still teaching that outdated nonsense about the effectiveness of electroshock therapy?
   A. Appeal to authority because it does not offer the specific ______ of the speaker
   B. Question-begging epithets because it uses ______ language to assume what it needs to ______
   C. Appeal to ignorance because it uses the opponent's inability to ______ as proof of its truth
   D. Complex question because it asks a question where the answer presumes the ______ of the claim
6. Look, you don't need to take Father Bob's remarks about gay marriage seriously. He's a priest. He has to be against it or he gets in trouble with the church.
   A. *Tu quoque* because it points out a past action of Father Bob's to ______ his ability to speak
   B. Begging the question because it ______ what it is supposed to prove
   C. Poisoning the well because it uses a person's ______ to undermine their ability to speak
   D. Appeal to tradition because it uses the way ______ (four little words) in the past as a reason to continue to do it in the future
7. Yes, my client was drunk when he crashed into the telephone pole, but his car was totalled, and he was severely injured. He's been in the hospital for months and will be injured for life. Surely he deserves something for his pain and suffering. I'm asking you of the jury to help him with a judgement against the power company for putting that pole so close to the street.
   A. Hasty generalization because it generalizes from a special ______ to a rule
   B. Weak analogy because it ignores ______ differences between the two things being compared
   C. (False cause) Spurious correlation because something else might have been the ______ of both the pole being there and the drunk driving

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D. Sweeping generalization because it applies a rule to a special ______ where it does not apply

8. An intelligent and well-read person like you shouldn't have any difficulty understanding how reasonable and important it is to support our town's school budget in the referendum.
   - **A.** Straw person because it uses a ______ characterization to refute the claim
   - **B.** Appeal to authority because it appeals to an expert without establishing whether they have the relevant ______
   - **C.** Two wrongs make a right because it is using the fact that the other person would do the ______ thing as reason to prove their conclusion
   - **D.** Mob appeal because it uses flattery and appeals to ______ interest to motivate belief
9. Silken Laumann eats Wheaties. Catriona Le May Doan eats Wheaties. Myriam Bédard eats Wheaties. These women are major athletes! You should eat Wheaties too.
   - **A.** Appeal to authority because it appeals to an expert without establishing whether they have the relevant ______
   - **B.** Hasty generalization because it builds a rule from a ______ case
   - **C.** Appeal to tradition because it uses the way ______ (four little words) in the past as a reason to continue to do it in the future
   - **D.** Begging the question because it ______ what it is supposed to prove
10. In Toronto, it has been found that there is a significant correlation between the number of fire trucks spraying water on a fire and the financial losses due to the fire. The extra trucks clearly make the damage worse.
    - **A.** (False cause) Spurious correlation because the extent of the fire causes both the number of trucks and the significant losses
    - **B.** (False cause) Mere correlation because there is not enough evidence to prove that the trucks caused the losses
    - **C.** Sweeping generalization because it doesn't pay attention to the relevant differences between fire trucks and other trucks
    - **D.** Appeal to anonymous authority because it says that "some people are saying" this, but it doesn't name who is making the claim.
11. The University of Saskatchewan is a great university. So if you want to study philosophy, this university is a great place to study.
    - **A.** Division because it improperly reasons from the property of a whole (university) to the property of a ______

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   B. Composition because it improperly reasons from the property of a part to the property of a whole ______ (university)
   C. Appeal to authority because it appeals to an expert without establishing whether they have the relevant ______
   D. Irrelevant thesis because it ______ from the main issue
12. Don't let worry kill you off—let the church help.
   A. Abuse because it uses ______ calling
   B. Appeal to authority because it appeals to an expert without establishing whether they have the relevant ______
   C. Appeal to anonymous authority because it says that "some people are saying" this, but it doesn't name who is making the claim.
   D. Amphiboly because it contains a ______ ambiguity
13. Now that hockey is back on television, we will once again have to watch those pathetic pretenders, Nik Antropov and Matts Sundin, and the rest of the Toronto Maple Leafs losers.
   A. Abuse because it uses ______ calling
   B. Question-begging epithets because it uses ______ language to prove what has not yet been proved
   C. Appeal to ignorance because it uses the opponent's inability to ______ as a reason their view is true
   D. Amphiboly because it contains a ______ ambiguity
14. My professor Eric Dayton is always spouting off about superstition and obviously is an atheist. I had better keep quiet about my religious beliefs so he won't be tempted to fail me.
   A. Hasty generalization because it builds a rule (about atheists) from a ______ case
   B. Force or fear appeal to ______ as a reason to believe a claim
   C. Appeal to authority because it appeals to an expert without establishing whether they have the relevant ______
   D. Irrelevant thesis because it ______ from the main issue
15. The *Globe and Mail* says that Toronto is a much more expensive place to live than Thunder Bay. But Toronto is a great place to live. It has great restaurants, live music, museums, and of course it has the Blue Jays and the Maple Leafs. The *Globe and Mail* is all wrong.
   A. Appeal to authority because it appeals to an expert without establishing whether they have the relevant ______
   B. Poisoning the well because it uses a person's ______ to undermine their ability to speak
   C. Irrelevant thesis because it ______ from the main issue

  - **D.** Appeal to ignorance because it uses the opponent's inability to ______ as a reason their view is true

16. Organic farming is superior because it is natural.
  - **A.** Appeal to nature because it assumes that just because something is ______ it is therefore superior
  - **B.** Begging the question because it ______ what it is supposed to prove
  - **C.** Poisoning the well because it uses a person's ______ to undermine their ability to speak
  - **D.** Appeal to tradition because it uses the way ______ (four little words) in the past as a reason to continue to do it in the future

17. Using renewable energy is superior for the economy because it is more natural than using fossil fuels.
  - **A.** Appeal to nature because it assumes that just because something is ______ it is therefore superior
  - **B.** Begging the question because it ______ what it is supposed to prove
  - **C.** Poisoning the well because it uses a person's ______ to undermine their ability to speak
  - **D.** Appeal to tradition because it uses the way ______ (four little words) in the past as a reason to continue to do it in the future

18. If we allow automation to replace human workers, it will lead to massive job losses, economic collapse, and the end of the family as we know it.
  - **A.** Appeal to nature because it assumes that just because something is ______ it is therefore superior
  - **B.** Slippery slope because it argues that one event must ______ follow from another without argument that the event is inevitable
  - **C.** Irrelevant thesis because it ______ from the main issue
  - **D.** Appeal to ignorance because it uses the opponent's inability to ______ as a reason their view is true

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PART IV

Conclusion

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Putting Critical Thinking into Practice

20.1 Returning to Inductive Strength

The nature of a critical thinking text such as this one is to show you many ways in which arguments go wrong—we show far more ways to go wrong than to go right. This might lead to a feeling that there are logical booby traps everywhere and making good arguments is impossible. This is not what we would like you to take from the text. The chapters on deductive reasoning showed that necessarily true conclusions are possible with good form and true premises. In the real world, we are often making arguments that do not fit neatly into this form. However, there is still a lot of reasoning we can do that gets us toward the truth.

The fact that most knowledge is merely probable rather than certain is obvious; most of our predictions are based on estimates or fallible signs of things to come; for example, we rely on the weather report even though we know well that it may be wrong. These days, it isn't uncommon to open the weather app and read that "it is snowing" in your location when it is indeed not snowing in your location. This is just a baked-in feature of inductive reasoning: it's probablistic and vulnerable to new information. More information will not dissolve this vulnerability. Inductive reasoning is limited because human beings have intellectual limits (we are not omniscient) and we can only live in the present (we cannot know the future). The human condition is one of incomplete knowledge in a world where we have risks and opportunities.

So, we are limited but must do our best with what we have. Our intellect is composed of many fast processes that run as automatic problem-solving modules that work reasonably well in certain situations. Like other animals, we evolved inferential powers to help us navigate our world. If your cat comes

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running whenever you open a can, we can say she has learned to recognize the sound of the can opener as a sign of probable food. Even if it is cat food only a quarter of the time you open a can, your cat thinks it is worthwhile to check and see. She is able to adjust her behaviour based on a recurring but low probability.

Many of the inferences we make are of just this sort: they are fast, very fallible intuitive judgements that rely on *typical* features, *probable* signs, and *reasonable* assumptions and that allow us to avoid risk and pursue goods. While they are individually more like guesses than knowledge, they cohere with one another—some being ruled out by the joint testimony of others—to give us an overall reasonable and reliable sense of what is going on around us. These assumptions we make about the world taken together are very powerful. A critical thinking course gives us a chance to reflect on these assumptions and pictures that we build of how the world works.

From small everyday assumptions to metaphysical claims, the tools of critical thinking remain the same. What is the justification for a claim? Is it necessary? What is the evidence? What supports the evidence? Even going to the store to buy milk contains a large number of assumptions, reinforced by other assumptions; the store will have milk, we can afford it, etc. More generally, we operate on assumptions that can also be scrutinized, such as the existence of money, what it does, what a store is, the existence of cows, that milk is a food, that what is in the carton is milk, and so forth. Our "merely probable" beliefs are enmeshed in a network of support relations with other beliefs. Again, this might start to feel like everything is questionable and you can't know anything. But let's follow that line of thinking. The fact that your beliefs are *merely probable* doesn't mean that you can just believe whatever you like.

THOUGHT EXPERIMENT

Pick a statement which you know to be false and *try to believe it*. Think of all the consequences that would result from really believing it is true. How many things in your day-to-day life would change if you made yourself believe it was true?

This exercise only works if you don't just imagine it to be true but really try to believe it (that you have a Ferrari or that your parents live in another country than they do or that you are eight feet tall). Think of all the consequences the truth of such a statement would have for your actual day-to-day life, in which the statement is shown to be false by all the other things you know. Of course, you may be able to *imagine* that the statement is true, but you cannot actually *believe* it at will. Of this, you are certain. Consider, then, how our

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"merely probable" beliefs are not only enmeshed in a network of support relations with other beliefs; they fit together into patterns of meaningfulness that make them accessible to our understanding. Our general knowledge base is not simply a large list of beliefs to which we give assent. Instead, our general knowledge is organized into various kinds of patterns that make our beliefs relevant and accessible.

Here are some examples of how we organize beliefs: in stories, plots, goal-oriented plans, schemas and scripts, or stereotypical and casually regular situations. These function as organizing structures that package our judgements into useful patterns for our lives—plans and activities that we pursue. Think about these patterns: going to a restaurant, playing a game, going on a holiday, getting married, solving a problem. Imagine that you are playing a game of improvisational theatre at a party, and you are told to act out "going to a restaurant." Whether you would be good at acting or not, you know what to do—after all, you know what to do when you actually do go to a restaurant. It is also useful to reflect on how we understand the behaviours of pets or of small children and how their knowledge is organized, since they show simpler forms of our own patterns.

The point is that we make many kinds of implicit inferences that do not involve definitional truth but rather typical features that "everyone knows" or probable consequences based on function or a likely purpose or goal. Most human stories are plan-based stories; information is organized around *people* in particular *situations* who perform understandable *actions* for *reasons* that are available to anybody. The inferences that depend on these structures may be called *material* inferences, since they do not depend upon a formal pattern, but instead on an informal pattern that is neither universal nor necessary but is useful and productive. It is a general characteristic of material inferences that they can be *defeated* by additional information; they are "defeasible" or fallible.

Material inferences are always potentially vulnerable to more information: it rains, and so plans for a picnic get changed; you get offered a job, and your summer plans shift to accommodate it. Material inferences are both strong and weak. Their strength is that they permit you to form a conclusion that you can act on with the information you have at hand; it allows you to assume that things are normal and will go as you expect. Here is an example: If we tell you that we are going to the store, you may conclude (in the absence of further information) that we want to buy something. But if we now tell you that we have promised Fred a ride home and that Fred is at the store, then you would probably no longer conclude that we want to buy something. But if you heard us tell Fred that we would give him a ride because we need to pick up some

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things at the store anyway, then you could after all conclude that we want to buy something. Of course, if you know that we acquire goods by shoplifting, you will not be able to conclude that we want to buy something . . . and so on. Each additional bit of information has the potential to change what you will infer. Material inferences are a kind of enthymeme, and it is their pervasiveness that leads some logicians to argue that material inferences are ineliminable in human reasoning (we can't *not* use them all of the time). Here are some examples of different types of ordinary *material inferences*.

A *motivational* inference is the inference to a "reasonable" motivation for an action you know about.

People have motives for their actions, and their actions are organized into plans that are guided by purposes. We understand a person's behaviour by recognizing both what kind of action it is and what kind of motive would explain why the person did it. Since people can have many motives, our inferences are easy to overturn. However, when we speak to one another, we tend to give people salient information—that is, relevant information that will make it easy for them to infer what we wish to convey. So if all we are told is that someone did a stereotypical action (Bill went to the store), we will infer that they were moved by the likely motive (he wanted to buy something). Motivational assumptions are potentially risky; people may have unusual motivations that you don't know about, they may lie to you or attempt to swindle you and so mislead you about their motives, but these people are truly rare. Motivational assumptions are unavoidable, and we make them constantly because they make other people and their actions intelligible to us. We also make another kind of material inference: a feature inference.

A *feature* inference is an inference grounded in the knowledge that someone or something has a property that is typical of individuals of a certain kind but is otherwise rare.

So it is an inference from a stereotypical property to the bearer of that property. Babies typically wear diapers (but of course, so do incontinent adults and others). If we tell you that we need diapers for Andy, *and we don't tell you anything else*, you assume reasonably that Andy is a baby because diapers are stereotypically used by babies, and most diapers that are used are used by babies. Additional information can block the inference; if you know that we

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have a sick and aged poodle named Andy, then you will not infer that Andy is a baby. Another material inference is a resultative inference.

A *resultative inference* is an inference to a result or consequence of a typical kind of action or event.

If you ask why Fred didn't come to the movie, and we tell you Fred hit his head, you will infer that Fred was injured and that his injury *explains* his absence. Obviously, such an inference can be defeated by additional information. Resultative inferences are required in ordinary prediction; you step on the gas because you believe that this will make your car move, for example. We also make inferences about the function of something.

A *functional inference* is an inference grounded in the fact that many objects and events have typical purposes or do recognizable jobs.

Hammers are for hammering, chairs are for sitting on, food is for eating, and so on. If we ask for a hammer, you rightly infer we wish to hammer something, or to obtain a hammer for someone who wishes to hammer something.

Material inferences of this sort are central to language use and to successful communication; after all, they are based on patterns that we all use and take for granted. We saw in our discussion of ambiguity (Chapter 14) how understanding ordinary sentences is a function of both weak grammatical rules and background information that can overrule one interpretation in light of something one knows. Because information is always limited, we normally expect you to organize the information that you communicate to us so that it is easy for us to understand you. Furthermore, you will normally give us the information we need to understand what you are saying, and because you do this, you have a right to expect us to understand your point. The misuse of material inferences, whether deliberately or by accident, is a common cause of fallacious informal reasoning (as we saw especially with analogies, fallacies of false cause, and our discussion of generalizations). However, as long as we treat them as provisional and stay open to dialogue (the giving and receiving of reasons), they are very useful in our day-to-day lives.

20.2 Making Better Arguments

By now you should be able to identify many of the ways that ordinary reasoning can go wrong. We have seen that these really represent diagnostic categories

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and that there is sometimes more than one way that a piece of reasoning can go wrong at once. This is especially true in more extended arguments where there are many opportunities for one kind of error to produce another. Just as a doctor will see certain bodily signs as *symptoms* of a disease rather than the disease itself, the careful reasoner will look at fallacies as symptoms of bad reasoning that will guide in both analysis and cure.

In part 3, we defined a fallacious argument partially as an argument that is not *cogent* and in part 1 we defined a cogent argument as one that meets three conditions:

1. the argument must be grounded in premises that are accepted or are rationally acceptable to a reasonable audience;
2. the premises must make a rationally grounded connection to the conclusion so that the truth or reasonableness of the premises genuinely bears on the truth or reasonableness of the conclusion; and
3. the premises must provide sufficient or strong rational grounds for asserting the conclusion, allowing the mind to move from asserting the premises to asserting the conclusion.

These three conditions offer us the beginnings of a diagnostic procedure for evaluating extended arguments. To apply the first condition, we must first of all *identify* all the claims being put forward and *distinguish* the conclusion from the premises so as to highlight the reasoning between them. As we have seen in the discussion of the fallacies, what is *presented* as the conclusion and what is actually being argued for are not always the same. There may be lexical ambiguity or irrelevant thesis, or the premises may be designed to move our emotions rather than present reasons. Once we have charitably identified all the claims put forward and identified the conclusion from the premises, we are in a position to determine whether the premises are *dialectically acceptable* to a reasonable audience. Recall that to be dialectically acceptable, the premises must not only be true or likely but also appropriate to support the conclusion. If the argument is circular, then even if the premises are true, they cannot offer rational support to the conclusion; if there is ambiguity between premise and conclusion, then the appearance of a support relation will be illusory as well. If the argument is neither circular nor ambiguous and the premises are otherwise dialectically acceptable, we can next ask whether the premises make a rationally grounded connection to the conclusion. The fallacies of emotional bias in particular fail this test. However, to say that there is a rational, grounded connection doesn't yet

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show that the connection is strong enough to allow the mind to move from the acceptability of the premises to endorsing the conclusion. The fallacies of expertise and the inductive fallacies can be used as a kind of checklist for determining the strength of the connection.

The fallacy method of critical thinking involves identifying claims, distinguishing premises from conclusions, and asking whether premises are dialectically acceptable. If they are, we then investigate the kind of connection the premises make to the conclusion: If the connection is not genuinely based on reason, we reject the argument; if it is reason based, we ask whether the ground of support is rationally sufficient. At each step, we can use our fallacy list of "bad argument patterns" as diagnostic tools. Along the way, we also bring to bear considerations of good practice that we have identified in the text. We look at the questions carefully and methodically. If there are implicit premises about what words mean or about what everyone knows, we try to make those assumptions explicit. If appeals are being made to our interests or desires, we step back from them to see whether the appeals are legitimate or whether they simply attempt to influence our judgment.

Recall that in addition to a fallacy lacking cogency, we also defined fallacies in terms of Douglas N. Walton's five conditions for defining fallacies (1995, 255):

1. an argument (or at least something that purports to be an argument) that
2. falls short of some standard of correctness,
3. is used in a context of dialogue,
4. has a semblance of correctness about it, and
5. poses a serious problem to the realization of the goal of the dialogue.

Fallacies have many features that make belief tempting—all the more reason to learn to identify them in our everyday reasoning.

20.3 Evaluating Arguments in Longer Text

Consider the following excerpt from a letter to the editor in the *St. Albert Gazette* (Letter to the Editor, "Don't Cut Money for Seniors,"[1] February 13, 2023):

1 https://www.stalbertgazette.com/opinion/dont-cut-money-for-seniors-6511015

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> In a recent letter to the editor (Feb 2023) a resident wrote in asking that council change its plan to cut funding for services for seniors. Here's an excerpt from the piece:
>
> > "Discussions with other seniors has indicated to me the lack of common sense council used to spend over a million dollars on a traffic circle for marginal benefits while ignoring the needs of seniors who have contributed a lifetime of revenues to the city. My father was a federal, provincial and municipal politician who was a president of the Alberta Urban Municipalities Association (AUMA), was president of the Alberta Municipal Service Corporation and was named one of Alberta's '50 Most Influential Citizens' by *Alberta Venture* magazine and specifically identified as one of seven 'political power houses' in the province. His lifetime as a politician over 50 years; he profoundly indicated the need to be aware of and communicate with seniors as to what their needs were. Seniors have always been considered to be the electoral base. When is St. Albert council and the UCP going to communicate with the seniors and better understand our needs?"

Looking at these words, you see a passion for seniors and a strong desire for money to be spent in a responsible way for seniors. We might *feel* this way too, but do the stated premises support this? We can extract a number of sub-arguments that contain fallacies. Let's first deal with this part of the passage:

> Discussions with other seniors has indicated to me the lack of common sense council used to spend over a million dollars on a traffic circle for marginal benefits while ignoring the needs of seniors who have contributed a lifetime of revenues to the city.

This one sentence contains a number of issues that we can evaluate. First, when the author says "discussions with seniors," is this an appeal to an anonymous authority? It seems to be, since they have not cited who they talked to, how many people they talked to, or whether they were experts on what they are being cited about, which is that city council lacks common sense.

Next, saying that the council lacked common sense is abuse. It is a way of glossing over calling them a worse name; however it is not nice to say someone lacks common sense. Essentially, "common sense" is used to undermine the argument by drawing attention to the person, not the claim—in this case, the claim is that a traffic circle needed to be built (at the time).

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So what about that traffic circle? Even a small town like St. Albert (about sixty-six thousand residents) has a multi-million-dollar budget. Looking at the financials for 2023, it is hard to ascertain what the total spending amount is available for a city, given that a city would have investments, revenue-generating projects, and, notably, tax collection. Let's just say, though, that a million dollars on a traffic circle (if that's true, and it seems to be) is a lot of money, but it is a small proportion of the overall budget. And notably, the arguer is bringing this up in the context of proposed funding cuts for seniors in 2023 when the traffic circle was completed in 2015. This means that money is long spent, not to mention members of council have changed, and the cuts to senior funding are proposed in 2023—a different pool of money. So is this a fallacy?

We hope by now you can see that this is an irrelevant thesis. The fact of purchasing a traffic circle (even if it was not a good idea and even if it was more expensive than it should have been) is not relevant to the amount of the budget spent on senior services, especially eight or more years later. Consider the following possible reconstruction:

Premise 1: City council lacks common sense.
Premise 2: City council spent one million dollars on a traffic circle.
Conclusion: Therefore, do not cut money for senior services.

Spending one million dollars on a traffic circle is a fact, and it is a fact worth discussing, but it is not relevant to the issue at hand. Formulated in another way, you can see this is also a version of a straw person, since it characterizes council as a bunch of senseless nitwits who throw money at silly infrastructure while ignoring what is important. The idea here is that in reconstructing this argument in standard form, you can see how the premises provide no ground for the conclusion since they are irrelevant, abusive, and they don't tell us anything about services for seniors.

Let's consider the next section of the argument:

> My father was a federal, provincial and municipal politician who was a president of the Alberta Urban Municipalities Association (AUMA), was president of the Alberta Municipal Service Corporation and was named one of Alberta's "50 Most Influential Citizens" by *Alberta Venture* magazine and specifically identified as one of seven "political power houses" in the province. His lifetime as a politician over fifty years; he profoundly indicated the need to be aware of and communicate with seniors as to what their needs were.

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To summarise this and put it in standard form might already identify the fallacy.

Premise 1: My father was a politician with extensive service and accolades.
Premise 2: He said we should listen to seniors.
Conclusion: Therefore, city council should listen to seniors.

First of all, it is already an issue that one's *influence* (political powerhouse, influential citizen, etc.) is being conflated with *expertise*. This smacks of equivocation, since the two are being used as if they mean the same thing. It is possible that none of this person's political service could have anything to do with being an *expert* on seniors' issues. Based on this specific appeal to the politician's experience, this is an argument that city council must listen to seniors (and presumably not cut their funding because that is what seniors would say). And since this is an argument that claims the conclusion is forced by virtue of what one person said, it is an appeal to authority. Is the authority genuine?

We can't really evaluate the authority being appealed to, since they are not named. Maybe they have expertise and credentials in the area, maybe they don't. Since we don't know, we don't have reason to accept the conclusion. In cases like this, it helps to imagine what genuine authority here would look like. It would have to be a collaborative endeavour of experts who have appropriately obtained representative information on what seniors in St. Albert want, how money can be spent in the most effective way, and a tremendous amount of information about the budget. We can get a little more information by reading on:

> His lifetime as a politician over 50 years; he profoundly indicated the need to be aware of and communicate with seniors as to what their needs were. Seniors have always been considered to be the electoral base. When is St. Albert council and the UCP going to communicate with the seniors and better understand our needs?

It seems like he is threatening that if you don't listen to seniors, you will be voted out. He does this by claiming seniors are the voting base, so it would be helpful to see if he can make good on this threat. We could start by asking whether being a "base" is just about numbers. About 75 percent of the population can vote, and 20 percent of the population is over sixty-five years of age. This means that 26 percent of the voting population is over sixty-five. And even if you correct for voter turnout among age groups, everyone eighteen to sixty-five represents *considerably* more votes than those over sixty-five (approximately

82 percent voting rates over sixty-five represents at most 21 percent of votes). This is not to say they aren't an important voting bloc, but it grossly exaggerates the electoral importance of seniors' votes. This is not to say that if you are a smaller voting group the majority ought to steamroll the minority. But this argument distorts the facts of how much influence seniors have in elections. Also, we're guessing seniors have differences of opinion about who to vote for!

Not only is this an appeal to force or fear, but it is implicitly a bifurcation: "Do what we want or we will vote you out!" Politically, this might make sense—we do have a right to vote out those who are not representing us properly. However, we are in the business of evaluating arguments, not politics. Here, we need an argument about listening to seniors and not cutting their funding that is rationally cogent.

One area that we didn't cover was the argument that seniors have contributed a "lifetime of revenues" to the city. This cuts to the heart of the purpose of city council and how it relates to seniors. Consider the following argument that we have constructed that might support this conclusion:

Premise 1: Municipal governments collect taxes to provide support services to residents.
Premise 2: Fair taxation involves redistribution of monies according to human needs, vulnerabilities, future planning, education, public good, and so on.
Premise 3: Seniors require services that other citizens do not.
Conclusion: It would be wrong to cut funding to seniors below the amount required to meet their needs.

We're keeping the conclusion that it is wrong to cut funding rather than that council must listen to seniors because these are different issues. Here we appeal to the purpose of taxes (functional inference), then we appeal to a feature of taxation—that it is used to provide services (feature inference)—and then a fact about seniors' distinct needs. Putting these claims together, we have a stronger argument that seniors' funding should not go below what it takes to meet their distinct needs, within reason. We're hoping this demonstrates that while the author has a good idea (it is a good idea to support seniors), they have not provided a cogent argument to support their conclusion. It is possible to provide better support than fallacious reasoning.

Extended pieces of reasoning may be too complex to consider all at once, but they will contain parts that can be isolated and evaluated independently. Throughout the evaluation of an argument, we need to recognize that we are not simply following some rules but that we are actively *exercising our judgment* and

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taking responsibility for the claims and connections being made. We need to be charitable, identify claims correctly, and rank the importance of statements in the overall pursuit of an argument. We hope to have demonstrated that you have to discriminate the pattern of argument and analyze the claims and their relationships in order to discern the fallacies they might contain. And in so doing, you might find more than one fallacy, but you have to decide which is most crucial to identify based on the features of the argument. There might be stronger and weaker versions of a fallacy, and you want to identify the strongest first.

Another way to say this is when we are identifying fallacies and evaluating reasoning in general, we are taking cognitive ownership of the argument as our own and thus as anyone's. We take it on and pay very close attention to it, and we have to be charitable. The letter writer about seniors' cuts is probably very irritated by the actions of city council. We should not just dismiss them as cranky jerks—we understand that they are likely exaggerating, but we still take them to be people making claims that can be evaluated for reasonableness. Also, we should be asking ourselves if there is anything *good* in the passage. Even if there are several fallacies, are there points worth considering? If we isolate the fallacies, can other parts of the argument survive intact?

KEY TAKEAWAYS

- *Material* inferences do not depend upon a formal pattern but instead on an informal pattern that is neither universal nor necessary but is useful and productive. It is a general characteristic of material inferences that they can be *defeated* by additional information; they are "defeasible" or fallible.
- A *motivational* inference is the inference to a "reasonable" motivation for an action you know about.
- A *feature* inference is an inference grounded in the knowledge that someone or something has a property that is typical of individuals of a certain kind but is otherwise rare.
- The first step in argument analysis is to clearly *identify* all the claims being put forward, clarify their meaning, and *distinguish* the conclusion from the premises.
- The second step in argument analysis is to analyze whether the premises are dialectically acceptable and relevant to the conclusion.
- The third step in argument analysis is to evaluate the logical connection between the premises and conclusion, looking for patterns such as fallacies.

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- Critical thinking is about not just following rules but using those rules to exercise our judgment, and in so doing, we take responsibility for our evaluation of an argument and the arguments we put forward.

EXERCISES

Here are some fictitious letters to the editor. Isolate and reconstruct the arguments and fallacies within, and evaluate the overall argument:

1. Ontario's graduated licensing system for new drivers is about to get tougher. New young drivers may face more restrictions—a longer wait to get a full license and more restrictions on the number of passengers—if new legislation is passed this fall. Young and inexperienced drivers are more likely to get into accidents according to Ontario accident statistics, especially at night and when there are other young passengers in the car. While the details of the proposed legislation are sketchy and still under review, Transportation Minister Jim Bradley says that there is broad support for tougher legislation.

   One person arguing for tighter rules for young drivers is Tim Mulcahy, whose twenty-year-old son Tyler and two friends were killed in a terrible crash after drinking at a Muskoka restaurant last summer. The three young people died when the car they were in crashed and plunged into Lake Joseph in July. According to police speed and alcohol were factors in the crash. Mulcahy wants the government to revoke the licenses of young drivers caught speeding or drinking for three months or even up to a year.

   Doubtless many young people will feel singled out and resent the proposed restrictions as unjustified constraints on their behaviour as young adults, but parents all over Ontario will breathe a sigh of relief knowing that their children are safer.

2. Your chamber of commerce brings you this message: "Say no to panhandling." Many people believe that panhandlers are poor homeless people victimized by society, but the vast majority of panhandlers are not homeless, and some do a lucrative business begging for other people's money. Panhandlers use your money to buy drugs and alcohol, and giving money to panhandlers only makes their self-destructive behaviours worse; it's like giving a gun to someone who is suicidal.

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Many panhandlers are aggressive and can be very intimidating when they demand money from old people, who become afraid to shop downtown. When ordinary citizens are afraid to go out in public, it is time for our city and police to take decisive action against these thugs and ruffians.

We need to change the generosity of ordinary people who think they are helping when they are really just enabling people to live off others and do no useful work. When begging becomes widespread in a city, it produces a change in the air—people have a lingering impression that the downtown is unsafe—and this is bad for local businesses. Confronting the panhandling plague is difficult without aggressive police enforcement of anti-panhandling bylaws. It should clearly be illegal to panhandle in the downtown shopping areas so that law-abiding citizens are safe when they go into banks and stores. So support tougher legislation against panhandlers to reduce drug use and fear. Sign our petition, available at most of your downtown merchants, and support a cleaner safer shopping environment. Just say no to panhandling in our city.

3. *Photo Radar Just Lining City Council's Pockets*

City council needs to get rid of photo radar right now! It is a mere cash grab set up to inflate their budgets and punish those of us who follow the rules 99 percent of the time. If they do not remove the photo radar from my street, I will start an online campaign that shows how useless these speed traps are. What is the purpose of city council if not to serve the constituents? I believe my interests are not being served.

First, photo radar doesn't even catch the person while they are speeding, so nothing is being stopped. In other words, if no one was speeding, then *we would know with certainty* that photo radar works. But people keep speeding. This is because photo radar is merely a passive way of punishing speeders: the only way to truly deter them is to catch them in the act.

Second, what do they need so much extra money for? We all know that the more they bring in, the more they will spend anyway. So obviously they will just add more and more photo radars, since they depend on the income from photo radars now. Look at all the money they wasted building that soccer facility—I don't even play soccer!

My cousin has been in road construction for thirty years, and he says that photo radar doesn't deter people from speeding anyway. He

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has seen it time and again on the job. He is building the road, and they set up photo radar where no one can see it, so how will they know when to slow down?

I have received three photo radar tickets this month for going only two kilometres over the limit on my street. This is beyond unfair. This is taking money away from my children and their financial security. Does city council want my children to starve?

4. Decades after 9/11, the US is still not safe from terrorism. In testimonies before the US Committee on Homeland Security and Governmental Affairs, America's top counter-terrorism officials, including the secretary of Homeland Security and the director of the Federal Bureau of Investigation (FBI), reported that the US is still vulnerable to terrorist attacks. They praised the temporary provisions of the Foreign Intelligence Surveillance Act (FISA), which enables the government to intercept terrorist plans, despite criticisms of the act being explored by Congress.

   While some people fear that FISA allows intelligence officers to conduct data-mining operations and other activities that endanger the rights of American citizens, they pointed out that these allegations are totally unfounded. FISA should not be put in jeopardy because of worries that are totally untrue. Democratic objections to FISA are simply part of an organized attack on Homeland Security; losing FISA would cut the government's ability to track terrorism in half. They stressed that while America is safer than it was on 9/11, it is still not safe and will not be for generations.

   According to the administration, FISA has not kept up with technology, and the law's requirement for warrants from a special FISA court doesn't permit intelligence authorities to react fast enough when a threat is electronically detected. Clearly the law needs strengthening rather than weakening so that America can once again become safe.

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21

Fallacy Round-Up

21.1 Fallacies of Ambiguity (Chapter 14)

Fallacy	Definition	Why it is wrong	What to do instead
Equivocation	*Equivocation* occurs when a keyword is used in two or more senses in the same argument and the apparent success of the argument depends on the shift in meaning. Or two different words that look or sound the same may become confused and lead to fallacious inference.	A shift in the meaning of terms in a deductive argument blocks transitivity. Terms must have agreed-upon meaning for an argument to work.	Arguments and claims need to have clearly defined terms. Do what you can to pay attention to the meaning of individual words. Ask yourself, Are they being used in the same sense?
Amphiboly	The fallacy of *amphiboly* is when there is a *structural ambiguity* in the grammar of a sentence that the argument or claim depends on.	Arguments need to have sentences with clear meaning (one proposition). This means they need functional grammar that avoids ambiguity.	Construct each sentence with care, and make sure that enough context is provided to rule out all possible, or at least all the likely, unintended interpretations.

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Accent	The *fallacy of accent* arises when there is an ambiguity of meaning because it is unclear where the stress should fall in a statement or what tone of voice is intended.	An arguer may be stretching the meaning of a phrase or sentence that allows for agreement or deduction that is not warranted.	Construct sentences that cannot have a shift in meaning depending on which words are accented and how. Pay attention to how different stresses on terms or phrases lead to different meanings. Ask questions about background assumptions.
Composition	The *fallacy of composition* is when one argues invalidly from the properties of the parts of a whole to the properties of the whole itself and when one reasons invalidly from properties of a member to properties of a class.	Because it inappropriately attributes properties to a whole that doesn't have that property. Here the reasoning doesn't pay enough attention to the kind of thing under discussion.	Pay attention to whether arguments contain reasoning from parts to wholes. Look for compositional heredity and what kind of whole and parts are being talked about (Is it a member of a class?).
Division	The *fallacy of division* is when one argues invalidly from the properties of the whole itself to properties of a part and when one reasons invalidly from properties of a class to properties of a member.	Because it inappropriately attributes properties from a whole to a member. Here the reasoning does not pay enough attention to the kind of thing under discussion.	Pay attention to whether arguments contain reasoning from wholes to parts. Look for divisional heredity and what kind of whole and parts are being talked about. (Is it a class with members?).
Hypostatization	The fallacy of *hypostatization* consists of regarding an abstract word or a metaphor as if it were a concrete one.	Good arguments use specific language. Metaphors don't have clear truth conditions.	Look for abstract entities given concrete properties or abilities. Ask whether the "thing" under discussion exists or if it is a metaphor. When arguing, replace metaphor with literal terms.

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21.2 Fallacies of Emotional Bias (Chapter 15)

Fallacy	Definition	Why it is wrong	What to do instead
Personal attack (*ad hominem*)	An *ad hominem* fallacy occurs when we reject someone's claim or argument simply by attacking the person rather than the person's claim or argument.	Claims and arguments have truth conditions independent of the speaker.	Address the argument and not the person.
Abuse	Fallacy of *abuse* is name-calling and abusive words that are used to direct attention away from the issue at hand and toward those who are arguing.	A dialogue aimed at truth must stay on topic. Also, name-calling is harmful.	Address the argument and not the person. Avoid slanted and negative terms to refer to your interlocutor.
Poisoning the well	The fallacy of *poisoning the well* occurs when we criticize a person's *motivation* for offering a particular argument or claim rather than examining the worth of the argument or claim itself.	A person's motivation is separable from their argument. In any case, it does not *by itself* undermine the argument the person is making.	Avoid calling motives into question. Address arguments directly. Ask yourself if the motive is the topic of the argument itself or is a distraction.
***Tu quoque* ("look who's talking")**	In the fallacy of *tu quoque*, a person is charged with acting in a manner that is incompatible with the position they are arguing for.	A person's previous behaviour is not by itself a reason to undermine their argument. This distracts from the dialogue. Behaviour is independent of the truth conditions of a claim.	Avoid calling out a person's behaviour. Address their claims. Ask yourself if the behaviour is what is under discussion, or if it is a distraction.

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Mob appeal (*argumentum ad populum*)	*Mob appeal* can be described as attempting to sway belief with an appeal to our emotions, using theatrical language, or appealing to group-based or special interests.	Arguments should be dialectically acceptable, meaning they stand up to scrutiny by the public, not just a specific group's feelings or interests.	Notice if you are trying to appeal to someone's group memberships or interests. Take a step back and imagine you are appealing to a general audience who will test your claim for dialectic acceptability.
Appeal to pity (*argumentum ad misericordiam*)	The fallacy of *appeal to pity* occurs when we attempt to evoke feelings of pity or compassion in order to cause you to assent to our claim.	Arguments, in our sense, are strengthened strictly by the dialectical acceptability of the premises and the strength of the logic between the premises and the conclusion.	Use claims in your argument that are emotion-neutral. Or use emotional claims when appropriate.
Appeal to force or fear (*argumentum ad baculum*)	The *appeal to force or fear* consists of the use of threats of force or unfortunate consequences to cause acceptance of a conclusion.	Arguments, in our sense, are strengthened strictly by the dialectical acceptability of the premises and the strength of the logic between the premises and the conclusion.	Notice if you are threatening bad consequences in order to sway belief, and rephrase your argument if you are. Use reason instead, focusing on claims that are dialectically acceptable.
Two wrongs make a right	In *two wrongs make a right*, the arguer attempts to justify their claim or behaviour by asserting that the person they are trying to convince would do the same thing.	The other claim being pointed to might also be wrong. So it cannot act as justification.	Focus on the strength of your claim, not whether someone else would also hold that belief if they were in your position. Offer independent justification.

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21.3 Fallacies of Expertise (Chapter 16)

Fallacy	Definition	Why it is wrong	What to do instead
Appeal to authority	The *appeal to authority* is a fallacy where we take something as fact *just because an expert claims it to be true* (without supporting considerations about their expertise and how that relates to their claim).	Just because a claim is supported by an authority does not by that very fact make it true.	Pay close attention to expertise, the area of expertise, bias, the nature of the claim being made, and expert consensus.
Snob appeal	The fallacy of *snob appeal* tries to motivate belief by saying that if you support this claim, you will be a part of an exclusive and thus superior group.	Social superiority is not a reason to believe an argument.	Take note of arguments that play on vanity and special interests.
Appeal to tradition	In the fallacy of the *appeal to tradition*, the fact that a social or cultural practice has been done a certain way in the past is taken to be reason for it to be done in the future.	Past traditions are not by themselves reasons to believe claims or arguments.	If appealing to tradition, offer additional support for the belief beyond it being traditional.
Appeal to nature	In the fallacy of the *appeal to nature*, one argues that if something occurs in nature, it is good, and if it is unnatural, it is bad.	Nature is extremely complex and also a vague term. Our understanding of it impacts our interpretation of nature.	When you are appealing to nature, the claim must be made with adequate context. Reasons for “goodness” or “badness” must be offered independent of what is observed in nature.

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Appeal to anonymous authority	In the *appeal to anonymous authority*, claims are asserted on the basis of being held by an authority that is not clarified or given.	Anonymous authority cannot offer support for a claim because the expertise of the authority cannot be evaluated.	If we are taking it to be true that a claim is worth evaluating, we need some sense of how the claim has arisen. This means a claim should be taken seriously only when it can be tied to an expert or a person who is engaged in a dialogue.
Appeal to ignorance	In the *appeal to ignorance*, one takes the failure to disprove a claim as an adequate reason to take the claim seriously. It inappropriately argues that negative evidence can prove a positive claim.	Negative evidence cannot support a positive claim. It is not enough to have an argument against an opposing claim to prove your claim true.	Use negative evidence to support a stance of neutrality. Notice how when proving your claim, you need to both dispute opposing claims and provide support for your own.

21.4 Fallacies of Distorting the Facts (Chapter 17)

Fallacy	Definition	Why it is wrong	What to do instead
False analogy	The fallacy of false analogy is the comparison of two things that are only *superficially similar* or that, even if they are very similar, are *not similar in the relevant respect*.	The understanding being transferred from one thing to another is inappropriate.	Use analogies with relevant features, paying attention to dissimilarities. Keep analogies within their scope.

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False cause (family)	The fallacy of *false cause* is actually a family of related fallacies that occur when an arguer gives *insufficient evidence* for a claim that one thing is the *cause* of another.	Arguments with causal conclusions must be supported with adequate evidence.	Most causal claims need to be made tentatively. Pay attention to intervening factors and correlations.
Post hoc, ergo propter hoc	*Post hoc, ergo propter hoc* (Latin for "after this therefore because of this") occurs when we assume, without adequate reason, that one event *B* was caused by another event *A* because *B* happened *after A*.	Because temporal sequence is not by itself reason to conclude there is a causal chain.	Find adequate support in addition to temporal sequence.
Mere correlation	Here we assume that *B* was caused by *A* *merely* because of a *positive correlation* between *A* and *B*.	Because it misidentifies a cause and obscures the actual cause of something.	Offer information that rules out other intervening factors, and offer evidence that the positive correlation is indeed causal.
Reversing cause and effect	Here we conclude that *A* causes *B* when *B* causes *A*, so there is a causal connection but not the connection we believe.	Because it offers a false explanation of a causal sequence.	The point of causal reasoning is to gather evidence that represents the causal sequence. Getting it backwards is wrong.
Spurious correlation	Here we conclude that *A* is the cause of *C* when in fact both *A* and *C* are the effects of some event caused by *B*.	Because it misidentifies a cause and ignores the actual cause.	Consider all possible causal factors and what might rule in or out alternative explanations.

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Slippery slope (wedge) argument	In this fallacy of *slippery slope*, a person asserts that some event or consequence must inevitably follow from another without any argument for the inevitability of the event in question.	Adding conjectured consequence after consequence without a guarantee that they are necessary is fallacious. Each step away from the initial claim provides a point of reasoning and discussion.	If a claim has bad consequences, you must provide evidence that the consequence is probable or likely.
Irrelevant thesis (*ignoratio elenchi*)	In the fallacy of *irrelevant thesis*, an arguer attempts to sidetrack their audience by raising an irrelevant issue and then claims that the original issue has been effectively settled by the diversion. In short, the attempt is made to prove a thesis other than the one at issue.	It doesn't stick to the issue at hand.	Stay on topic. Dialogue needs to progress with related arguments.

21.5 Fallacies of Presumption (Chapter 18)

Fallacy	Definition	Why it is wrong	What to do instead
Sweeping generalization (fallacy of accident)	The fallacy of *sweeping generalization* is committed when an argument that depends on the application of a generalization or rule to a particular case is *improper* because a *special circumstance* (accident) makes the rule inapplicable to that particular case.	Rules and generalizations usually have boundary conditions that discern when and where the rule applies. The application of a rule should pay attention to the circumstances of application.	Note the scope of any rule or generalization you are using. Ask yourself where it is designed to apply and whether there are special circumstances.

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Hasty generalization (converse accident)	The fallacy of *hasty generalization* is committed when an argument that develops a general rule does so in an *improper* way because it reasons from a special case (accident) to a general rule.	Rules should be developed from a set of examples that share enough relevant features to develop a rule. If rules are developed from special cases, then they do not apply to other members of that group.	When developing a generalization, note whether you are generalizing from special cases or representative samples. Then when communicating the rule, be subtle in how that is stated.
Bifurcation	The fallacy of *bifurcation* is when an arguer treats a distinction of classification as exclusive and exhaustive of the possibilities when in fact other alternatives exist. In this fallacy, one confuses *contraries* with *contradictories*.	If other options exist, then they should be considered on their own merits. A false choice should not be used to force agreement.	Consider the range of relevant options available. Use "or" in a way that doesn't present a false choice.

21.6 Fallacies of Evading the Facts (Chapter 19)

Fallacy	Definition	Why it is wrong	What to do instead
Straw person	In the case of the *straw person fallacy*, an arguer constructs their dialogue partner's view out of "straw" (to make it easy to knock down), which effectively creates a new person, the "straw person," who is refuted (rather than the original dialogue partner).	It isn't fair to the opponent, and it doesn't support your view to knock down a weak argument.	Represent the views of others fairly. Use the principle of charity.

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Begging the question	The fallacy of *begging the question* is assuming what you intend to, or should be, proving. It is a failure of the support relationship.	A conclusion cannot support itself. It needs independent support.	Pay attention to repetition in an argument. Make the support relationship very clear.
Question-begging epithets	*Question-begging epithets* use slanted language that is question begging because it implies what we wish to prove but have not yet proved.	It is wrong to paint a view in such a bad way that its falsity is assumed rather than proven.	Use neutral language to avoid circularity. Make the support relationship appropriate.
Complex question	The *fallacy of complex question* is when the arguer asks a question that presupposes the truth of the question at issue.	In the way the arguer asks the question, they force agreement with a claim.	Follow appropriate rules of interrogative inquiry. One claim at a time, aimed at the truth.
Special pleading	*Special pleading* is when we use slanted or loaded language for others when we do the same ourselves and use neutral or positive language.	It is biased toward the speaker, taking latitude to describe two things differently.	Stick as closely as you can to the facts when describing something. Check to see if you describe something you do in more positive terms than when others do the same thing.

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Glossary

ambiguity Ambiguity is the condition of having more than one interpretation or meaning. There are two basic ways in which ambiguity can arise. The first is lexical ambiguity or equivocation, in which a word or phrase has more than one lexical definition and so can be understood in more than one way. Alternatively, two different words that look or sound the same may become confused and lead to fallacious inference. The second basic way ambiguity can arise is *structural* ambiguity or *amphiboly*, in which a string of words in a sentence has more than one legitimate grammatical interpretation and so can be understood in more than one way.

antecedent A conditional statement asserts a relation between two statements of which it is made stating that if the antecedent (first) statement is true, then the consequent (second) statement is also true. For example, in the conditional statement "If it is raining, then you will get wet," "it is raining" is the antecedent, and "you will get wet" is the consequent.

appeal to tradition In the fallacy of the *appeal to tradition*, the fact that a social or cultural practice has been done a certain way in the past is taken to be reason for it to be done in the future.

argument An argument in the broad sense is a social exchange between several reasoners who advance claims and then support them with reasons. In a narrow sense, argument is a set of statements in which it is claimed that the truth or likelihood of the premises support the conclusion.

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argument pattern Logical arguments usually occur in characteristic patterns. These patterns represent the formal relationships that the premises have with each other in light of which they support the conclusion. An argument pattern is a formal structure that many different arguments fit.

categorical logic This is the traditional logic of terms, developed by Aristotle, covering a theory of the syllogism and a theory of immediate inference.

chained enthymeme A chain argument (or chained enthymeme) is two or more arguments that are joined together by one or more implicit statements that form the conclusion of one argument and a premise in the next.

claim The claim is the assertion of a sentence; the claim that it is true.

classification Classification is a kind of division according to a rule: a group of individuals is divided into subgroups by a rule that sorts them by a set of common properties.

complement The complement of a class is everything in the universe of discourse that is not a member of that class.

conclusion A claim or statement made in an argument that its premises are intended to support. The aim of giving an argument is to rationally persuade an audience that a conclusion is true or likely if its premises are.

conditional statement A conditional statement asserts a relation between two statements of which it is composed, stating that if the antecedent (first) statement is true, then the consequent (second) statement is also true. For example, the conditional statement “If it is raining, then you will get wet” is a conditional.

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consequent A conditional statement asserts a relation between two statements of which it is made, stating that if the antecedent (first) statement is true, then the consequent (second) statement is also true. For example, in the conditional statement "If it is raining, then you will get wet," "it is raining" is the antecedent, and "you will get wet" is the consequent.

constructive dilemma (see *argument patterns*) A valid argument pattern that takes the form

If P, then Q
If R, then S
P or R
$\therefore Q$ or S

context The context of a statement or argument is the set of background conditions that are implicitly assumed to hold. We often need to make some aspect of the context explicit to fully reconstruct the meaning of an argument.

contradiction A contradiction statement that is false under every possible interpretation; its negation is a logical truth.

contraposition (in *immediate inference*) In the traditional logic of terms, the contrapositive of a categorical statement is the new categorical that results from putting the *complement* of the original subject term in the predicate place and putting the *complement* of the original predicate term in the place subject place; in short, both terms are turned into their complement and their positions switched.

contrary (see *subcontrary*) Two statements are contraries if both can be false but at most one can be true—for example, "Today is Friday" and "Today is Wednesday."

conversion (in *immediate inference*) In the traditional logic of terms, the converse of a categorical statement is made by interchanging the statements' subject and predicate terms. This procedure is called conversion.

counter-example A counter-example of an argument is a situation in which the *premises* are true and the conclusion is false. If an argument is *valid*, there is no possible counter-example, and the statement produced by conjoining the premises with the negation of the conclusion is a *contradiction*.

critical thinking Thinking that is disciplined by being guided by principles of good method.

deductive (*argument*) A deductive argument is one whose conclusion can be derived from its premises by procedures that preserve truth; in short, a deductive argument is one in which the truth of the conclusion follows from the truth of the premises.

definition The definition of a term is a statement that specifies what the term means.

definition, argument from An argument from definition is an argument in which the conclusion is presented as following simply by definition or by the meanings of the words used in the argument.

disjunctive syllogism (see *argument patterns*) Disjunctive syllogism is *a valid argument pattern* taking the form:

P or Q
Not P
$\therefore Q$

fallacy (see fallacy list in Chapter 5) A fallacy is an argument that violates one or more of the conditions of a *cogent argument*.

generalization Is a statement concerning a class of things stating that all or some number of members of that class have some feature.

hypothetical syllogism (see *argument patterns*) Hypothetical syllogism is the *valid argument pattern* having the form:

If P, then Q
If Q, then R
$\therefore$ if P, then R

implicit (see *premise*) An implicit statement is a statement that is assumed to be true in some context but is not explicitly stated.

indicative sentence An indicative sentence is one that when uttered makes a truth claim—that is, either true or false.

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inductive (inductive argument, inductive inference, inductive strength) An inductive argument makes a general claim on the strength of a set of particular statements. Inductive arguments are not true by virtue of their form but because the generalization is made true by the way the world is. An inductive inference is the mental act of drawing an inductive conclusion from a set of particular premises. Inductive strength is the degree to which the premises support the likelihood of the conclusion.

inference An inference is a mental act or piece of reasoning that culminates in a conclusion.

invalid (see *valid*) An argument is invalid if has *a counter-example*. One can show that an argument is invalid by constructing a counter-example or by showing that its negation is valid.

justification Justification is a relation that grounds. To say that a conclusion is justified is to say that the premises provide adequate grounds for asserting the conclusion.

logic Logic is the systematic study of arguments.

modus ponens (see *argument patterns*) Modus ponens is the *valid argument pattern* having the form:

If P, then Q
P
$\therefore Q$

modus tollens (see *argument patterns*) Modus tollens is the *valid argument pattern* having the form:

If P, then Q
Not Q
$\therefore$ not P

necessary A statement that is necessary is never false.

necessary condition (see *sufficient condition*) *A necessary* condition of a statement must be satisfied for the statement to be true.

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necessary truth A necessary truth is the same as a *logical truth* or tautology.

obversion (in *immediate inference*) In the traditional logic of terms, the obverse categorical statement is the product of changing the quality of the statement and replacing the statement's predicate term with its *complement*.

premise A premise is a claim made in an argument to ground or support the conclusion.

proof A proof is a procedure that demonstrates the truth of a conclusion; alternately a proof is the set of statements that are the product of such a demonstration.

quality In the traditional logic of terms, the quality of a categorical statement is the character (affirmative or negative) of the relationship it affirms between its subject and predicate terms: it is an affirmative statement if it states that the class designated by its subject term is included, either as a whole or only in part, within the class designated by its predicate term, and it is a negative statement if it wholly or partially excludes members of the subject class from the predicate class.

reasoning Reasoning is a mental process in which the mind is moved to endorse statements because they appear to be justified by other statements the person accepts.

refutation by counter-example A procedure in logic whereby an argument is shown not to be *valid* by the construction of a genuine *counter-example* in which the premises are true and the conclusion false.

relevance A word with a very general application, indicating the bearing that one thing has on something else.

soundness, sound Soundness is the property of being sound; a sound argument is a valid argument that has true premises.

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standard form The standard form of an argument is a way of regimenting it to show the relation between premises and conclusion. We do this by stacking the premises first and separating the conclusion with a line. For example, the argument "You are tired and tired people should sleep so *you should sleep*" has the standard form:

Premise 1: You are tired.
Premise 2: Tired people should sleep.

Conclusion: You should sleep.

statement A sentence used to make a claim (which can be true or false).

subcontrary (see *contrary*) Two statements are subcontraries if both can be true but at most one can be false true—for example, "some dogs are black" and "some dogs are not black." The relation of being contraries depends on the subject terms having reference (in the case of the example, that there are dogs).

sufficient condition (see *necessary condition*) A *sufficient* condition is one that, if satisfied, assures the statement's truth.

syllogism A syllogism is a very general argument pattern that involves two premises and a conclusion and three terms. In the traditional logic of terms, a syllogism is an argument composed of three categorical statements, two of which are premises and the third is the conclusion. The three statements jointly contain three non-logical referring terms, each appearing in two of the three statements. See Chapter 8.

truth A statement is true if things are as the statement says they are. To *assert* that a sentence—for example, "it is raining"—is true, it suffices to assert the sentence (because "it is raining" is true if and only if it is raining).

truth value Logic statements are evaluated as either true or false. These two possibilities are the possible truth values of the sentence.

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universe of discourse The universe of discourse in a situation is the set of all the things there are in the universe under discussion. This universe of discourse is typically either just reality or else a stipulated domain under discussion, such as "all the people in this room."

validity, valid An argument is valid if and only if there is no possible situation in which the premises are true and the conclusion is false. Validity is the property of a valid deductive argument.

Venn diagram A method of representing the properties of sets useful in diagramming categorical statements and determining validity in categorical syllogisms, named for John Venn, its inventor.

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About the Authors

Eric Dayton is a professor emeritus at the University of Saskatchewan in the Philosophy Department. He works/worked in epistemology, logic, practical reasoning, and aesthetics as well as the history of American philosophy. He is the editor of *Art and Interpretation* (1999), an anthology in the philosophy of art. He was also the editor of *Dialogue: The Canadian Philosophical Review*, the journal of the Canadian Philosophical Association.

Kristin Rodier is an assistant professor of philosophy at Athabasca University in the Centre for Humanities. She works in the areas of critical phenomenology, feminist philosophy, and the scholarship of teaching and learning philosophy online. She has been teaching critical thinking, logic, and practical reasoning for nearly twenty years.

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