Exercise 10-16

In each item, identify the analogues and the attribute of interest. State which analogue is said to have that attribute, and which is predicted to have it.

▲ 1. Saccharin causes cancer in rats, and rats are like humans, biologically speaking. So saccharin will cause cancer in humans, too.

2. Doug Gray is a successful businessman; he'd make a fine mayor.

3. Jeb Bush is very popular in Georgia. He'd be just as popular in Alabama, since most voters in both states are southern conservatives.

▲ 4. Tell you what, this ant poison looks like Windex. I bet we can clean the windows with it.

5. You need strong, quick fingers if you're going to play a violin or a viola. Angus is great on the violin; he'd probably be great on the viola, too.

6. I liked Will Smith's last movie, so I'll probably like this one too, especially since they have the same story line.

▲ 7. January's heating bill will be high, given that December's was outrageous and January is supposed to be even colder.

8. Expect Hawes to speak his mind at the meeting. He always speaks up in class.

9. Appeasement didn't work with Hitler; why should it work with Kim Jong Il?

▲ 10. Abortion means killing a live person. If abortion is wrong, then so is capital punishment, since it also involves killing a live person.

Exercise 10-17

In each item, identify the analogues and the attribute of interest. State which analogue is said to have that attribute, and which is predicted to have it.

▲ 1. It's easy to use an iPod; it's got to be easy to use an iPad. Apple makes them both.

2. Almonds upset my stomach; I'd bet hazel nuts do, too.

3. The bagels at Safeway are great; the sourdough's probably fine.

▲ 4. Odwalla carrot juice tastes moldy; I'd bet their orange juice tastes that way as well.

5. My PC slowed way down after a couple of years; it'll happen to yours, too.

6. L.L. Bean makes great sheets; I bet they make great bedspreads.

▲ 7. It's a good thing auto insurance is mandatory; why would it be different with health insurance?

8. The Greek economy collapsed because of all the government pensions. If it happened there, it can happen here.

9. I can't play a baritone; I doubt I could play a Sousaphone.

▲ 10. What, you don't like *Dancing with the Stars*? Well, don't bother watching *So You Think You Can Dance*.

11. Let's get a Whirlpool washing machine. Their dishwashers are great!

Exercise 10-18

▲ Rank these analogues from most similar to most dissimilar.

a. football and bowling
b. football and rugby
c. football and golf
d. football and basketball
e. football and chess
f. football and tennis

Exercise 10-19

Rank these analogues from most similar to most dissimilar.

a. going to a rock concert and going to a bluegrass concert
b. watching Lady Gaga on YouTube and seeing her in concert
c. going to a ballet and going to a classical concert
d. going to a ballet and watching Lady Gaga on YouTube
e. listening to classical music and reading poetry
f. seeing Lady Gaga in concert or going to a July Fourth fireworks show

Exercise 10-20

Based on the similarities and differences between the analogues, evaluate each of the following arguments from analogy as relatively strong or relatively weak. To a certain extent this will be a judgment call, but the class as a whole should reach approximate consensus on many items.

▲ 1. Earth is like Mars. Since Earth can support life, so can Mars.

2. Tucker wasn't any good when he managed Big Five Sports; I doubt he'd be good at managing an auto parts store.

3. Hey, work for Harris if you can. She leaves big tips; she probably pays her employees well, too.

▲ 4. Saddam was another Hitler. Obviously we had to take him out.

5. Julia is good at bowling; I bet she'd be great at poker.

6. Julia is good at croquet; I bet she'd be great at bowling.

▲ 7. Ann takes care of her dog; she'd make a great babysitter.

8. Hey, Carl? When you don't return something you borrowed, that's like stealing. Give Tony back his wheelbarrow.

9. Warren shows up to work on time; I bet he pays his rent on time.

▲ 10. Norway is like Sweden. There's no crime in Norway, so there won't be any in Sweden, either.

Exercise 10-21

What kind of argument is this? Is it as good as the writer thinks it is?

> The proponents of [school] vouchers say, in essence, that if competition produces excellences in other fields—consumer products, athletics, and higher education, to name but three—it would be healthy for the schools as well. Their logic is difficult to refute.
>
> —*Dan Walters, political columnist*

Exercise 10-22

For the past four years, Cliff has attempted the 100-mile bike ride on the Fourth of July. He has never had the stamina to finish. He decides to attempt the ride again, but is pessimistic about his chances of finishing. How should each of the following suppositions affect his confidence that once again he *won't* finish? Use the principles discussed on page 365.

1. Suppose past attempts were done in a variety of weather conditions.
2. Suppose Cliff will ride the same bike this year as on all previous attempts.
3. Suppose past attempts were on the same bike, but that is not the bike Cliff will ride this year.
4. Suppose Cliff hasn't yet decided what kind of bike to ride this year.
5. Suppose past attempts were all on flat ground, and this year's ride will also be on flat ground.
6. Suppose past attempts were all on flat ground, and this year's ride will be in hilly terrain.
7. Suppose past attempts were all in hilly terrain, and this year's ride will be on flat ground.
8. In answering question 7, did you consider only the stated information, or did you consider other things you know about bike riding?
9. Suppose some of past attempts were on flat ground and others were in hilly terrain, but where this year's ride will be hasn't been announced yet.

Exercise 10-23

During three earlier years, Kirk has tried to grow artichokes in his backyard garden, and each time, his crop has been ruined by mildew. Billie prods him to try one more time, and he agrees to do so, though he secretly thinks, "This is probably a waste of time. Mildew is likely to ruin this crop, too." How should each of the following suppositions affect his confidence that mildew will ruin this crop, too?

1. Suppose this year Kirk plants the artichokes in a new location.
2. Suppose on the past three occasions Kirk planted his artichokes at different times of the growing season.
3. Suppose this year Billie plants marigolds near the artichokes.
4. Suppose the past three years were unusually cool.
5. Suppose only two of the three earlier crops were ruined by mildew.
6. Suppose one of the earlier crops grew during a dry year, one during a wet year, and one during an average year.
7. Suppose this year, unlike the preceding three, there is a solar eclipse.
8. Suppose this year Kirk fertilizes with lawn clippings for the first time.
9. Suppose this year Billie and Kirk acquire a large dog.
10. Suppose this year Kirk installs a drip irrigation system.

REASONING FROM GENERAL TO GENERAL

Let's summarize: So far we've discussed the following:

- Reasoning from the general to the specific: *statistical syllogisms*
- Reasoning from the specific to the general: *inductive generalizing from samples*
- Reasoning from the specific to the specific: *arguments from analogy*

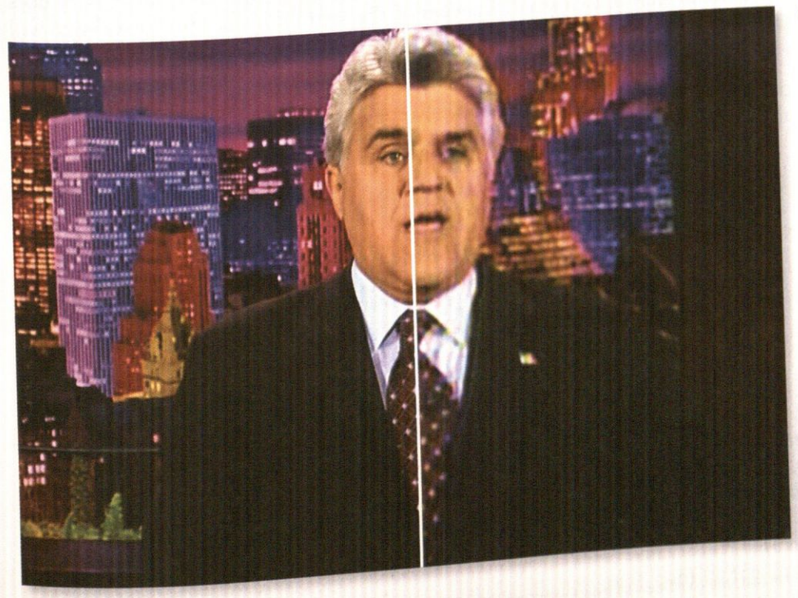
What remains is this:

- Reasoning from the general to the general.

You *can* inductively support a conclusion about the attributes of one population by considering the attributes of another population. You do this by viewing the two populations as analogues, and by reasoning analogically.

Example:

Major league baseball players widely use performance-enhancing drugs. ML baseball players and NFL football players are under comparable pressure to perform well; and performance-enhancing drugs are as available to NFL football players as to ML baseball players. Further, the methods used for preventing and detecting the use of performance-enhancing drugs are the same for both NFL and ML players, and the penalties for using the drugs are similar for both sets of individuals.



■ HDTV vs. SDTV images. The "populations" of such images are highly uniform; so a single comparison image may suffice to let you know which populations you'd be happier with.

Therefore, National Football League players probably widely use performance-enhancing drugs, too.

Using the guidelines mentioned on page 365 leads to the finding that this argument from analogy is relatively strong. However, it is not strong enough to warrant conclusions about specific individuals. That kind of conclusion would require hard evidence in the form, perhaps, of tests. But it is strong enough to raise concern on the part of those who think that professional football players should not use performance-enhancing drugs.

An argument like this one, based on an analogy between two populations, is a legitimate inductive argument.* However, there is another way people attempt to come to a conclusion about the attributes of one population by considering the attributes of another population. Sometimes people think that information about the proportion of Xs that are Ys automatically supports conclusions about the proportion of Ys that are Xs. It is a mistake to think this.

Example of Mistaken Reasoning

Most men with prostate cancer have an elevated PSA level.

Therefore most men with an elevated PSA level have prostate cancer.

Without additional information, you *cannot* derive a conclusion about the proportion of Xs that are Ys from information about the proportion of Ys that are Xs. The fact that few mammals are aardvarks does not support the conclusion that few aardvarks are mammals. The fact that only a small fraction of this year's college graduates will be seniors from your university does not mean that only a small fraction of the seniors from your university will graduate. This mistake we shall call an **illicit inductive conversion**; here are four additional examples:

First example:

Most people who have lung cancer are smokers; therefore most smokers have lung cancer.

Second example:

Few members of the National Rifle Association are Marxists; therefore few Marxists are members of the National Rifle Association.

Third example:

Only a tiny percentage of traffic accidents involve stoned 90-year-old drivers. Therefore, stoned 90-year-old drivers have little chance of getting into a traffic accident.

Fourth example:

Most meth addicts are former marijuana users; therefore most former marijuana users are meth addicts.

*In fact, you could view all inductive generalizations from samples as arguments from analogy, in which one analogue is the sample and the other analogue is the population it supposedly represents.

INFORMAL ERROR-MARGIN AND CONFIDENCE-LEVEL INDICATORS

Definition of Statistics: The science of producing unreliable facts from reliable figures. —Evan Esar

Confidence level (explained earlier in the chapter) is a technical concept from statistics; a confidence level is a quantitative statement of the probability that random variation among samples of a given size falls within certain limits known as the error margin. We have, however, everyday expressions that convey our level of confidence that a statement is true. We might speak, for example, of a proposition as being *almost certainly true* or as *true beyond any reasonable doubt*. If someone were to say, "I'd bet my shirt that blahblah-blah," you would know he or she is very confident of that assertion.

In everyday discourse, we use phrases like the following to express how much confidence we have in a proposition:

Informal "confidence level" indicating phrases:

- Undoubtedly
- I'd bet anything
- Almost certainly
- Very probably
- It's likely
- There's a good chance
- The chances are 50/50
- There's a chance
- Maybe
- There's not much chance
- It's utterly impossible

And so forth.

Error margins too may be expressed informally. To give oneself an "error margin" when asserting a proportion, one might use terms like the following:

Informal "error margin" indicating words:

- around
- about
- approximately
- roughly
- most
- many

And so on.

Everyday "error margins" and "confidence levels" are also expressed by implication. Recently we encountered a man with a dog whose name—judging from what the man kept shouting—was "Getoverhere." He assured us Getoverhere wasn't dangerous—bared fangs notwithstanding. "Dad-gum dog won't bite," he said. "I've raised lots of pits and the breed don't bite." The man expressed this without caveat, indicating he placed great confidence in the probability that pit bulls don't bite.

Conclusions of statistical syllogisms and arguments from analogy are also expressed with levels of confidence, though not with "error margins," since they are about individuals rather than populations. The argument the dog owner made about Getoverhere was both generalizing from a sample and a statistical syllogism:

Generalizing from a sample:
The pits I've raised don't bite.
Therefore pits don't bite.
Statistical syllogism:
Pits don't bite.
This dog is a pit.
Therefore this dog "don't bite."

Informal error-margin and confidence-level indicators (and other expressions that do the same job) enable us to express an estimation of the probability of claims. Thinking critically about everyday inductive reasoning from samples means matching error-margin and confidence-level indicators to the size and representativeness of a sample. For example, generalizing from a small, atypical sample isn't a mistake in reasoning—unless we overestimate the probability of the conclusion relative to the size of our sample and the error margin we allow ourselves.

Example of Inflated Confidence Level and Unduly Narrow Error Margin

I bought two apples at Kroger and one tasted awful. Therefore, it is dead certain that exactly 50 percent of all the apples at Kroger taste awful.

Example of a More Appropriate Confidence Level and a More Appropriate Error Margin

I bought two apples at Kroger and one tasted awful. Therefore, it's possible that a rather significant proportion of all apples at Kroger taste awful.

FALLACIES IN INDUCTIVE REASONING, AND RELATED PROBLEMS

Thinking critically means, perhaps above everything else, eliminating fallacies from your thinking. Several fallacies associated with inductive reasoning bear keeping in mind.

Hasty Generalization

Sometimes "hasty generalizing" is depicted simply as reasoning from a sample that is too small relative to the size of the population it is said to represent. But there is no mistake in reasoning from a small sample even if the population it is said to represent is very large. The mistake lies in being overly confident of how likely the small sample makes the conclusion.

Example of Hasty Generalization

This pit bites. Therefore all pits bite.

Example That Is Not Hasty Generalization

This pit bites. Therefore some pits bite.

The latter example isn't "hasty generalization" because the word "some" conveys a wide error-margin.

Anecdotal Evidence

One version of hasty generalizing deserves special mention. You sometimes hear statisticians, psychologists, and social scientists dismiss an argument as "merely anecdotal." An anecdote is a story, and the **fallacy of anecdotal evidence** is a version of hasty generalizing where the sample is presented as a narrative.

Studies indicate that more brunettes than blondes or redheads have high-paying corporate jobs.

—From a letter in the *San Francisco Chronicle*

Is this evidence of discrimination against blondes and redheads, as the writer of the letter thought?

Nope; there are more brunettes to begin with. We'd be suspicious if *fewer* brunettes had high-paying corporate jobs.

Example of the Fallacy of Anecdotal Evidence

These reports about pits being mean—there's nothing to them. You should see ol' Getoverhere playing with the grandkids. Dad-gum dog lets them eat out of his bowl.

Often, as with this example, generalizing from an anecdote is used to rebut a general statement. It's still generalizing from a sample of one or two, and if one overestimates the probability of the conclusion given the evidence (as the speaker does above), he or she commits the fallacy of anecdotal evidence.

One of the most important things you can learn from this book is to be on guard against this fallacy. "Evidence" that consists only of an anecdote is psychologically almost ravishing in its power to persuade. Whenever you hear someone supporting a general statement, or a rebuttal of a general statement, with nothing more than a story, remind yourself that a story is a sample of one.

Biased Generalization

The fallacy known as biased generalization happens when one is overly confident of how likely a biased sample makes a conclusion. (Again, a biased sample over- or under-represents one or more important variables found in its population.)

Now, a very small sample of a large and highly diversified population just *can't* be representative; the sample wouldn't be large enough to incorporate the important variables. Because such cases are automatically biased, it is customary to apply the **biased generalization** label to reasoning based on a relatively large sample that nevertheless is biased.

Example of the Fallacy Biased Generalization

Apparently nearly half of college students use Adderall, judging from a study of 1,000 seniors at Arizona State University. Nearly 50 percent of those surveyed said they use Adderall to prepare for final exams.*

*A made-up statistic.

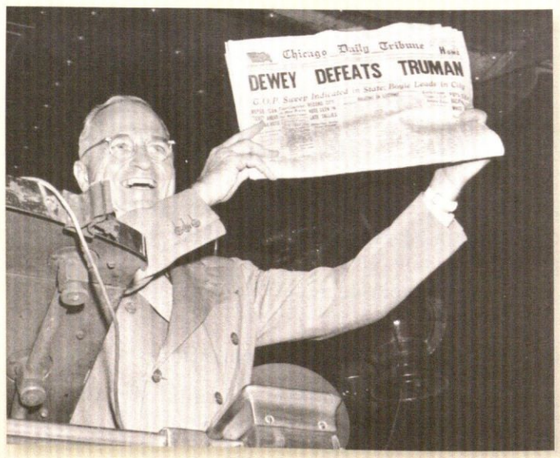
The Self-Selection Fallacy

On any given night, a thousand people may register an opinion online about a question posed on a CNN or FOX News program. That's as many people as you'd find in the sample of a professional opinion poll. But the informal cable news poll sample has not been scientifically selected to make sure every viewpoint has an equal chance of being included. What should reduce our confidence in conclusions about public opinion derived from such samples isn't necessarily that the samples are too small, but that they are self-selected.

A self-selected sample is one whose members are included by their own decision. A famous example would be a large poll conducted in 1993 by the political organization of H. Ross Perot, a wealthy businessman who ran for president. The poll was conducted by means of the magazine *TV Guide*; people were asked to answer questions posed in the magazine, then tear out or reproduce the pages and send them in for processing. You've already heard all you need to know to discount any results it produced. It, and all self-selected samples, over-represent people who want to be in the sample and under-represent people who don't have strong enough feelings on the issues to respond or who don't have the time to go to the trouble. Such a situation almost guarantees the sample will have views that are significantly different from those of its purported population.

Real Life

The Great Slip-Up of 1948



Because of a strike, the *Chicago Daily Tribune* had to go to press earlier than usual the night of the 1948 presidential election. So, they relied on some early returns, some "expert" opinion, and public opinion polls to decide on the famous "Dewey Defeats Truman" headline. But the polls were not sufficiently accurate, as Truman edged Dewey in a narrow upset victory.

When we overestimate the probability of a conclusion derived from a relatively large but self-selected sample, we commit the **self-selection fallacy**. As should be clear, this fallacy is merely a subcategory of the biased generalization fallacy, when the reasoning is founded on a large but self-selected sample. Common examples include online public opinion polls and person-on-the-street interviews.

Example of the Self-Selection Fallacy

Over sixty percent of people who responded to an online survey on CNN say they like President Obama as a person; clearly, most Americans like President Obama as a person.

Slanted Questions

A major source of unreliability in polling practices is the wording of the questions. It is possible to ask nearly any question of importance in many different ways. Consider this pair of questions:

- Do you think the school board should agree to teachers' demands for higher pay?
- Do you think it is reasonable for local public school teachers to seek pay raises?

These questions ask essentially the same thing, but you would be smart to expect more negative answers to the first version than to the second. The context in which a question is asked can be important, too. Imagine a question asking about approval of pay raises for public school teachers, but imagine it coming after one or the other of the following questions:

- Are you aware that teachers in this district have not had a salary increase for the past six years?
- Are you aware that the school district is facing a budget shortfall for the coming fiscal year?

We'd expect the approval of raises to fare better when asked after the first of these questions than after the second.

We might add that the inclusion of slanted questions is not always accidental. Often, a group or an organization will want to produce results that are slanted in their direction, and so they will include questions that are designed to do exactly that. This is an exercise in deception, of course, but unfortunately it is more widespread than we'd wish.

Have a look at the box "Ask Us No (Loaded) Questions . . ." (page 380), and you'll see how one large, very expensive poll can contain most of the errors we've been discussing.

Weak Analogy

When we overestimate the probability of a conclusion derived from an argument from analogy, we commit the fallacy called **weak analogy**. As in the preceding cases, the mistake will be apparent through phrases or other features that disclose one's confidence level.

On Language

Ask Us No (Loaded) Questions; We'll Tell You No Lies

In the spring of 1993, H. Ross Perot did a nationwide survey that received a lot of publicity. But a survey is only as good as the questions it asks, and loaded questions can produce a biased result. *Time* and CNN hired the Yankelovich Partners survey research firm to ask a split random sample of Americans two versions of the questions; the first was Perot's original version, the second was a rewritten version produced by the Yankelovich firm. Here is what happened for three of the topics covered.

Question 1

PEROT VERSION: "Do you believe that for every dollar of tax increase there should be two dollars in spending cuts with the savings earmarked for deficit and debt reduction?"

YANKELOVICH VERSION: "Would you favor or oppose a proposal to cut spending by two dollars for every dollar in new taxes, with the savings earmarked for deficit reduction, even if that meant cuts in domestic programs like Medicare and education?"

RESULTS: Perot version: 67 percent yes; 18 percent no
Yankelovich version: 33 percent in favor; 61 percent opposed

Question 2

PEROT VERSION: "Should the President have the Line Item Veto to eliminate waste?"

YANKELOVICH VERSION: "Should the President have the Line Item Veto, or not?"

RESULTS: Perot version: 71 percent in favor; 16 percent opposed
Yankelovich version: 57 percent in favor; 21 percent opposed

Question 3

PEROT VERSION: "Should laws be passed to eliminate all possibilities of special interests giving huge sums of money to candidates?"

YANKELOVICH VERSION: "Should laws be passed to prohibit interest groups from contributing to campaigns, or do groups have a right to contribute to the candidate they support?"

RESULTS: Perot version: 80 percent yes; 17 percent no
Yankelovich version: 40 percent for prohibition; 55 percent for right to contribute

Example of Weak Analogy

"My neighbor's pit bull is aggressive, so the one you're thinking of getting will also be aggressive."

The argument lists just one similarity between the analogues: both are pit bulls. Pit bulls, of course, share important genetic similarities that are related to aggressiveness. The conclusion of this argument, however, is expressed unconditionally. The speaker has overestimated how likely the premise makes the conclusion. If he had said, "My neighbor's pit bull is aggressive, so the one you're thinking of getting might have that problem, too," the argument would have been expressed with an appropriate confidence-level indicator. Expressed that way, no fallacy would have been committed. Likewise, there would be no fallacy if the speaker had said, "That pit you're thinking of getting could well be aggressive; its litter mate certainly is."

Vague Generalities

If someone told you that successful people think outside the box, you *might* ask him or her for evidence. But don't. A more pertinent question—though a bit rude—would be, "What are you talking about?" Until you know what counts as a successful person and thinking outside the box, you don't really know what it is you want evidence for.

A **vague generality** is a general statement too vague to be meaningful for practical purposes. This happens when a group is so vaguely named we don't know exactly who or what is in the group, or when an attribute is so obscure we can't tell if a given person or thing has it. "Environmentalists are the real enemy" and "Kids are too into themselves these days" will serve as examples.

A smart move in the critical thinking game is to watch for vague generalities in our own thinking and in the statements of others. If we have a genuine interest in checking to see if a general statement is true, we should be able to specify a sampling frame, a concept mentioned earlier. A sampling frame is essentially a precising definition, a definition that enables us to determine unambiguously whether someone or something is a member of a population and has an attribute of interest. Recently, someone told us that people with long necks make good listeners. That assertion contains a couple of pretty subjective concepts, but one could specify reasonably precisely (even though arbitrarily) how long a long neck is and could establish (arbitrarily) a standard for good listening. We doubt, however, that you could secure a grant from the National Science Foundation for testing even a precise version of the claim.

When a vague generality is couched in words and phrases with strongly positive associations, words like "freedom," "hard working," "principled," "courage," "change," and "taking back," the result is a **glowing generality**. Political ads and speeches are filled with examples.

"The people are taking back their government." —*Sarah Palin*

"We owe our children more than we have been giving them." —*Hillary Clinton*

The opposite of a glowing generality has no widely accepted name, but it obviously includes negative stereotypes and other dysphemisms (Chapter 5). Democrats generalize about Republicans using words like "rigid" and "inflexible," and refer to them as "right-wing extremists"; Republicans accuse Democrats of being "Marxists" and "secular socialists." Generalities of either variety amount to nothing more than name-calling; we express our attitudes when we use them, but we do not convey further substantive information.

Almost no one in Las Vegas believes the gambler's fallacy is in fact a fallacy.

—From an anonymous reviewer of this book

How does he or she know this?

Recap

Before we recap, we want to point something out. You should not get the idea from this chapter that informal reasoning from analogies or from nonscientific samples should be dismissed or avoided or that conclusions based on such reasoning should be routinely rejected. Everyday reasoning of this sort often has little confirmatory power, but it has considerable utility in suggesting ideas for more systematic, scientific exploration and confirmation. Smoking's linkage to various medical conditions would probably not have been investigated scientifically if it had not occurred to people that health problems seem greater among smokers. The moral of this chapter is not that you should never generalize or reason analogically, but only that, when you do, you should think critically and not overestimate the strength of your arguments.

The following list summarizes topics and concepts from this chapter.

- Inductive reasoning is used to support a conclusion rather than to demonstrate or prove it.
- Inductive arguments can be depicted as relatively strong or relatively weak, depending on how much their premises increase the probability of the conclusion.
- The strength of an argument is distinct from the overall probability of the conclusion. You can have a relatively strong argument for a conclusion whose overall probability is very low, and a relatively weak argument for a conclusion whose overall probability is quite high.
- Statistical syllogisms have the form: Most Xs are Ys; this is an X; therefore this is a Y.
- The strength of a statistical syllogism is distinct from the probability of its conclusion everything considered. The latter depends on The Principle of Total Evidence. The former depends on the proportion of Xs that are Ys.
- Everyday inductive generalizations from samples differ from scientific inductive generalizations from samples in that everyday samples are not scientifically selected to eliminate bias, and probabilities in everyday generalizing cannot be calculated precisely.
- Thinking critically about everyday generalizations from samples involves the two principles stated on page 355.
- Inductive reasoning from analogy is based on the idea that things alike in some respects will be alike in further respects.
- Thinking critically about inductive arguments from analogy involves the principles stated on page 365.
- The time-honored strategy for rebutting an argument from analogy is to "attack the analogy" by calling attention to important dissimilarities between the analogues.
- Arguments from analogy are especially important in ethics, history, and law, and to refute other arguments.
- We can support a conclusion about one population by reasoning analogically from a second population that has similar attributes.
- An overestimation of the strength of an argument based on a small sample is "hasty generalization."
- An overestimation of the strength of an argument based on a biased but not-so-small sample is "biased generalization."
- The fallacy of "anecdotal evidence" is a version of hasty generalization in which the sample is presented as a narrative.
- Generalizations based on anecdotes are often persuasive psychologically, even though they are based on a sample of one.
- The self-selection fallacy is a version of biased generalization in which the sample is self-selected.
- When we overestimate the probability of a conclusion derived from an argument from analogy, we commit the fallacy called weak analogy.
- Vague generalizations suffer not so much from lack of support as from lack of substantive meaning.

Additional Exercises

These exercises will help you identify slanted questions, informal confidence-level and error-margin indicators, vague generalizations, and fallacies in inductive reasoning.

Exercise 10-24

Explain how each of the following public opinion poll questions is slanted, if it is.

▲ 1. Some say Republican plans to reduce environmental safeguards will lead to more ecological disasters. Do you favor or oppose these plans?

2. Was British Petroleum slow to respond to the gulf oil spill because they didn't care or because they hadn't adequately prepared for drilling in deep water?

3. Do you agree or disagree that immigration laws should be more vigorously enforced?

▲ 4. Some say that the high cost of medicine is due to frivolous lawsuits. Do you favor or oppose ceilings on the amount doctors can be sued for?

5. Polls indicate that most Americans are satisfied with their health care. Do you agree or disagree that health care reform is needed?

6. To reduce the federal deficit, do you favor raising taxes on working families or reducing excessive government spending?

▲ 7. To reduce the federal deficit, do you favor raising taxes on the super wealthy or slashing services for the needy?

8. Should a doctor be able to withhold medical care from a baby who has survived an abortion?

9. When framing new laws, should legislators be guided by Judeo-Christian values or only by secular considerations?

▲ 10. Would you favor or oppose reasonable background checks on people who want to purchase deadly assault weapons?

Exercise 10-25

Find a confidence-level indicator or an error-margin indicator in each of the following arguments. Then, create a new argument with a more appropriate indicator.

Example

Original argument:

> It rained yesterday. Therefore, it absolutely, positively will rain again today.

New argument with a more appropriate confidence-level indicator:

> It rained yesterday. Therefore, it could well rain again today.

▲ 1. Paulette, Georgette, Babette, and Brigitte are all Miami University students, and they all are members of Webkinz. Therefore, all Miami University students are members of Webkinz.

2. Paulette, Georgette, Babette, and Brigitte are all Miami University students and the first three are members of Webkinz. Therefore, exactly three out of every four Miami University students is a member of Webkinz.

3. Gustavo likes all the business courses he has taken at Foothill College. Therefore, he is bound to like the next business course he takes at Foothill.

▲ 4. Gustavo liked two of the four business profs he has had at Foothill College. Therefore, he will like 50 percent of all his business profs at Foothill.

5. Gustavo likes all the business courses he has had at Foothill. No doubt his brother Sergio will like all his Foothill business courses, too.

6. Twenty percent of York's 8:00 A.M. class watch PBS. Therefore, 20 percent of York's 9:00 A.M. class watch PBS.

▲ 7. Twenty percent of York's 8:00 A.M. class watch PBS. Therefore, it is certain that exactly 20 percent of all the students at York's community college watch PBS.

8. Bill Clinton lied about his relationship with Monica Lewinsky; therefore, he lied about Jennifer Flowers as well.

9. Seventy percent of Wal-Mart shoppers own cars. Therefore, the same percentage of Target customers own cars.

▲ 10. Susan likes Thanksgiving. We can be very certain, therefore, that she likes Christmas too.

Exercise 10-26

Arrange the alternative conclusions of the following arguments in order of decreasing confidence level. Some options are pretty close to tied; don't get into feuds with classmates over close calls.

▲ 1. Not once this century has this city gone Republican in a presidential election. Therefore,

a. I wouldn't count on it happening this time
b. it won't happen this time
c. in all likelihood, it won't happen this time
d. there's no chance whatsoever that it will happen this time
e. it would be surprising if it happened this time
f. I'll be a donkey's uncle if it happens this time

2. Byron doesn't know how to play poker, so,

a. he sure as heck doesn't know how to play blackjack
b. it's doubtful he knows how to play blackjack
c. there's a possibility he doesn't know how to play blackjack
d. don't bet on him knowing how to play blackjack
e. you're nuts if you think he knows how to play blackjack

3. Every time I've used the Beltway, the traffic has been heavy, so I figure that

a. the traffic is almost always heavy on the Beltway
b. frequently the traffic on the Beltway is heavy
c. as a rule, the traffic on the Beltway is heavy
d. the traffic on the Beltway can be heavy at times
e. the traffic on the Beltway is invariably heavy
f. typically, the traffic on the Beltway is heavy
g. the traffic on the Beltway is likely to be heavy most of the time

Exercise 10-27

In which of the following arguments is the implied confidence level too high or low, given the premises? After you have decided, compare your results with those of three or four classmates.

▲ 1. We spent a day on the Farallon Islands last June, and was it ever foggy and cold! So, dress warmly when you go there this June. Based on our experience, it is 100 percent certain to be foggy and cold.

2. We've visited the Farallon Islands on five different days, two during the summer and one each during fall, winter, and spring. It's been foggy and cold every time we've been there. So, dress warmly when you go there. Based on our experience, there is an excellent chance it will be foggy and cold whenever you go.

3. We've visited the Farallon Islands on five different days, all in June. It's been foggy and cold every time we've been there. So, dress warmly when you go there in June. Based on our experience, it could well be foggy and cold.

▲ 4. We've visited the Farallon Islands on five different days, all in June. It's been foggy and cold every time we've been there. So, dress warmly when you go there in June. Based on our experience, there is a small chance it will be foggy and cold.

5. We've visited the Farallon Islands on five different days, all in January. It's been foggy and cold every time we've been there. So, dress warmly when you go there in June. Based on our experience, it almost certainly will be foggy and cold.

Exercise 10-28

In each of the following, determine whether the sample, the population, or the attribute of interest is excessively vague.

▲ 1. The tests in the class are going to be hard, judging from the first midterm.
2. The transmissions in Chrysler minivans tend to fail prematurely, if my Voyager is an indication.
3. Judging from my experience, technical people are exceedingly difficult to communicate with sometimes.
▲ 4. Men cannot tolerate stress. My husband even freaks if the newspaper is a little late.
5. Movies are too graphic these days. Just go to one—you'll see.
6. Violence in movies carries a message that degrades women. The movies playing right now prove the point.
▲ 7. You need to get cooler clothing than that if you're going to Minneapolis in the summer. I've been there.
8. Entertainment is much too expensive these days. Just look at what they charge for movies.
9. Art majors sure are weird! I roomed with one once. Man.
▲ 10. The French just don't like Americans. I couldn't find anyone in Paris who would speak English to me.
11. All the research suggests introverts are likely to be well versed in computer skills.
12. Suspicious people tend to be quite unhappy, from what I've observed.
13. Everyone marries someone who looks like him/her. Just check out the married people you know.

Exercise 10-29

If you can, specify a sampling frame for each of the following populations and attributes. In other words, define them so one could determine whether a person or thing is a member of the population and has the attribute.

▲ 1. The proportion of Denver residents who watch *The Bachelorette*.
2. The proportion of religious people in your city who are conservatives.
3. The proportion of blondes at your university.
▲ 4. The proportion of country songs about lost love.
5. The proportion of plumbers in Chicago who play the Illinois Lotto.
6. The proportion of people with long necks who make good listeners.

Exercise 10-30

Identify any fallacies or other problems in each of the following arguments or statements. Some items may be relatively free of problems.

▲ 1. My cousin uses a Dodge truck on his ranch; it has over 300,000 miles on the original engine. Obviously, Dodge really does build tough trucks.
2. Things are getting better all the time.
3. I ordered a packet of California watermelon seeds from Hansen Seed Company last year, and they germinated like crazy. I expect the seeds I ordered this year to sprout, too. Of course it's a little colder up here in Canada than it was in El Paso.
▲ 4. Poker? Nah, I don't like card games.
5. Drug abuse among pro athletes is unquestionably a serious and widespread problem. Why, last week three players from just one team said they used HGH!
6. Orange cats are easy to train. I had one once—Gross Kitty we called him—and you could teach that cat to ski if you wanted to.
▲ 7. You're gonna take a course from Toadstool? Two guys I know think he's terrible! He flunked both of them!
8. Most Americans favor a national lottery to reduce the federal debt, judging from a poll taken in Las Vegas where about 80 percent said they liked the idea.
9. Young people these days are too easily distracted by things. Just look at the kids in this class.
▲ 10. Most Ohio residents are worried about air quality. In a survey taken in Cleveland, more than half the respondents identified air pollution as the most significant environmental hazard.

Exercise 10-31

Identify any fallacies or other problems in each of the following arguments or statements. Some items may be relatively free of problems.

▲ 1. The IRS isn't interested in the big corporations, just middle-class taxpayers like you and me. I was audited last year—you ever hear of Exxon-Mobile getting nailed?
2. The weatherman on Channel 12 sure knows his stuff. I bet he knows a lot about global warming, too.
3. It's time to take back our government. Most Americans agree with that.
▲ 4. I wouldn't buy anything from Ace. The lawn mower I got there didn't work worth beans.
5. Border collies are way smarter than Rottweilers. I know: I've owned both.
6. Daniel showed me a photo of his sister yesterday; that girl is photogenic!
▲ 7. My Zenon plasma TV broke down three times in the first six month. It's a bad brand.
8. The dinner we had in Paris was great. I bet the food's great in London, too.
9. I liked watching *American Idol* last year; chances are I'll like it again this year.

▲ 10. Did you know there's no Starbuck's in Pincus, Nebraska? I guess Starbuck's doesn't like the state.
11. Southwest doesn't assign seats. Leastwise they didn't on the flights I've taken.
12. You get what you pay for.
13. Charles cheated on his income tax. I bet he cheats on his wife.

Writing Exercises

1. Select one of the following general claims and explain how you might find out if it is true. Begin by making the generalization more precise by specifying a sampling frame, and then explain how you might select a sample from the frame. Alternatively, if you think you already have evidence the claim is true, produce an argument that supports it.

   Politicians can't be trusted.
   Government intrudes in our private lives/business affairs too much.
   Many welfare recipients take advantage of the system.
   Anyone who really wants a job can find one.
   College teachers are liberals.
   The super-wealthy don't pay much in taxes.
   The media are biased.

2. When everyone is finished, the instructor will redistribute everyone's paper to another member of the class. In groups of four or five, read the papers and select the best one to share with everyone in the class. Be prepared to explain why it is the best.

11 Causal Explanation

So far in this book, we have been talking mainly about arguments. Now it is time to say something about explanations.

Explanations and arguments are different things. You use arguments to support or demonstrate statements; you use explanations to elucidate something in one way or another. "In one way or another" can mean many things, including why something happened, how it happened, how it works, what it does, what will happen to it, what became of it, what can be done about it, why something isn't done about it, and many other things—really, the list is almost endless.

Although explanations and arguments are different things and serve different purposes, one source of confusion is that a sentence that can be used to explain something can also be used *in* an argument, either as a premise or as a conclusion. The statement "The puddle was caused by the leak in the toilet" might be the conclusion of an argument whose premise is "There wasn't a puddle until the toilet started leaking." Alternatively, it might be a premise in an argument that has the conclusion "Therefore, let's fix the toilet."

Students will learn to . . .

1. Differentiate between arguments and explanations
2. Recognize two important types of explanations
3. Apply standards for evaluating explanations
4. Apply methods for forming causal hypotheses
5. Learn methods for confirming causal hypotheses
6. Recognize mistakes in causal reasoning
7. Distinguish the concept of cause as it applies to law