sound arguments are valid arguments, but not all valid arguments are sound arguments.

Although soundness is what any argument should aim for, we will not be talking much about soundness in this book. The reason for this is that the only difference between a valid argument and a sound argument is that a sound argument has all true premises. But how do we determine whether the premises of an argument are actually true? Well, there are lots of ways to do that, including using Google to look up an answer, studying the relevant subjects in school, consulting experts on the relevant topics, and so on. But none of these activities have anything to do with logic, per se. The relevant disciplines to consult if you want to know whether a particular statement is true is almost never logic! For example, logic has nothing to say regarding whether or not protozoa are animals or whether there are predators that aren't in the animal kingdom. In order to learn whether those statements are true, we'd have to consult biology, not logic. Since this is a logic textbook, however, it is best to leave the question of what is empirically true or false to the relevant disciplines that study those topics. And that is why the issue of soundness, while crucial for any good argument, is outside the purview of logic.

1.8 Deductive vs. Inductive arguments

The concepts of validity and soundness that we have introduced apply only to the class of what are called "deductive arguments". A **deductive argument** is an argument whose conclusion is supposed to follow from its premises with absolute certainty, thus leaving no possibility that the conclusion doesn't follow from the premises. For a deductive argument to fail to do this is for it to fail as a deductive argument. In contrast, an **inductive argument** is an argument whose conclusion is supposed to follow from its premises with a high level of probability, which means that although it is possible that the conclusion doesn't follow from its premises, it is unlikely that this is the case. Here is an example of an inductive argument:

> Tweets is a healthy, normally functioning bird and since most healthy, normally functioning birds fly, Tweets probably flies.

Notice that the conclusion, Tweets probably flies, contains the word "probably." This is a clear indicator that the argument is supposed to be inductive, not deductive. Here is the argument in standard form:

1. Tweets is a healthy, normally functioning bird
2. Most healthy, normally functioning birds fly
3. Therefore, Tweets probably flies

Given the information provided by the premises, the conclusion does seem to be well supported. That is, the premises do give us a strong reason for accepting the conclusion. This is true even though we can imagine a scenario in which the premises are true and yet the conclusion is false. For example, suppose that we added the following premise:

Tweets is 6 ft tall and can run 30 mph.

Were we to add that premise, the conclusion would no longer be supported by the premises, since any bird that is 6 ft tall and can run 30 mph, is not a kind of bird that can fly. That information leads us to believe that Tweets is an ostrich or emu, which are not kinds of birds that can fly. As this example shows, inductive arguments are **defeasible arguments** since by adding further information or premises to the argument, we can overturn (defeat) the verdict that the conclusion is well-supported by the premises. Inductive arguments whose premises give us a strong, even if defeasible, reason for accepting the conclusion are called, unsurprisingly, **strong inductive arguments**. In contrast, an inductive argument that does not provide a strong reason for accepting the conclusion are called **weak inductive arguments**.

Whereas strong inductive arguments are defeasible, valid deductive arguments aren't. Suppose that instead of saying that *most* birds fly, premise 2 said that *all* birds fly.

1. Tweets is a healthy, normally function bird.
2. All healthy, normally functioning birds can fly.
3. Therefore, Tweets can fly.

This is a valid argument and since it is a valid argument, there are no further premises that we could add that could overturn the argument's validity. (True, premise 2 is false, but as we've seen that is irrelevant to determining whether an

argument is valid.) Even if we were to add the premise that Tweets is 6 ft tall and can run 30 mph, it doesn't overturn the validity of the argument. As soon as we use the **universal generalization**, "*all* healthy, normally function birds can fly," then when we assume that premise is true and add that Tweets is a healthy, normally functioning bird, it *has* to follow from those premises that Tweets can fly. This is true even if we add that Tweets is 6 ft tall because then what we have to imagine (in applying our informal test of validity) is a world in which all birds, including those that are 6 ft tall and can run 30 mph, can fly.

Although inductive arguments are an important class of argument that are commonly used every day in many contexts, logic texts tend not to spend as much time with them since we have no agreed upon standard of evaluating them. In contrast, there is an agreed upon standard of evaluation of deductive arguments. We have already seen what that is; it is the concept of validity. In chapter 2 we will learn some precise, formal methods of evaluating deductive arguments. There are no such agreed upon formal methods of evaluation for inductive arguments. This is an area of ongoing research in philosophy. In chapter 3 we will revisit inductive arguments and consider some ways to evaluate inductive arguments.

1.9 Arguments with missing premises

Quite often, an argument will not explicitly state a premise that we can see is needed in order for the argument to be valid. In such a case, we can supply the premise(s) needed in order so make the argument valid. Making missing premises explicit is a central part of reconstructing arguments in standard form. We have already dealt in part with this in the section on paraphrasing, but now that we have introduced the concept of validity, we have a useful tool for knowing when to supply missing premises in our reconstruction of an argument. In some cases, the missing premise will be fairly obvious, as in the following:

> Gary is a convicted sex-offender, so Gary is not allowed to work with children.

The premise and conclusion of this argument are straightforward:

1. Gary is a convicted sex-offender
2. Therefore, Gary is not allowed to work with children (from 1)

However, as stated, the argument is invalid. (Before reading on, see if you can provide a counterexample for this argument. That is, come up with an imaginary scenario in which the premise is true and yet the conclusion is false.) Here is just one counterexample (there could be many): Gary is a convicted sex-offender but the country in which he lives does not restrict convicted sex-offenders from working with children. I don't know whether there are any such countries, although I suspect there are (and it doesn't matter for the purpose of validity whether there are or aren't). In any case, it seems clear that this argument is relying upon a premise that isn't explicitly stated. We can and should state that premise explicitly in our reconstruction of the standard form argument. But what is the argument's missing premise? The obvious one is that no sex-offenders are allowed to work with children, but we could also use a more carefully statement like this one:

> *Where Gary lives*, no convicted sex-offenders are allowed to work with children.

It should be obvious why this is a more "careful" statement. It is more careful because it is not so universal in scope, which means that it is easier for the statement to be made true. By relativizing the statement that sex-offenders are not allowed to work with children to the *place* where Gary lives, we leave open the possibility that other places in the world don't have this same restriction. So even if there are other places in the world where convicted sex-offenders are allowed to work with children, our statements could still be true since in *this* place (the place where Gary lives) they aren't. (For more on strong and weak statements, see section 1.10). So here is the argument in standard form:

1. Gary is a convicted sex-offender.
2. Where Gary lives, no convicted sex-offenders are allowed to work with children.
3. Therefore, Gary is not allowed to work with children. (from 1-2)

This argument is now valid: there is no way for the conclusion to be false, assuming the truth of the premises. This was a fairly simple example where the missing premise needed to make the argument valid was relatively easy to see. As we can see from this example, a **missing premise** is a premise that the argument needs in order to be as strong as possible. Typically, this means supplying the statement(s) that are needed to make the argument valid. But in

addition to making the argument valid, we want to make the argument plausible. This is called "the principle of charity." The **principle of charity** states that when reconstructing an argument, you should try to make that argument (whether inductive or deductive) as strong as possible. When it comes to supplying missing premises, this means supplying the most plausible premises needed in order to make the argument either valid (for deductive arguments) or inductively strong (for inductive arguments).

Although in the last example figuring out the missing premise was relatively easy to do, it is not always so easy. Here is an argument whose missing premises are not as easy to determine:

> Since children who are raised by gay couples often have psychological and emotional problems, the state should discourage gay couples from raising children.

The conclusion of this argument, that the state should not allow gay marriage, is apparently supported by a single premise, which should be recognizable from the occurrence of the premise indicator, "since." Thus, our initial reconstruction of the standard form argument looks like this:

1. Children who are raised by gay couples often have psychological and emotional problems.
2. Therefore, the state should discourage gay couples from raising children.

However, as it stands, this argument is invalid because it depends on certain missing premises. The conclusion of this argument is a **normative statement**—a statement about whether something *ought to be true*, relative to some standard of evaluation. Normative statements can be contrasted with **descriptive statements**, which are simply factual claims about what *is true*. For example, "Russia *does not* allow gay couples to raise children" is a descriptive statement. That is, it is simply a claim about what is *in fact the case* in Russia today. In contrast, "Russia *should not* allow gay couples to raise children" is a normative statement since it is not a claim about what is true, but what ought to be true, relative to some standard of evaluation (for example, a moral or legal standard). An important idea within philosophy, which is often traced back to the Scottish philosopher David Hume (1711-1776), is that statements about what ought to be the case (i.e., normative statements) can never be derived from

statements about what is the case (i.e., descriptive statements). This is known within philosophy as **the is-ought gap**. The problem with the above argument is that it attempts to infer a normative statement from a purely descriptive statement, violating the is-ought gap. We can see the problem by constructing a counterexample. Suppose that in society x it is true that children raised by gay couples have psychological problems. However, suppose that in that society people do not accept that the state should do what it can to decrease harm to children. In this case, the conclusion, that the state should discourage gay couples from raising children, does not follow. Thus, we can see that the argument depends on a missing or assumed premise that is not explicitly stated. That missing premise must be a normative statement, in order that we can infer the conclusion, which is also a normative statement. There is an important general lesson here: *Many times an argument with a normative conclusion will depend on a normative premise which is not explicitly stated*. The missing normative premise of this particular argument seems to be something like this:

The state should always do what it can to decrease harm to children.

Notice that this is a normative statement, which is indicated by the use of the word "should." There are many other words that can be used to capture normative statements such as: good, bad, and ought. Thus, we can reconstruct the argument, filling in the missing normative premise like this:

1. Children who are raised by gay couples often have psychological and emotional problems.
2. The state should always do what it can to decrease harm to children.
3. Therefore, the state should discourage gay couples from raising children. (from 1-2)

However, although the argument is now in better shape, it is *still* invalid because it is still possible for the premises to be true and yet the conclusion false. In order to show this, we just have to imagine a scenario in which both the premises are true and yet the conclusion is false. Here is one counterexample to the argument (there are many). Suppose that while it is true that children of gay couples often have psychological and emotional problems, the rate of psychological problems in children raised by gay couples is actually lower than in children raised by heterosexual couples. In this case, even if it were true that the state should always do what it can to decrease harm to children, it does not follow that the state should discourage gay couples from raising children. In

fact, in the scenario I've described, just the opposite would seem to follow: the state should discourage heterosexual couples from raising children.

But even if we suppose that the rate of psychological problems in children of gay couples is higher than in children of heterosexual couples, the conclusion still doesn't seem to follow. For example, it could be that the reason that children of gay couples have higher rates of psychological problems is that in a society that is not yet accepting of gay couples, children of gay couples will face more teasing, bullying and general lack of acceptance than children of heterosexual couples. If this were true, then the harm to these children isn't so much due to the fact that their parents are gay as it is to the fact that their community does not accept them. In that case, the state should not necessarily discourage gay couples from raising children. Here is an analogy: At one point in our country's history (if not still today) it is plausible that the children of black Americans suffered more psychologically and emotionally than the children of white Americans. But for the government to discourage black Americans from raising children would have been unjust, since it is likely that if there was a higher incidence of psychological and emotional problems in black Americans, then it was due to unjust and unequal conditions, not to the black parents, per se. So, to return to our example, the state should only discourage gay couples from raising children if they know that the higher incidence of psychological problems in children of gay couples *isn't* the result of any kind of injustice, but is due to the simple fact that the parents are gay.

Thus, one way of making the argument (at least closer to) valid would be to add the following two missing premises:

A. The rate of psychological problems in children of gay couples is higher than in children of heterosexual couples.
B. The higher incidence of psychological problems in children of gay couples is not due to any kind of injustice in society, but to the fact that the parents are gay.

So the reconstructed standard form argument would look like this:

1. Children who are raised by gay couples often have psychological and emotional problems.
2. The rate of psychological problems in children of gay couples is higher than in children of heterosexual couples.

3. The higher incidence of psychological problems in children of gay couples is not due to any kind of injustice in society, but to the fact that the parents are gay.
4. The state should always do what it can to decrease harm to children.
5. Therefore, the state should discourage gay couples from raising children. (from 1-4)

In this argument, premises 2-4 are the missing or assumed premises. Their addition makes the argument much stronger, but making them explicit enables us to clearly see what assumptions the argument relies on in order for the argument to be valid. This is useful since we can now clearly see which premises of the argument we may challenge as false. Arguably, premise 4 is false, since the state shouldn't always do what it can to decrease harm to children. Rather, it should only do so as long as such an action didn't violate other rights that the state has to protect or create larger harms elsewhere.

The important lesson from this example is that supplying the missing premises of an argument is not always a simple matter. In the example above, I have used the principle of charity to supply missing premises. Mastering this skill is truly an art (rather than a science) since there is never just one correct way of doing it (cf. section 1.5) and because it requires a lot of skilled practice.

Exercise 6: Supply the missing premise or premises needed in order to make the following arguments valid. Try to make the premises as plausible as possible while making the argument valid (which is to apply the principle of charity).

1. Ed rides horses. Therefore, Ed is a cowboy.
2. Tom was driving over the speed limit. Therefore, Tom was doing something wrong.
3. If it is raining then the ground is wet. Therefore, the ground must be wet.
4. All elves drink Guinness, which is why Olaf drinks Guinness.
5. Mark didn't invite me to homecoming. Instead, he invited his friend Alexia. So he must like Alexia more than me.
6. The watch must be broken because every time I have looked at it, the hands have been in the same place.

7. Olaf drank too much Guinness and fell out of his second story apartment window. Therefore, drinking too much Guinness caused Olaf to injure himself.
8. Mark jumped into the air. Therefore, Mark landed back on the ground.
9. In 2009 in the United States, the net worth of the median white household was $113,149 a year, whereas the net worth of the median black household was $5,677. Therefore, as of 2009, the United States was still a racist nation.
10. The temperature of the water is 212 degrees Fahrenheit. Therefore, the water is boiling.
11. Capital punishment sometimes takes innocent lives, such as the lives of individuals who were later found to be not guilty. Therefore, we should not allow capital punishment.
12. Allowing immigrants to migrate to the U.S. will take working class jobs away from working class folks. Therefore, we should not allow immigrants to migrate to the U.S.
13. Prostitution is a fair economic exchange between two consenting adults. Therefore, prostitution should be allowed.
14. Colleges are more interested in making money off of their football athletes than in educating them. Therefore, college football ought to be banned.
15. Edward received an F in college Algebra. Therefore, Edward should have studied more.

1.10 Assuring, guarding and discounting

As we have seen, arguments often have complex structures including subarguments (recall that a subargument is an argument for one of the premises of the main argument). But in practice people do not always give further reasons or argument in support of every statement they make. Sometimes they use certain rhetorical devices to cut the argument short, or to hint at a further argument without actually stating it. There are three common strategies for doing this:

> **Assuring**: informing someone that there are further reasons although one is not giving them now