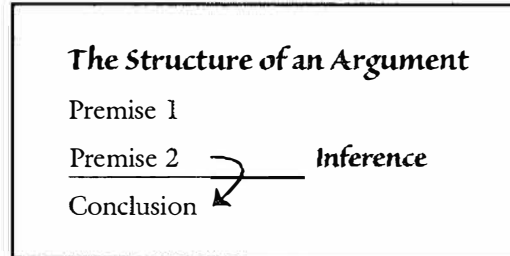


Excursus: A Little Bit of Logic

Philosophy is centered in the analysis and construction of **arguments**. We call the study of arguments **logic**. By argument we do not mean a verbal fight or quarrel. An argument is the supporting of a thesis (called the **conclusion**) with reasons (called **premises**). Both the conclusion and the premises are set forth in the form of statements—assertions that something is or is not the case (that is, statements that are either true or false). An argument, then, consists of at least two statements: a statement to be supported (the conclusion) and the statement (premise) meant to support it. This process of reasoning from premises to the conclusion is known as **inference**, which we can represent like this:



In philosophy, arguments can be simple or complex, clearly expressed or muddled, neatly labeled or buried in an expanse of nonargumentative text. But they will all have a common structure: premises given to back up a conclusion. Identifying the premises and conclusion is not always easy, but **indicator words** can help. Indicator words frequently accompany arguments and alert you that a premise or conclusion may be nearby. Premise indicators include *because, since, due to the fact that, the reason being, for the reason that,* and *inasmuch as*. Some conclusion indicators are *therefore, it follows that, thus, so, it must be that, consequently,* and *we can conclude that*. In any case, probably the best technique for identifying the parts of an argument is to try to find the conclusion first.

Arguments can be good or bad. A good argument shows that its conclusion is worthy of acceptance; a bad argument fails to do this. In a good argument, the inference is solid *and* the premises are true. Bad arguments fail on one or both counts.

Deductive and Inductive Reasoning

Arguments are of two types—**deductive** and **inductive**. A deductive argument is supposed to give logically *conclusive* support to its conclusion. An inductive argument is supposed to give *probable* support to its conclusion. Both kinds of arguments are used not just in philosophy, but in every endeavor in life that calls for intelligent, reasoned inquiry.

Deductive Arguments

A deductive argument that succeeds in providing logically conclusive support for its conclusion is said to be *valid*; one that fails to provide such support is said to be *invalid*. In a valid argument, if the premises are true, it's not possible for the conclusion to be false. The logical structure *guarantees* the truth of the conclusion if the premises are true. Because of this guarantee, deductively valid arguments are said to be *truth-preserving*. Consider this classic valid argument:

1. Socrates is a man.
2. All men are mortal.
3. \therefore Socrates is mortal. (The symbol \therefore stands for *therefore*.)

And this valid argument:

1. If philosophy leads to wisdom, then it is worth studying.
2. Philosophy leads to wisdom.
3. \therefore Philosophy is worth studying.

In both arguments, you can see that *if* the premises are true, there is no way the conclusion can be false. This result is due to the argument's form, not its content. Thus, *valid* refers to the form and is not a synonym for *true*. We could set up many other arguments of the same inferential form and plug any statements we wanted into the form, and we would get the same result: If the premises are true, the conclusion will be true. Of course, the premises or conclusion of a valid argument may *not* be true. The only limit on the possible combinations is that a valid argument cannot possibly have true premises and a false conclusion.

In philosophy the form of an argument is sometimes indicated by using letters to represent the argument's statements. So we can signify, or symbolize, the form of the second argument like this:

1. If P , then Q .
2. P .
3. $\therefore Q$.

Try substituting different statements into this form, and you will see the result is always a valid argument. (This form is known as a conditional, or hypothetical, argument because it contains at least one conditional, or if-then, premise. The first part of a conditional premise—the *if* part—is called the *antecedent*; the second—the *then* part—is called the *consequent*.)

Now consider this deductively *invalid* argument:

1. If Mary is sneezing, then she has a cold.
2. Mary is not sneezing.
3. \therefore She does not have a cold.

The conclusion certainly does not follow from the premises. It is possible for the premises to be true, and the conclusion false.

As we mentioned, a good deductive argument must not only be valid, but also have true premises. When an argument meets both these requirements, it is said to be *sound*. An argument that falls short of either requirement is not sound—it can be valid with false premises, or invalid with true premises, or invalid with false premises. Again, the quality of the reasoning is one thing; the truth of the premises another.

Here is an example of a sound argument:

1. If Mary is a mother, she must be a woman.
2. Mary is a mother (for she has just given birth to a baby).
3. ∴ Mary is a woman.

If Mary hasn't given birth, then premise 2 is false, and the argument is unsound.

$$\boxed{\text{Validity}} + \boxed{\text{All True Premises}} = \boxed{\text{Soundness}}$$

Some deductive argument forms are so common and so useful that they have been given names. They deserve special attention—and even memorization. Among the most famous ones are *modus ponens*, *modus tollens*, *disjunctive syllogism*, and *reductio ad absurdum*:

Modus Ponens (MP)

(*Affirming the Antecedent*)

1. If P , then Q .
2. P .
3. ∴ Q .

Modus Tollens (MT)

(*Denying the Consequent*)

1. If P , then Q .
2. Not Q .
3. ∴ Not P .

Both affirming the antecedent and denying the consequent are valid forms.

Disjunctive Syllogism (DS)

(*Denying the Disjunct*)

1. Either P or Q .
2. Not Q .
3. ∴ P .

Reductio ad Absurdum (RAA)

(*Reduce to a Contradiction*)

1. Assume A (A is the logical opposite of the conclusion you seek to prove).
2. Logically deduce a contradiction from A . (This shows that A implies a contradiction.)
3. This proves A is false, since a contradiction cannot be true. So not- A must be true.

We have already given examples of *modus ponens*, the last one being:

1. If Mary is a mother, she must be a woman.
2. Mary is a mother.
3. \therefore Mary is a woman.

Here is an example of *modus tollens*:

1. If Leslie is a mother, she is a woman.
2. Leslie is not a woman (but a man).
3. \therefore Leslie is not a mother.

Here is an example of a *disjunctive syllogism* (sometimes called “denying the disjunct”—a *disjunct* refers to a proposition with an “or” statement in it, such as “*P* or *Q*”).

1. John is either a bachelor or a married man.
2. We know for certain that John is not married.
3. \therefore John is a bachelor.

We turn to *reductio ad absurdum* (RAA). This is an indirect method of proving or establishing a thesis. You assume the opposite of what you want to prove and show that it produces an absurd conclusion. Therefore, your thesis must be true. Here is an example of a *reductio ad absurdum*. It is a little more complicated than the other forms, but it is important especially in reference to the ontological argument (see Readings II.10 and II.11). Suppose that someone denies that there is such a thing as a self, and you want to refute the assertion. You might argue in the following manner:

1. Suppose that you’re correct, and there is no such thing as a self (not *A*).
2. But if there is no such thing as a self, then no one ever acts (if not *A*, then not *B*).
3. But if no one ever acts, then no one can utter meaningful statements (if not *B*, then not *C*).
4. But you have purported to utter a meaningful statement in saying that there is no such thing as a self, so there is at least one meaningful statement (*C*).
5. According to your argument, there is and there is not at least one meaningful statement (*C* and not *C*).
6. \therefore It must be false that there is no such thing as a self (not, not *A*—which by double negation yields *A*). Thus, we have proved by *reductio ad absurdum* that there is such a thing as a self.

Before we leave the realm of deductive argument, we must point out two invalid forms that often give students trouble. To understand them, look back at forms MP and MT, which respectively argue by affirming the antecedent and denying the consequent. But notice that there are two other possible forms. You can also deny the antecedent and affirm the consequent in the following manner:

- | Denying the Antecedent (DA) | Affirming the Consequent (AC) |
|----------------------------------|----------------------------------|
| 1. If <i>P</i> , then <i>Q</i> . | 1. If <i>P</i> , then <i>Q</i> . |
| 2. Not <i>P</i> . | 2. <i>Q</i> . |
| 3. \therefore Not <i>Q</i> . | 3. \therefore <i>P</i> . |

Are these valid forms? Remember a valid form must always yield true conclusions if the premises are true. Try to find a counterexample that will show that these two forms are invalid. You might let proposition 1 (if P , then Q) be represented by the previous proposition, "If Mary is a mother, then she is a woman." First, deny the antecedent. Does it necessarily yield a true conclusion? Not necessarily. The conclusion says that Mary is not a woman, but there are many women who are not mothers. So DA is an invalid form:

1. If Mary is a mother, she is a woman.
2. Mary is not a mother.
3. \therefore Mary is not a woman.

Take the same initial proposition and affirm the consequent "Mary is a woman." Does this in itself yield the conclusion that she is a mother? Of course not. She could be a woman without being a mother:

1. If Mary is a mother, she is a woman.
2. She is a woman.
3. \therefore Mary is a mother.

Thus, whereas MP and MT are valid forms, DA and AC are not. Be careful here. Many students slur over these distinctions. Work out your own examples of each form of argument.

These are just simple examples of deductive argument forms. Often, alas, it is difficult to state exactly what the author's premises are.

Inductive Arguments

Unlike deductive arguments, inductive arguments are not truth-preserving. An inductive argument cannot guarantee that if its premises are true, the conclusion will also be true. It is intended to provide only probable support to its conclusion—that is, support that renders the conclusion more likely to be true than not. An inductive argument that succeeds in providing such probable support is said to be *strong*. If its premises are true, then the conclusion is likely to be true. An inductive argument that fails to provide this level of support is said to be *weak*. A strong argument with true premises is considered *cogent*.

Inductive reasoning is the guiding light of scientific investigations and the primary means by which we come to know the workings of the empirical world. If we learn anything from experience, it likely comes by way of induction. Inductive arguments allow us to reason from the evidence we have in hand to new knowledge, to conclusions established by degrees of probability.

Inductive arguments take several familiar forms. Sometimes we reason inductively from premises about a group of things to a conclusion about a single member of the group. For example:

1. Ninety percent of the students attending this college are religious.
2. Maria attends this college.
3. \therefore Maria is probably religious.

1. Almost all the apples in the barrel are rotten.
2. ∴ The next apple I take out of the barrel will likely be rotten too.

Another common inductive argument form reasons from premises about a few members of a group to conclusions about the group as a whole—an argument pattern known as *enumerative induction*. Consider:

1. Half the students I've met at this college (ten students) are agnostics.
2. ∴ Half of all the students at this college are agnostics.

In enumerative induction the group generalized about is called the *target group* (all the students at the college, in the example). The observed or known members of the group are called the *sample* (the students met so far). To reach reliable conclusions about a target group, the sample must be large enough and representative of the whole target group. The agnostics argument is weak because the sample is much too small to reach reliable conclusions about the entire student population. Such an undersized sample is also unlikely to be representative of all the students. That is, it is unlikely to resemble the target group in all the relevant ways. Drawing conclusions about a target group based on a sample that is too small is a common error known as *hasty generalization*. Opinion polls—which are essentially enumerative inductions—usually avoid such errors by using large, representative samples. They can therefore reach reliable conclusions about the characteristics of all American adults, say, by using a representative sample of only 1,200 to 1,500 individuals.

When we should know better, generalizing about groups of people from inadequate samples is pure prejudice. If a child infers from only six bad experiences with people from Podunkville that all people in Podunkville are bad, that might be overlooked. However, if an adult who could easily have evidence that many good people live in Podunkville still makes such a faulty generalization and acts accordingly, we label that an irrational bias, a prejudice.

A special kind of induction reasoning is called *reasoning by analogy* (see the teleological argument Readings II.8 and II.9 for its use). Reasoning by analogy allows us to reason from the similarity of two things in some relevant respects to their similarity in an unexpected respect. For example, suppose I am lost in the forest and I want to determine whether to eat a certain mushroom, which my hungry stomach craves. I note that it is similar in shape, color, and constituency with other mushrooms that turned out to be edible. Thus, I infer that probably this mushroom will be edible too.

Inference to the Best Explanation

Another kind of inductive reasoning, both prevalent and powerful, is **inference to the best explanation** (or abduction). Here we reason from premises about a state of affairs to an explanation for that state of affairs. The premises are statements about the facts of a phenomenon or situation (usually based on observations or other kinds of evidence), and the explanation is a statement about why the facts are as they are. Arguments of this

form are used widely in philosophy, science, ethics, the law, medicine, and everyday life. Consider this one, a typical line of reasoning in criminal trials:

1. The defendant was holding the murder weapon—a pistol—when the police entered the room.
2. The victim's blood was on the defendant's shirt.
3. An eyewitness saw the defendant enter the room holding a pistol and then heard a gunshot.
4. No one else was in the room at the time of the murder.
5. The best explanation of these facts is that the defendant committed the murder.
6. ∴ The defendant probably committed the murder.

As in all good inductive arguments, the conclusion here is shown to be only probable, and there is no guarantee of its truth. If the explanation given (statement 5) really is the best, then the argument is strong. If the premises are also true, then the argument is cogent.

Inference to the best explanation is especially important in science, where scientists advance their knowledge by positing theories or hypotheses to explain a set of data, then evaluating those explanations to see which is best. To explain the peculiarities of planetary motion, scientists proposed the heliocentric (sun-centered) theory as an alternative to the traditional earth-centered (Ptolemaic) view. The former turned out to be the better explanation, and the latter was discarded. Through this potent type of inference, scientists have plumbed great mysteries and discovered everything from vaccines to quarks to black holes.

One of the more famous and astute users of this kind of reasoning was none other than the fictional Sherlock Holmes:

The portly client puffed out his chest with an appearance of some little pride and pulled a dirty and wrinkled newspaper from the inside pocket of his greatcoat. As he glanced down the advertisement column with his head thrust forward and the paper flattened out upon his knee, I took a good look at the man and endeavored, after the fashion of my companion, to read the indications which might be presented by his dress or appearance.

I did not gain very much, however, by my inspection. Our visitor bore every mark of being an average commonplace British tradesman, obese, pompous, and slow. He wore rather baggy gray shepherd's check trousers, a not over-clean black frock-coat, unbuttoned in the front, and a drab waistcoat with a heavy brassy Albert chain, and a square pierced bit of metal dangling down as an ornament. A frayed top-hat and a faded brown overcoat with a wrinkled velvet collar lay upon a chair beside him. Altogether, look as I would, there was nothing remarkable about the man save his blazing red head and the expression of extreme chagrin and discontent upon his features.

Sherlock Holmes's quick eye took in my occupation, and he shook his head with a smile as he noticed my questioning glances. "Beyond the obvious facts that he has at some time done manual labour, that he takes snuff, that he is a Freemason, that he has been in China, and that he has done a considerable amount of writing lately, I can *deduce* nothing else." Mr. Jabez Wilson started up in his chair, with his forefinger upon the paper, but his eyes upon my companion.

"How, in the name of good-fortune did you know all that, Mr. Holmes?" he asked. "How did you know, for example, that I did manual labour? It's as true as gospel, for I began as a ship's carpenter."

"Your hands, my dear sir. Your right hand is quite a size larger than your left. You have worked with it, and the muscles are more developed."

"Well, the snuff, then, and the Freemasonry?"

"I won't insult your intelligence by telling you how I read that, especially as, rather against the strict rules of your order, you use an arc-and-compass breastpin."

"Ah, of course, I forgot that. But the writing?"

"What else can be indicated by that right cuff so very shiny for five inches, and the left one with the smooth patch near the elbow where you rest it upon the desk?"

"Well, but China?"

"The fish which you have tattooed immediately above your right wrist could only have been done in China. I have made a small study of tattoo marks and have even contributed to the literature of the subject. That trick of staining the fishes' scales of a delicate pink is quite peculiar to China. When, in addition, I see a Chinese coin hanging from your watchchain, the matter becomes even more simple."

Mr. Jabez Wilson laughed heavily. "Well, I never!" said he. "I thought at first that you had done something clever, but I see that there was nothing in it, after all."¹

Philosophers appreciate Mr. Wilson's final remark, that Holmes' explanation makes so much sense that one wonders why one didn't think of it oneself. Holmes often chided Watson: "You see, but you do not observe." A good philosopher, like a good detective or scientist, observes while he or she sees.

There is, however, a significant inaccuracy in Holmes' description of what he does. He claims to be deducing the conclusions about Mr. Wilson from the telltale signs. Strictly speaking, he is doing no such thing. What Holmes has really done is reason abductively, that is, reason to the best explanation of the facts. The best explanation of Mr. Wilson's wearing the arc-and-compass breastpin is his belonging to the Freemasons. The best explanation of a child's having a fever and red spots is that she has the measles. The best explanation of the puddles outside is that it has recently rained.

The notion of the best explanation is fascinating in its own right. How do we discover the best explanation? What characteristics does it have? How do we rank various virtues of a good explanation? There are no definite answers to these questions, but it is generally agreed that such criteria as predictability, coherence, simplicity, and fruitfulness are among the main yardsticks for judging theories. If a theory helps us predict future events, that is a powerful weapon. If it coheres well with everything or nearly everything else that we hold true in the field, that lends support to it. If it is simpler than its rivals, if it rests on fewer assumptions, that is a virtue. If it leads to new insight and discoveries, that is also a point in its favor. But what if explanatory theory A has more of one of these features and theory B more of another? Which should we prefer? There is no decision-making formula to decide the matter with any finality. Ultimately, applying the criteria and weighing theories comes down to reasoned judgment.

Inference to the best explanation has been neglected in philosophy, but it really is of the utmost importance. Consider the following questions: Why do you believe in God? Why do you believe in evolutionary theory? Why do you believe that there are

universal moral principles? Why do you believe that all events are caused? In one way or another, the answer will probably be abductive: What you believe seems to you to be the best explanation among all the competitors of certain phenomena. We will have opportunity to use abductive reasoning at several points during our course of study.

Identifying Arguments

Consider these simple arguments:

1. Because banning assault rifles violates a constitutional right, the U.S. government should not ban assault rifles.
2. The *Wall Street Journal* says that people should invest heavily in stocks. Therefore, investing in stocks is a smart move.
3. When Judy drives her car, she's always late. Since she's driving her car now, she will be late.
4. Listen, any movie with clowns in it cannot be a good movie. Last night's movie had at least a dozen clowns in it. Consequently it was awful.
5. The war on terrorism must include a massive military strike on nation X because without this intervention, terrorists cannot be defeated. They will always be able to find safe haven and support in the X regime. Even if terrorists are scattered around the world, support from nation X will increase their chances of surviving and launching new attacks.
6. No one should buy a beer brewed in Canada. Old Guzzler beer is brewed in Canada, so no one should buy it.

Here are the same arguments laid out so the parts are easily identified:

1. [Premise] Because banning assault rifles violates a constitutional right,
[Conclusion] the U.S. government should not ban assault rifles.
2. [Premise] The *Wall Street Journal* says that people should invest heavily in stocks.
[Conclusion] Therefore, investing in stocks is a smart move.
3. [Premise] When Judy drives her car, she's always late.
[Premise] Since she's driving her car now,
[Conclusion] she will be late.
4. [Premise] Any movie with clowns in it cannot be a good movie.
[Premise] Last night's movie had at least a dozen clowns in it.
[Conclusion] Consequently it was awful.
5. [Premise] Without a military intervention in nation X, terrorists cannot be defeated.
[Premise] They will always be able to find safe haven and support in the X regime.
[Premise] Even if terrorists are scattered around the world, support from nation X will increase their chances of surviving and launching new attacks.

[Conclusion] The war on terrorism must include a massive military strike on nation X.

6. [Premise] No one should buy a beer brewed in Canada.

[Premise] Old Guzzler beer is brewed in Canada.

[Conclusion] So no one should buy it.

What all of these arguments have in common is that reasons (the premises) are offered to support or prove a claim (the conclusion). This logical link between premises and conclusion is what distinguishes arguments from all other kinds of discourse. Now consider this passage:

The cost of the new XJ fighter plane is \$650 million. The cost of three AR21 fighter-bombers is \$1.2 billion. The administration intends to fund such projects.

Is there an argument here? No. This passage consists of several claims, but no reasons are presented to support any particular claim (conclusion), including the last sentence. This passage can be turned into an argument, though, with some minor editing:

The GAO says that any weapon that costs more than \$50 million apiece will actually impair our military readiness. The cost of the new XJ fighter plane is \$650 million dollars. The cost of three AR21 fighter-bombers is \$1.2 billion. We should never impair our readiness. Therefore, the administration should cancel both these projects.

Now we have an argument because reasons are given for accepting a conclusion. Here's another passage:

Allisha went to the bank to get a more recent bank statement of her checking account. The teller told her that the balance was \$1725. Allisha was stunned that it was so low. She called her brother to see if he had been playing one of his twisted pranks. He hadn't. Finally, she concluded that she had been a victim of bank fraud.

Where is the conclusion? Where are the reasons? There are none. This is a little narrative hung on some descriptive claims. But it's not an argument. It could be turned into an argument if, say, some of the claims were restated as reasons for the conclusion that bank fraud had been committed.

Being able to distinguish between passages that do and do not contain arguments is a very basic skill—and an extremely important one. Many people think that if they have clearly stated their beliefs on a subject, they have presented an argument. But a mere declaration of beliefs is not an argument. Often such assertions of opinion are just a jumble of unsupported claims. Search high and low and you will not find an argument anywhere. A writer or speaker of these claims gives the readers or listeners no grounds for believing the claims. In writing courses, the absence of supporting premises is sometimes called “a lack of development.”

Here are three more examples of verbiage sans argument:

Attributing alcohol abuse by children too young to buy a drink to lack of parental discipline, intense pressure to succeed, and affluence incorrectly draws

attention to proximate causes while ignoring the ultimate cause: a culture that tolerates overt and covert marketing of alcohol, tobacco and sex to these easily manipulated, voracious consumers.—Letter to the editor, *New York Times*

[A recent column in this newspaper] deals with the living quarters of Bishop William Murphy of the Diocese of Rockville Centre. I am so disgusted with the higher-ups in the church that at times I am embarrassed to say I am Catholic. To know that my parents' hard-earned money went to lawyers and payoffs made me sick. Now I see it has also paid for a high-end kitchen. I am enraged. I will never make a donation again.—Letter to the editor, *Newsday*

I don't understand what is happening to this country. The citizens of this country are trying to destroy the beliefs of our forefathers with their liberal views. This country was founded on Christian beliefs. This has been and I believe still is the greatest country in the world. But the issue that we cannot have prayer in public places and on public property because there has to be separation of church and state is a farce.—Letter to the editor, *Douglas County Sentinel*

The passage on alcohol abuse in children is not an argument but an unsupported assertion about the causes of the problems. The passage from the disappointed Catholic is an expression of outrage (which may or may not be justified), but no conclusion is put forth, and no reasons supporting a conclusion are offered. Note the contentious tone in the third passage. This passage smells like an argument. But, alas, there is no argument. Each sentence is a claim presented without support.

Some Applications

Let us apply these brief lessons of logic to reading philosophy. Because the key to philosophy is the argument, you will want to concentrate and even outline the author's reasoning. Find his or her thesis or conclusion. Usually, it is stated early on. After this, identify the premises that support or lead to the conclusion. For example, Thomas Aquinas (1224–1274) holds the conclusion that God exists. He argues for this conclusion in five different ways. In the second argument, he uses the following premises to reach his conclusion: There is motion, and there cannot be motion without something initiating the motion.

It helps to outline the premises of the argument. For example, here's how we might set forth Aquinas' second argument:

1. Some things are in motion. (Premise)
2. Nothing in the world can move itself but must be moved by another. (Premise)
3. There cannot be an infinite regress of motions. (Premise)
4. There must be a First Mover who is responsible for all other motion. (Conclusion of premises 1–3, which in turn becomes a premise for the rest of the argument)

5. This First Mover is what we call God. (Explanation of the meaning of God)
(Premise)

6. \therefore God exists. (Conclusion of second part of the argument, premises 4 and 5)

After you have identified the premises and conclusion, analyze them, looking for mistakes in the reasoning process. Sometimes arguments are faulty, but not obviously so. Then stretch your imagination and think of possible counter-examples to the claims of the author.

Because philosophical arguments are often complex and subtle (and because philosophers do not always write as clearly as they should), a full understanding of an essay is not readily available after a single reading. So read it twice or even thrice. Here is one good approach: the first time you read a philosophy essay, read it for understanding. After the first reading, leave the essay for some time, ruminating on it. Then go back a day or so later and read the essay a second time, this time, trying to determine its soundness.

A few pointers should be mentioned along the way. Some students find it helpful to keep a notebook on their reflections on the readings. If you own the book, you might want to make notes in the margins—initially in pencil because you may want to revise your impressions after a second reading.

Finally, practice charity. Give the author the best possible interpretation in order to see if the argument has merit. Always try to deal with the most generous version of the argument, especially if you don't agree with its conclusion. A position has not been seriously challenged unless the best arguments for it have been refuted. That's why it is necessary to construe all arguments, including those of your opponents, as charitably as possible. The exercise will broaden your horizons and help you develop sharper reasoning skills.

Fallacies of Reasoning

As we have seen, arguments can be defective either because their reasoning is faulty or their premises are false, or both. Certain kinds of faulty arguments are extremely common—and seductive—persuading many that they have hit solid truth when it is only thin air. These parodies of reasoning are known as *fallacies*. Studying them helps us identify them and avoid both being taken in by them and concocting them ourselves. Here are some of them, listed by their common names.

Ad Hominem Argument (or an argument against the man). This argument attacks the person instead of the position—for example, if someone says to you, “You can't trust what Joan says about abortion, she is an immoral person.” But, of course, her argument for or against abortion might be sound on independent grounds. Even the devil has true beliefs. The character of the person is irrelevant to the soundness of the argument.

Argument from Authority Suppose you are arguing about the death penalty, and someone tells you that you should believe in the death penalty because Plato believed in it.

Since you don't know Plato's reasons, it is not sufficient grounds for you to believe in the death penalty. We need positive arguments, not simply authority. Advertisements are notorious for subtly and sometimes not so subtly using this device. In a beer commercial, a famous athlete (nicely remunerated for the exercise) can be seen gratifying his thirst, proclaiming the ecstasy of the beverage, as if that were proof of its quality.

Of course, authority might sometimes be the best we can get and sufficient for justified belief, as when a physicist tells us the conclusions of complicated physics research or a friend from Australia gives you pertinent information for your upcoming visit to that country. We sometimes do need to trust authority, but often it is an improper substitute for good reasoning.

Arguing in a Circle (sometimes referred to as "begging the question"). Suppose that someone argues that you should believe that God exists. You ask why. He says, "Because the Bible says so." You ask, "Why should I believe what the Bible says?" He replies, "Because it's the Word of God." That is, he argues in a circle, using his conclusion as a premise to prove the conclusion. Note that all valid deductive argument can appear as arguing in a circle, since the conclusion of such an argument is contained in the premises. The difference is that in a valid argument the conclusion brings out a nontrivial feature of the premises. Essentially, arguing in a circle is not invalid, just trivial and unconvincing, having no power to convince an opponent.

Appeal to Ignorance To use this fallacious ploy is to argue that a *lack of evidence* proves something. In one form of this fallacy, you argue that a conclusion must be true because no one has shown it to be false. For example:

1. Nobody has shown that God does not exist.
2. \therefore God exists.

Here a lack of evidence is supposed to prove something, but a lack of evidence alone can neither prove nor disprove a claim. If we have no evidence for a claim, then we have no reason for believing it. The lack does not prove the claim false.

In another form of the appeal to ignorance, you argue that a conclusion must be false because no one has shown it to be true:

1. Nobody has proven that God exists.
2. \therefore God does not exist.

If either version of this fallacy were credible, we could prove almost anything by citing a lack of evidence. For example: You cannot prove that gremlins are not hiding in this textbook, so gremlins must be hiding there. You cannot prove that Aristotle had blue eyes; therefore he did not have blue eyes.

False Dilemma This happens when we reduce several possibilities to two alternatives. Consider two travelers facing a swamp in which traveler A says to traveler B: "Since you admit you don't know the way through the swamp and there must be a way, follow me. I must know the way." Of course, neither might know the way. Likewise, someone can argue that since your answer to a problem isn't correct, his or hers must be. But, of course, both can be wrong.

Slippery Slope Fallacy This fallacy consists of arguing, without good reasons, that taking a particular step will inevitably lead to further, undesirable (usually catastrophic) steps. The basic form of the argument is "Doing action A will lead to action B, which will result in disastrous action C. Therefore you should not do action A." The argument is fallacious if there is no good reason to believe that doing action A will lead to action C. Robert Wright has argued that "once you buy the premise that animals can experience pain and pleasure, and that their welfare therefore deserves *some* consideration, you're on the road to comparing yourself with a lobster. There may be some exit ramps along the way—plausible places to separate welfare from rights—but I can't find any." Others have argued that if we allow voluntary euthanasia, we are on the slippery slope to involuntary euthanasia, even eventually to a holocaust. Still others have argued that if we pass a National Health Care bill, it will inevitably lead to socialism and communism. The slippery slope fallacy ignores the truth that very often wise policy is a moderate stance between two extremes and that rational people can hold to a rational position without going to an extreme.

Straw Man Argument This is an instance of misrepresenting an opponent's position. It occurs when someone ignores the evidence for a position and instead attacks an inferior version of the position. In the heat of debate on whether our nation should reduce its military spending, a militarist might argue that his opponent wants to leave our nation defenseless or a willing prey to communism. The straw man argument is often a distortion of the other person's position. There is a tendency in all of us to attack a weaker, less plausible version of our opponent's position. The *principle of charity* is the opposite of the straw man argument. It instructs us to give our opponent's position the very best form we can find—and then try to show it is unsound.

Genetic Fallacy This fallacy is arguing against a position or argument merely because its origins are suspect. Suppose someone tells you not to believe in the principles of chemistry because they originated in superstitious alchemy or that you should not believe in an astronomical theory because it arose from astrological sources. The fact that a theory or position originated in discredited circumstances is irrelevant if the theory is supported by the evidence. Chemistry and astronomy can produce impressive evidence for their theories that is independent of the authority of alchemy and astrology. It doesn't matter where the truth comes from, as long as it is true.

Fallacy of Composition This fallacy consists of an erroneous inference from the part to the whole. That is, because each part has an attribute, the whole is said to have the same attribute. For example sodium and chlorine are each deadly poisons, so that sodium chlorine must be a deadly poison. But it's not. It's ordinary table salt. The whole can have different properties from its parts. Here is another example: Each member of the football team is an excellent player, therefore the team must be excellent. But it might not be, for their individual excellences might not transfer into the right combination. For example, they might all be excellent halfbacks and quarterbacks, but none be good at blocking. Is the following an example of this fallacy: *Because every part of the world exhibits design, the whole must exhibit design?*

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Inconsistency When we argue inconsistently, we argue from contradictory premises. Politicians, when trying to win votes from one constituency, sometimes contradict what they have said to other constituencies. For an illustration of this consider some statements made by former President Ronald Reagan at different periods of his political career:

● *Civil Rights*

1. I favor the Civil Rights Act of 1964 and it must be enforced at the point of a bayonet, if necessary (October 19, 1965).
2. I would have voted against the Civil Rights Act of 1964 (June 16, 1966).

● *On Redwood National Park*

1. I believe our country can and should have a Redwood National Park in California (April 17, 1967).
2. There can be no proof given that a national park is necessary to preserve the redwoods. The state of California has already maintained a great conservation program (April 18, 1967—the next day).

● *On the Soviet Grain Embargo*

1. I just don't believe the farmers should be made to pay a special price for our diplomacy, and I'm opposed to [the Soviet grain embargo] (January 7, 1980).
2. If we are going to do such a thing to the Soviet Union as a full grain embargo, which I support, first we have to be sure our own allies would join us on this (January 8, 1980, the next day).²

Of course, people change their minds and come to believe the opposite of what they formerly believed. That might show progress. But many of us are not aware of the inconsistencies in our own belief systems. For example, Fred might believe that morality entails universalizing principles (what's good for the goose is good for the gander), but fail to note that his view that premarital sex is morally permissible for men but not for women is inconsistent with that principle.

Exercises in Critical Reasoning

I. Analyze the following arguments and tell whether they are *valid* and *sound*:

- 1) 1. If Missy is a cat, then she is a mammal.
2. Missy is not a mammal.
3. Therefore she is not a cat.
- 2) 1. If Fido is a dog, then he is a mammal.
2. Fido is a dog.
3. Therefore he is a mammal.

- 3) 1. If nine hundred million people die of malnutrition each year, something needs to be done about the distribution of food. 4)
 2. Nothing needs to be done about the distribution of food. 5)
 3. Therefore [fill in the blank].
- 4) 1. If Fido is a dog, then he is a mammal. 6)
 2. Fido is *not* a dog. 7)
 3. Therefore Fido is not a mammal.
- 5) 1. If Fido is a dog, then he is a mammal. 8)
 2. Fido is a mammal. 9)
 3. Therefore he is a dog.
- 6) 1. If my boyfriend, John, is a dog, then he is a mammal. 10)
 2. John is a mammal.
 3. Therefore John is a dog.
- 7) 1. If we keep burning so much coal and oil, the greenhouse effect will continue to get worse. III.
 2. But it will be a disaster if the greenhouse effect gets worse.
 3. Therefore, we have to cut down on these fossil fuels.
- 8) 1. If this wire is made of copper it will conduct electricity.
 2. This wire conducts electricity.
 3. Therefore this wire is made of copper.
- 9) 1. If a world government doesn't occur soon, then we're in for a lot more terrorism and war.
 2. A world government isn't going to occur soon.
 3. Therefore we're in for a lot more terrorism and war.
- 10) 1. Either the Yankees will win the American League pennant or their manager will get fired. IV. S
 2. The Yankees will not win the American League pennant.
 3. Therefore, the manager will get fired. 1)

II. Indicate whether the following arguments are *strong* or *weak*.

- 1) The three fish that I caught in this stream were bass, so all the fish in this stream must be bass. 2)
 2) One thousand samples of water taken from sites all along the Miami river show unsafe concentrations of toxic chemicals. Therefore, the water in the river is unsafe. 3)
 3) Seventy percent of adults in Cincinnati and 90 percent of adults in Orange County, California, are conservatives. So a large majority of people in this country are conservatives.

- 4) All the evidence in this trial suggests that Mack the Knife committed the murder. There can be only one conclusion: He is guilty.
- 5) For the past year, every time Aziz left his apartment, he forgot to lock the door. He will probably forget this time, too.
- 6) Eighty percent of Americans believe in an afterlife, and 75 percent of Canadians do. Therefore the afterlife is a reality.
- 7) You should buy a Dell computer. They're great. I bought one last year and it has given me nothing but flawless performance.
- 8) All the celebrities highlighted on Fox TV have drug problems. Why are all the celebrities such stoners?
- 9) I have asked twenty undergraduates at this school if they believe in God, and ten of them have said yes. So half of the undergraduates at this school must be atheists.
- 10) Almost every Arabic-speaking person interviewed by CNN thinks that the United States is evil. Clearly, Arabic-speaking people throughout the world believe that the United States is evil.

III. *Fallacies of Reasoning*. Find an example of each of the following fallacies:

1. Ad Hominem Arguments
2. Arguments from Authority
3. Arguing in a Circle (Begging the Question)
4. Appeal to Ignorance
5. False Dilemma
6. Slippery Slope Fallacy
7. Straw Man Arguments
8. Genetic Fallacy
9. Fallacy of Composition
10. Inconsistency

IV. Symbolize the form of the following arguments and tell whether they are valid. Where possible, identify the form by name.

- 1)
 1. If Mary gets the job, then she will be happy.
 2. Mary will get the job.
 3. Therefore, Mary will be happy.
- 2)
 1. If Napoleon was born in Chicago, he was Emperor of France.
 2. Napoleon was not born in Chicago.
 3. Therefore Napoleon was not Emperor of France.
- 3) An Environmental Argument:
 1. If I wash, I'll pollute the water.

2. If I don't wash, I'll pollute the air.
 3. Therefore whatever I do I will be a polluter.
- 4) 1. All cadets at military institutions are drug-free.
2. Timothy Leary was once a West Point cadet (a true statement).
3. Therefore Timothy was drug-free.
- 5) 1. If John is a bachelor, he is unmarried.
2. John is married.
3. Therefore [fill in blank].
- 6) 1. If Mary gets the job, she will be happy.
2. If she is happy, then her husband will be happy.
3. If her husband is happy, her mother-in-law will be happy.
4. If her mother-in-law is happy, her mother-in-law's boss, Bob, will be happy.
5. If Bob will be happy, his dog will be happy.
6. Therefore [fill in the blank].
- 7) 1. All dogs are animals.
2. All cats are animals.
3. Therefore all dogs are cats.
- 8) 1. If the fetus is a person, abortion is immoral.
2. Abortion is not immoral.
3. Therefore, the fetus is not a person.

Study and Discussion Questions

1. What is an argument? Using the argument forms discussed in this chapter, construct an argument of your own for each form shown.
2. Explain the difference between deductive, inductive, and abductive reasoning.
3. Explain the difference between validity and soundness.
4. Get a copy of your student newspaper or your local newspaper and analyze two arguments therein. Begin to look at the claims of others in argument form.
5. Philosophy can be seen as an attempt to solve life's perennial puzzles. Taking the material at hand, it tries to unravel enigmas by thought alone. See what you can do with the puzzles and paradoxes included here.
 - a. There is a barber in Barberville who shaves all and only those barbers who do not shave themselves. Does this barber shave himself?
Who does shave him?

- b. You are the sole survivor of a shipwreck and are drifting in a small raft parallel to the coast of an island. You know that on this island there are only two tribes of natives: Nobles, kind folk who *always* tell the truth, and Savages, cannibals who always lie. Naturally, you want to find refuge with the Nobles. You see a man standing on the shore and call out, "Are you a Noble or a Savage?" The man answers the question, but a wave breaks on the beach at that very moment, so you don't hear the reply. The boat drifts farther down along the shore when you see another man. You ask him the same question, and he replies, pointing to the first man, "He said he was a Noble." Then he continues, "I am a Noble." Your boat drifts farther down the shore where you see a third man. You ask him the same question. The man seems very friendly as he calls out, "They are both liars. I am a Noble. They are Savages."

The puzzle: Is the data given sufficient to tell you any man's tribe? Is it sufficient to tell you each man's tribe?

- c. Mrs. Smith, a schoolteacher, announces to her class on Friday that there will be a surprise test during the following week. She defines "surprise test" as one that no one could reasonably predict on the day of the test. Johnny, one of her students, responds that she may not give the test on pain of contradicting herself. Mrs. Smith asks, "Why not?" Johnny replies, "You cannot give the test on Friday because on Friday everyone would know that the test would take place on that day, and so it would not be a surprise. So the test must take place on a day between Monday and Thursday. But it cannot take place on Thursday, for if it hasn't taken place by then, it would not be a surprise on Thursday. So the test must take place between Monday and Wednesday. But it cannot take place on Wednesday for the same reason that we rejected Friday and Thursday. Similarly, we can use the same reason to exclude Tuesday and Monday. On no day of the week can a surprise test be given. So the test cannot be given next week."

Mrs. Smith heard Johnny's argument and wondered what the solution was. She gave the test on Tuesday, and everyone was surprised, including Johnny.

How was this possible?

- d. It is sometimes said that space is empty, which means presumably that there is nothing between two stars. But if there is nothing between stars, then they are not separated by anything, and, thus, they must be right up against one another, perhaps forming some peculiar sort of double star. We know this not to be the case, of course.³

What follows from this puzzle?

6. A good reason to be a critical thinker is to avoid getting cheated. Occasionally, you may be in danger of being duped by an unscrupulous salesperson. Thinking clearly may save you. Here is an example of such a situation that occurred after the Loma Prieta earthquake in the California Bay Area in 1989.

Last week the 55 year old [Eva] Davis was evicted from her . . . home of 22 years by San Francisco sheriff's deputies. Her troubles began in 1990 when a contractor offered to repair front steps damaged in the Loma Prieta earthquake. Two hours later came a disaster worse than an earthquake, a disaster with a smile, a representative of Congress Mortgage Co. of San Jose. Convinced that she was getting a federal loan that didn't have to be repaid until the house was sold, Davis signed a 15 percent loan with a 15 percent origination fee. The 15 points meant a \$23,000 fee,

instead of a usual \$4,000 or so. Suddenly, Davis had \$1,800 monthly payments instead of \$459. It was only a matter of time before the house belonged to Congress Mortgage.

Congress Mortgage sold the home, valued at \$225,000. The company makes some 400 loans a year and has scheduled 51 foreclosure sales in the next month alone. The bust business is booming. (Rob Morse, *San Francisco Chronicle* [Feb. 20, 1994])

Think of other examples of how critical thinking can save people from evil.

NOTES

1. Arthur Conan Doyle, *The Red-Headed League* (New York: Harper & Bros., 1892).
2. Marc Green and Gail MacCall, *There He Goes Again: Ronald Reagan's Reign of Error* (New York: Pantheon, 1983).
3. Jay Rosenberg, *The Practice of Philosophy* (Englewood Cliffs, NJ: Prentice Hall, 1978), p. 89.

Key Terms

philosophy	dialectic	principle of fallibilism
principle of parsimony	argument	logic
conclusion	premise	inference
indicator words	deductive	inductive
inference to the best explanation		

Suggestions for Further Reading

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- Moore, Brooke, and Richard Parker. *Critical Thinking*. Mountain View, CA: Mayfield, 2007. A very good introduction to logical thinking.
- Scriven, Michael. *Reasoning*. New York: McGraw-Hill, 1976. A rich presentation of the major topics in philosophical reasoning.
- Vaughn, Lewis. *The Power of Critical Thinking*. New York: Oxford University Press, 2008.