1 An Introduction to Arguments

1.1 Premises and a Conclusion

Among other things, Jeff knows the following. *He and his next-door neighbor live a few blocks from the campus of State University. The next-door neighbor looks about twenty years old, and the neighbor often wears State University T-shirts and sweatshirts.* On the basis of this information, it is quite reasonable for Jeff to generate this new piece of information, although he does not have any direct evidence for it: *his next-door neighbor attends State University.* This sort of process, using a certain set of information as a basis for generating a new piece of information, is what this book is about.

Together, all of the information in the above example is an argument. The term *argument* has a technical meaning, and, of course, it has a colloquial meaning as well. Here the technical meaning is what matters. In its technical sense, all arguments have two parts: a premise or set of premises, and a conclusion. The premises are that first set of information—the information that is used as a basis for generating the new piece of information. The conclusion is the new piece of information.

To clearly identify each premise and the conclusion, we can write the above argument this way:

Premise 1 Jeff and his next-door neighbor live a few blocks from the campus of State University.

Premise 2 Jeff's next-door neighbor looks about twenty years old.

Premise 3 Jeff's next-door neighbor often wears State University T-shirts and sweatshirts.

Conclusion Therefore, Jeff's next-door neighbor attends State University.

argument (1)

Notice that each part of the argument (each premise and the conclusion) is a statement that can be true or false. Right at this moment, there is no way to determine if Jeff and his next-door neighbor actually do live a few blocks from this campus, if the next-door neighbor looks about twenty years old, or if the next-door neighbor often wears State University T-shirts and sweatshirts. Nevertheless, even without knowing if these sentences are true or false, it is still the case that each of them is the type of sentence that *can* be true or false. Some sentences cannot be true or false, for instance, questions ("Is the door closed?") or commands ("Close the door!"). Only sentences that can be true or false can be parts of an argument.

But leaving aside whether they actually are true or false, if the three premises are true, then they provide reasons for thinking that this sentence is also true: *Jeff's next-door neighbor attends State University*. In other words, the three premises support the conclusion. Preserving truth is the core notion behind support, but a more intuitive definition will also work, something like *the premises back up the conclusion* or *the premises provide justification for believing the conclusion*. In short, that's what an argument is.

> An ***argument*** is a set of statements, one or more of which are intended to support another in the set. The statements providing support are the *premises*, and the statement receiving support is the *conclusion*.

And an *inference* is just the process by which an argument is created: generating a conclusion on the basis of a premise or set of premises.

For comparison's sake, here is short passage:

(i) Usually, Kate gets to school an hour before her first class. Most mornings she takes the bus, but yesterday she walked.

Although (i) is composed of statements—sentences that can be true or false—it is not an argument because it does not have a conclusion that is supported by premises. Instead, it is just a description of an event.

Often—but not always—an inference is indicated by words such as *therefore*, *thus*, *hence*, *so*, *since*, or *because*. Either the conclusion will follow *therefore*, *thus*, *hence*, or *so* or the premises will follow *since* or *because*. For example, (ii), (iii), and (iv) are arguments. In each, the final clause is the conclusion, and what precedes it are the premises.

(ii) Because all men are mortal and Socrates is a man, Socrates is mortal.

(iii) Since no man is immortal and Socrates is a man, Socrates is not immortal.

(iv) All men desire glory and Socrates is a man; thus, Socrates desires glory.

But an inference can still be made without one of these words. For instance,

(v) All men want respect and Socrates is a man; Socrates wants respect.

Perhaps it is somewhat subtle that *All men want respect* and *Socrates is a man* are supporting *Socrates wants respect*. But compare that to a case such as (vi) where an inference is not being made, and you should be able to see the difference between an argument and just a description of, in this case, Socrates.

(vi) Socrates is mortal, he desires glory, and he wants respect.

Before moving on, it is worth looking at two qualities that, although not desirable, do not prohibit a set of statements from being an argument. First, sometimes premises are meant to support a conclusion, but they fail to do so. For whatever reason, they provide little or no justification for believing the conclusion. Nevertheless, as long as the premises are *intended* to support the conclusion, the collection of statements is still an argument. Here are a couple of examples:

P1 Jeff slept with his chemistry textbook under his pillow last night.

P2 He slept for seven hours.

C Therefore, he will do well on his chemistry exam today.

argument (2)

P1 Denver is the largest city in Colorado.

P2 Colorado is the twenty-fourth-largest state in the United States.

C Therefore, Denver is the twenty-fourth-largest city in the United States.

argument (3)

These are both arguments, but they are not very good ones, because the premises provide little or no support for the conclusions. In argument (2), the inference is based on a folksy and false idea about how information is transmitted. In argument (3), the inference is based on an assumption that the size of states and the size of cities are somehow directly connected such that the largest state will contain the largest city, the second-largest state will contain the second-largest city, and so on. But since the sizes of cities and states are not connected—at least not to the degree that this argument requires—the premises provide very little support for the conclusion.

Second, it is also sometimes the case that an argument will lack premises that it really needs in order to be considered complete. For example,

P1 This summer, Derek and Megan are getting married.

C Therefore, Joan will buy them a blender.

argument (4)

This would be a better argument if it had a premise stating that Joan knows the couple, and even better would be a premise indicating that they have some sort of friendly relationship. Plus, a premise stating that Joan has a tendency to give blenders as wedding presents would help.

When evaluating an argument like (4), it is generally preferable to be charitable, at least up to a point, and fill in the information that is missing from the premises, rather than judge the argument a poor one. While ideally, all—or at least most—of the information that is needed to support the conclusion will be explicitly stated in the premises, sometimes it may be assumed that an argument will be understandable without all of the details, and so some of the information that could be in the premises might not be included.

Whatever the case may be, to identify an argument the important thing to look for is this relationship of support. If there is a statement or series of statements that are supporting (or at least trying to support) another statement, then it is an argument.

1.2 Deductively Valid and Inductively Strong

Consider argument (1) again.

P1 Jeff and his next-door neighbor live a few blocks from the campus of State University.

P2 Jeff's next-door neighbor looks about twenty years old.

P3 Jeff's next-door neighbor often wears State University T-shirts and sweatshirts.

C Therefore, Jeff's next-door neighbor attends State University.

argument (1)

Notice that even if the three premises are true, there is still a chance that the conclusion will be false. The next-door neighbor might live there and wear State University clothing, but not attend the nearby university. Nonetheless,

if the premises are true, then there is a high probability that Jeff's next-door neighbor does attend State University.

Whereas Jeff does not get to be absolutely certain, in some arguments, if the premises are true, then the conclusion has to be true. Consider these two simple arguments:

P1 Mary is either in the library or in the cafeteria.

P2 She is not in the library.

C Therefore, she is in the cafeteria.

argument (5)

P1 All men are mortal.

P2 Socrates is a man.

C Therefore, Socrates is mortal.

argument (6)

These two arguments have a feature that argument (1) lacks. For these two, if the premises are true, then there is no way that the conclusion can be false.

This distinction between a conclusion that is certain versus one that is only probable is at the heart of the two most basic standards used for evaluating arguments: the deductively valid standard and the inductively strong standard. These two standards are defined as follows.

> An argument is ***deductively valid*** when it is the case that if the premises are true, then the conclusion has to be true.
>
> An argument is ***inductively strong*** when it is the case that (1) the argument is not deductively valid, and (2) if the premises are true, then they make it probable that the conclusion is true.

When evaluating an argument, it is important to figure out if it meets either of these two definitions.[1]

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1. There are different ways of stating these definitions. Alternative ways of defining *deductively valid* are

   (a) an argument in which the truth of the premises guarantees the truth of the conclusion; or

   (b) an argument for which it would be contradictory to assert the premises and yet deny the conclusion.

(footnote continues on next page)

If an argument does not satisfy the definition of deductively valid, then it is *deductively invalid*. There is no in-between; every argument is either deductively valid or deductively invalid. And when an argument is deductively invalid, even if the premises are true, the conclusion is not guaranteed to be true.

With respect to being inductively strong, the situation is somewhat different. An argument that is invalid can have any amount (or degree) of inductive strength from strong to weak, and then even down to worthless. The issue here is this: How probable is it that the conclusion will be true if the premises are true? The more probable the conclusion, the higher the argument's degree of inductive strength. Table 1.1 outlines different degrees of inductive strength.

To see how the degree of inductive strength can vary, compare arguments (7), (8), and (9).

P1 Paul is twenty years old.

P2 Paul is on his university's cross country team.

Table 1.1
Inductive strength

Relationship between the premises and the conclusion	Degree of inductive strength
If the premises are true, then that makes it probable (i.e., very likely) that the conclusion is true.	The argument has a high degree of inductive strength, and so the argument is inductively strong.
If the premises are true, then that makes it somewhat likely that the conclusion is true.	The argument has a medium-to-high degree of inductive strength.
Even if the premises are true, that does not make it very likely that the conclusion is true.	The argument has a low degree of inductive strength (i.e., the argument is inductively weak).

Inductively strong may be defined as

(c) an argument in which the truth of the premises supports the truth of the conclusion, but does not guarantee the truth of the conclusion; or

(d) an argument in which the premises are about what has been observed and the conclusion is about what has not been observed, but what is likely to be true if the premises are true.

P3 Paul runs six days a week.

C Therefore, Paul will complete the race, consisting of 1,576 stairs, up the Empire State Building.

argument (7)

As it is, (7) has a pretty high degree of inductive strength; if the premises are true, then they (the true premises) make it very likely that the conclusion will be true. The same cannot quite be said for argument (8), however.

P1 Tom is forty years old.

P2 Tom runs four to five miles twice a week.

C Therefore, Tom will complete the race, consisting of 1,576 stairs, up the Empire State Building.

argument (8)

Argument (8) is a decent argument. The race up the Empire State Building is challenging, but not impossible, and, according to premise 2, Tom is not a couch potato. But the information in those two premises cannot support the conclusion as well as the premises in (7) support that argument's conclusion. Hence, anyone would be—or at least should be—less confident about the truth of the conclusion in argument (8). Argument (9), meanwhile, has the lowest degree of inductive strength of the three.

P1 George is sixty years old.

P2 George walks two miles twice a week.

C Therefore, George will complete the race, consisting of 1,576 stairs, up the Empire State Building.

argument (9)

In (9), based on the information in the premises, there is a chance that the conclusion will be true, but that chance is not especially high.

Now, why is it that in some arguments the truth of the conclusion is guaranteed while in others it is only probable? Consider this deductively valid argument again:

P1 Mary is either in the library or in the cafeteria.

P2 She is not in the library.

C Therefore, she is in the cafeteria.

argument (5)

The reason the conclusion is certain in (5) is because all of the information in the conclusion is contained in the premises. The information in the premises is simply moved around in order to get a particular conclusion. Moving this information around has to follow certain rules, but as long as these rules are followed, the conclusion is guaranteed to be true (if the premises are true).

Inductively strong arguments are different in a fundamental way. In these arguments, the conclusion goes beyond the information that is found in the premises. Instead of drawing out some information that is already contained in the premises, arguments that are inductively strong use the premises as grounds for a guess about some new information. Of course, this should not be a wild guess; but it is a guess in the sense that the conclusion is not information that is present in the premises.

Consider the difference between arguments (10) and (11), the first of which is deductively valid, the second inductively strong.

P1 The sun rose yesterday, the day before yesterday, the day before the day before yesterday, and the 1,000,000 days before that.

C The sun rose the day before yesterday.

argument (10)

P1 The sun rose yesterday, the day before yesterday, the day before the day before yesterday, and the 1,000,000 days before that.

C The sun will rise tomorrow.

argument (11)

Since argument (10) is deductively valid, the information in the conclusion has to be in the premise, and it is.

With respect to argument (11), it hardly seems like a guess that the sun will rise tomorrow, but that information is not contained in the premise. Moreover, if the premise contains only information about what has been observed in the past, then since tomorrow has not yet been observed, information about tomorrow cannot be in the premise. Of course, there does not seem to be any reason to think, at least with respect to the sun rising, that tomorrow will be different than the last 1,000,003 days. Thus, there is a very high probability that the sun will rise tomorrow. But it is still not a conclusion that can be drawn with absolute certainty.

These two ways of evaluating arguments are typically treated as separate branches of philosophy. *Deductive logic* is the system of rules that, if

followed, will uphold the deductively valid standard. This system is also studied in mathematics and is essential for, among other things, computer science. *Inductive logic* is the system of rules and guidelines developed for the inductively strong standard. Inductive reasoning, which is the application of inductive logic, is—in one manner or another—the kind of reasoning that people most often use in their day-to-day lives. It is also used in most of the sciences. When people reason inductively, they cannot be completely certain about the conclusions that they draw. But the alternative, deductively valid reasoning, is simply not applicable to most of the problems encountered in everyday life.

1.3 Soundness and Reliability

The two standards for evaluating arguments we have been discussing, deductively valid and inductively strong, address the relationship between the premises and the conclusion. These two standards always use the notion: *if the premises are true*, then how certain is the conclusion? Hence, it is possible to determine if an argument is deductively valid or inductively strong without actually knowing if the premises are true or false. And even when the premises are false, it is still possible for an argument to be deductively valid or inductively strong.

At times, however, it is desirable to know if an argument has premises that are actually true. If an argument is deductively valid, and the premises are true, then the conclusion has to be a true statement. This is somewhat of an improvement over just being able to say that *if* the premises are true, then the conclusion will be true. Likewise for inductively strong arguments; if an argument is inductively strong and has true premises, then it is very likely that the conclusion is a true statement. That said, in philosophy the main focus is generally on the form of arguments and how premises support a conclusion. Philosophers usually leave it to others—scientists, journalists, Nancy Drew—to determine if premises are actually true.[2]

2. It is worth emphasizing that *truth* and *falsity* are terms that apply only to certain kinds of sentences: statements (i.e., declarative sentences). Arguments cannot be true or false. The notion of an argument being true or false does not even really make sense. Instead, the concepts that we have discussed in this chapter are used to describe arguments: deductively valid, deductively invalid, inductively strong, medium, or weak, sound or not sound, and reliable or not reliable.

The third and fourth standards for evaluating arguments are soundness and reliability.

An argument is ***sound*** when it is deductively valid and has all true premises.

An argument is ***reliable*** when it is inductively strong and has all true premises.

Notice that being sound or reliable depends on the premises being true, not the conclusion being true. There is no need to figure out whether the conclusion is true if the argument is deductively valid or inductively strong; rather, the conclusion has to be true (or is likely to be true) if the premises are. Moreover, if it is possible to just go out and check whether the conclusion is true or not, then there is really no need for the argument in the first place.

Arguments (12) and (13) are both deductively valid, but (12) is not sound, while (13) is sound.

P1 New York City is in Maryland.

P2 Claire is in New York City.

C Therefore, Claire is in Maryland.

argument (12)

P1 George H. W. Bush's oldest son was the forty-third president of the United States.

P2 George H. W. Bush's oldest son is George W. Bush.

C Therefore, George W. Bush was the forty-third president of the United States.

argument (13)

Argument (14) is reliable because it is inductively strong and has all true premises.

P1 The People's Republic of China has 1.34 billion citizens and is the world's largest country by population.

P2 The Republic of India has 1.2 billion citizens and is the world's second-largest country by population.

P3 The United States of America has 315 million citizens and is the world's third-largest country by population.

C Therefore, in ten years, either China or India will be the largest country in the world by population.

argument (14)

Remember that it must be established that an argument is either deductively valid or inductively strong before worrying about whether the premises are true. Soundness and reliability are higher standards than deductively valid or inductively strong, and they require that one of these other two standards has already been attained. An argument that has true premises but is neither deductively valid nor inductively strong is not sound or reliable. For example, argument (3) has true premises (and a true conclusion), but it is not sound or reliable.

1.4 Some Argument Forms

Many arguments take a precise form or structure. For such arguments, the form stays the same, or basically the same, no matter what the argument is about. This section introduces six common argument forms. The purpose of this section is, first, to introduce the idea of an argument's form, and, second, to begin explaining how specific types of arguments work—and how it is that arguments with the same form, but with different content, still work the same way.

The first two types of arguments introduced in this section are called *modus ponens* and *modus tollens*. Any argument that has one of these two forms is deductively valid. The other four are the *inductive generalization*, *proportional syllogism*, *induction by confirmation*, and *analogical argument*. These, with one occasional exception, can never be deductively valid. They can, however, be used to construct inductively strong arguments, although the strength of any particular argument depends on its specific content.

1.4.1 Modus Ponens

The name *modus ponens* is the shorten version of *modus ponendo ponens*, which means (although it does not exactly translate as) the method that, by an affirming statement, an affirming conclusion.

Modus ponens consists of two premises and a conclusion. One of those premises must be a conditional statement. A conditional statement has the form: *if A, then B*. In a conditional statement, the first clause (the *A* clause in *if A, then B*) is called the antecedent. The second clause (the *B* clause in *if A, then B*) is called the consequent. In *If today is Thursday, then Sam is in court*, the antecedent is *today is Thursday*; the consequent is *Sam is in court*.