1

A Brief Introduction to Key Terms

1.1 Arguments

Arguments crop up in conversations, political debates, lectures, editorials, comic strips, novels, television programs, scriptures, films, graffiti, posters, on the net, and so on. Ordinarily when we argue with others, we try to persuade them of some point. The forms of persuasion are many. We can persuade others by hitting them, by screaming at them, by drugging them, and so on. These kinds of persuasion are, unfortunately, prevalent. However, in this book we will use the term 'argument' exclusively to pick out sets of statements of the following sort:

Provided the fetus is a person, a fetus has a right to life. Should a fetus have a right to life, it is false that someone has the right to take its life. However, if abortions are moral, someone does have the right to take the life of a fetus. Consequently, if a fetus is a person, abortions are not moral.

Lung cancer is not caused by smoking, and this is so for the following reasons. Lung cancer is more common among male smokers than among female smokers. If smoking were the cause of lung cancer, this would not be true. The fact that lung cancer is more common among male smokers implies that it is caused by something in the male makeup. But if caused by this, it is not caused by smoking.

Anyone who deliberates about alternative courses of action believes he is free. Since everybody deliberates about alternative courses of action, it follows that we all believe ourselves to be free.

What do these passages have in common in virtue of which each is an argument in our sense? In this book an argument is any set of *statements* – explicit

or implicit – one of which is the *conclusion* (the statement allegedly being defended) and the others are the *premises* (statements allegedly providing the defense).[1] The relationship between the conclusion and the premises is such that the conclusion purportedly *follows from* the premises. This description of an argument leads us to ask what statements are, and what it means to say that one statement follows from others.

1.1.1   What is a Statement?

A statement is any indicative sentence that is either true or false.[2] The following are statements:

> Galileo was an astronomer.
> Provided the fetus is a person, a fetus has a right to life.
> No one but Nixon knew the truth.
> Lung cancer is not caused by smoking.
> Everybody deliberates about alternative courses of action.
> Martin Van Buren was not the ninth president of the United States.

Interrogatives, imperatives, and exclamations are sentences that are not statements; for example:

> Is George Washington president?
> Shave yourself!
> Wow!

1.1.2   Premises and Conclusion

A main aim in learning logic is to enhance skills in assessing arguments as we find them. But arguments cannot be assessed unless they are first identified as arguments. Although there are no sure signs of whether an argument is present, fairly reliable indicators exist.

Premise indicators: Premise indicators are terms that indicate that a premise will immediately follow. In the second argument in §1.1 above, the first sentence ends with 'this is so for the following reasons'. This clause indicates that the statements which follow are the premises of this argument. The third argument has a second sentence that begins with the word 'Since', indicating that a premise is about to be introduced. Other such expressions include 'because',

'for', 'after all', 'given', 'whereas', 'although', 'suppose', 'assume', 'let us presume', 'granted', 'here are the facts'. When a premise indicator starts a clause, then what follows the premise indicator is usually a premise.

Conclusion indicators: Likewise, when a conclusion indicator starts a clause, then what follows is usually a conclusion. In the first argument in §1.1 above, the last sentence begins with the word 'Consequently', indicating that it is the conclusion. Other conclusion indicators include 'therefore', 'so', 'hence', 'it follows', '... proves', '... shows', 'we can now infer', 'it cannot fail to be', 'let us conclude', 'this implies', 'these facts indicate', 'this supports the view or claim', 'let us infer', 'as a consequence we can deduce'.

Many passages contain arguments but none of these indicators, and some passages contain one or more of them without stating a premise or a conclusion. Indeed, the indicators seen most frequently are often used as neither conclusion nor premise indicators, as in the following sentences.

> How long has it been **since** you last saw him?
> He is **so** good at what he does.
> **For** two years he has been away.
> **After all** these days, you come home.
> Let us go **hence**.

None of these sentences is being offered as a premise for some conclusion or as a conclusion from some premises. Even though each contains familiar indicator terms, obviously the terms are not being used as indicators in these sentences.

Alternatively, one may simply announce that an argument is forthcoming, and then go on to affirm several statements. In this case, the context makes clear that the last statement is the conclusion and the others are premises. Still, some terms are almost always used as conclusion or premise indicators. It's hard to imagine a context in which 'on the assumption that' is not a premise indicator or 'as a consequence it follows' is not a conclusion indicator.

1.2 Putting Arguments into a Standard Format

Having determined that some piece of discourse contains an argument, the next task is to put it into a standard format. This task may involve all of the following:

   i.   Identifying the premises and the conclusion.
   ii.   Placing the premises first. (Order does not matter.)
 iii.   Placing the conclusion last.
 iv.   Making explicit any premise or even the conclusion, which may be only implicit in the original but essential to the argument.

So standard forms for the above three arguments are:

Provided the fetus is a person, a fetus has a right to life.
Should a fetus have a right to life, it is false that someone has the right to take its life.
If abortions are moral, someone does have the right to take the life of a fetus.
If a fetus is a person, abortions are not moral.

The first three statements are premises, and the fourth is the conclusion.

Lung cancer is more common among male smokers than among female smokers.
If smoking were the cause of lung cancer, this would not be true.
The fact that lung cancer is more common among male smokers implies that it is caused by something in the male makeup.
If it is caused by this, it is not caused by smoking.
Lung cancer is not caused by smoking.

The first four statements are premises, and the fifth is the conclusion.

Anyone who deliberates about alternative courses of action believes he is free.
Everybody deliberates about alternative courses of action.
We all believe ourselves to be free.

The first two statements are the premises, and the third is the conclusion.

In none of the arguments is a premise or a conclusion missing. Nothing said so far explains exactly how we were able to devise these standard forms based on what we were presented with. So far our process has been rather loose, and it cannot be tightened until we say something substantive about when one statement follows from some others.

1.3   Multiple Conclusions

As we have characterized arguments, no argument can have more than one conclusion. Of course, sometimes we do find passages with more than one conclusion. There are two types of cases. The first occurs when more than one conclusion is drawn from the same set of premises. For such a case we adopt the convention that distinct arguments can have the same premises, but different conclusions. So, for example, (1)–(4) below include two distinct arguments. (1)–(2) are premises, and (3)–(4) are conclusions. So (1)–(3) constitute one argument; and (1)–(2) and (4) constitute another distinct argument.

1. All women are mortal and rational.
2. Andrea is a woman.
3. So, Andrea is rational.
4. So, Andrea is mortal.

The second case occurs when we chain arguments together so that a single statement serves as both a premise and a conclusion. In this case the conclusion of one argument functions as a premise of another. (5)–(9) include two arguments.

5. Killing children is evil.
6. Children were being killed in Bosnia.
7. Therefore, someone was doing something evil in Bosnia.
8. When someone does something evil, he should be punished.
9. So, whoever killed children in Bosnia should be punished.

(5)–(6) are premises of an argument with (7) as its conclusion. However, (7) is also the premise of an argument, which along with (5), (6), and (8), has (9) as its conclusion.

Exercise 1.1   Standard form

- Put arguments (1)–(4) into a standard form.

1. If we are going to avoid a nuclear war in the next few years, we will have to adopt strong punitive measures now. But if we adopt such measures,

many nations will be very unhappy. Thus, we are going to avoid a nuclear war in the next few years only if many nations are going to be unhappy.
2. The state will increase its financial support of our university only if the priorities of the legislature shift in favor of higher education. But if such a shift were to occur, the people who benefit from other state projects would complain bitterly. If the state does not increase financial support for the university, tuition will have to be raised. So, tuition will be raised.
3. If a man is to play some role in society, that role must be determined by nature or by society. However, if his role is determined by nature, that role will be the role of the selfish hunter on the make. Hence, either society determines a role for man, or man will play the role of the selfish hunter always on the make.
4. If it is true that 30 out of every 50 college coeds have sexual intercourse outside marriage, then it is very important to have birth control information available from the Student Health Service. It is very important to have birth control information available from the Student Health Service. Thus, we know that 30 out of every 50 college coeds have sexual intercourse outside marriage.

1.4   Deductive Validity

What is it for one statement to follow from others? The principal sense of 'follows from' in this book derives from the notion of a deductively valid argument.

> **A deductively valid argument is an argument such that it is not possible both for its premises to be true and its conclusion to be false.**

So, consider argument (10)–(12).

10.   The current Vice-President will win the next election.
11.   If the current Vice-President wins the next election, then the country will prosper.
12.   So, the country will prosper.

This is an argument in which the conclusion follows intuitively from its premises. But what is it about (10)–(12) that makes us think that (12) can

be concluded on the basis of (10)–(11)? We know it's not the truth of the premises, because we are in no position to know whether they are true. The relevant events haven't even occurred yet. So what is it? One salient feature is that, were the premises true, the conclusion would have to be true as well. These considerations should help the reader to appreciate the difference between the deductive validity of an argument and the truth of its premises.

Another argument will make this point even more evident.

13. All fish fly.
14. Anything which flies talks.
15. So, all fish talk.

Even though each statement in (13)–(15) is obviously false, the argument is deductively valid, because it is not possible for its premises to be true and its conclusion to be false. If it so happened (even though we know otherwise) that the premises were true, would the conclusion have to be true as well? Say that, due to some strange release of radiation, all fish flew and anything which flew talked, it would then be, and have to be, true that all fish talk. In this sense the conclusion (15) follows from its premises (13)–(14), and the argument is deductively valid.

What about an invalid argument? Consider argument (16)–(18).

16. If God exists, then the creation is perfect.
17. God doesn't exist.
18. So, the creation is imperfect.

Argument (16)–(18) is invalid. (16) merely tells us what the state of the creation would be if God exists. It doesn't assert anything about the state of the creation if God does not exist. The creation could be perfect whether or not God exists. Consider an analogous argument. If you prepare for a chess game, you win. But suppose you don't prepare for it. It doesn't follow that you lose. Plainly you might win even if you don't prepare. Your opponent might forfeit, for example.

In ordinary English the terms 'valid' and 'true', on the one hand, and 'invalid' and 'false', on the other, are often used interchangeably. People will say that statements are valid or invalid, and that arguments are true or false. But logicians use these terms in a much more restricted way, such that 'valid' and 'invalid' apply only to arguments, and 'true' and 'false' only to statements. We will adopt this restrictive practice in this book.

Exercise 1.2   Deductive validity

- With this characterization of deductive validity, it is already possible to evaluate many arguments. Which of (1)–(8) is deductively valid?

1. Mary either plays basketball or baseball.
   She does not play basketball.
   So, she plays baseball.
2. Al will play tennis or he will play baseball.
   Al will play tennis.
   So, Al will not play baseball.
3. You play in the National Basketball Association only if you are over three feet tall.
   Bill Clinton is over three feet tall.
   So, Clinton plays in the National Basketball Association.
4. Any creature with a kidney has a heart.
   Not every creature has a heart.
   So, not every creature has a kidney.
5. Bill ate steak for dinner this evening.
   So, Bill ate dinner this evening.
6. Everybody loves someone.
   So, someone is loved by everyone.
7. Some birds do not fly.
   Therefore, not every bird flies.
8. There is evil in the world.
   If there were a God, there would be no evil.
   Therefore, there is no God.

Exercise 1.3   Truth, falsity, and deductive validity

- Give an example, if possible, for each box in the following diagram.
- If it's not possible, explain why.

Devising a deductively valid argument for box 7 demonstrates that there is no connection between actual truth and validity. Someone may assert only false sentences, and yet his argument may be deductively valid.

Devising an argument for box 2, on the other hand, demonstrates that someone may assert only truths, and yet his argument may be deductively invalid.

Together these show that we might criticize in two distinct ways those who offer an argument in order to persuade us of some point: they might go wrong because they are ignorant (box 7), in which case what they say is false; or they might go wrong because they are illogical (box 2), in which case what they conclude does not follow from what they believe or assert as premises.

Premises	Conclusion	Valid	Invalid
True	True	1	2
At least one false	True	3	4
True	False	5	6
At least one false	False	7	8

1.5   Soundness

A good argument is not simply deductively valid; (13)–(15) is deductively valid but unlikely to persuade anyone.

13.   All fish fly.
14.   Anything which flies talks.
15.   So, all fish talk.

Though it is not possible for both (13) and (14) to be true and (15) false, the argument is unlikely to persuade any knowledgeable person, because (13)–(14) are patently false. Normally, good arguments are not only deductively valid. They also have true premises. Such arguments are called *sound*.[3]

Suppose an argument is valid, yet its conclusion is false. Then at least one of its premises must be false, and the argument, though valid, is unsound. Once we decide that an argument is deductively valid, we may direct attention to the question of its soundness.

1.6   Missing Premises and Conclusions

Intuitively, argument (19)–(20) is deductively valid, because an obviously true premise (21) is missing from it.

19. New York City is in New York State.
20. So, Manhattan is in New York State.

21. Manhattan is in New York City.

Almost anyone familiar with the facts about New York City, when presented with (19)–(20) as an argument, would effortlessly add (21) as a premise. But we must be careful about adding premises to arguments, since any argument can be turned into a deductively valid argument if the right 'missing' premise(s) are added. On its face, argument (22)–(23) appears to be invalid; but if we treat this argument like we did argument (19)–(20) by adding the 'missing' premise (24), we too easily turn a bad argument into a deductively valid argument.

22. The Yankees are losing.
23. So, we should elect a new president.

24. If the Yankees are losing, we should elect a new president.

Clearly, until some independent reason is provided, why should we add (24)? Why should we suppose a connection between the Yankees losing, on the one hand, and electing a new president, on the other?

The question we need to take a stab at is why many people would refrain from postulating (24) as a missing premise from (22)–(23), even though they intuit that (21) is implicit in argument (19)–(20)? According to one hypothesis, the difference has something to do with successful communication. When we communicate, we normally share a background of beliefs or assumptions and recognize that we share them. When I discuss politics with a colleague, we each take elementary facts about our government for granted, and we each assume that the other does too. We assume that Washington DC is the capital of the United States, that the White House is located there, that the President lives there, and so forth. The more we share, the easier it is to communicate. If we did not share any beliefs, we probably could not communicate at all.

Typically, a conversation depends in part on what we want to convey and in part on what we assume about the listener's beliefs. We do not usually say what is already common knowledge, since that would be banal. Nor do we ordinarily say what we believe is inconsistent with our shared beliefs, since that would sabotage our conversation.

Although many facts and opinions are assumed in conversation, we frequently need to bring them to the fore, in order to evaluate properly the

validity of an argument. Which premises to make explicit is not always easy to decide. The interpreter of an argument has a choice: to declare an explicitly invalid argument invalid or to make that argument valid by adding premises he thinks implicit but unstated. No matter how unpromising an argument may seem, you can always conjure up premises sufficient to make the conclusion follow. When should you add premises thought to be implicit, and when not? If, to save an argument, you would need to put into the mouth of its author beliefs he probably does not or would not hold, then the best course of action is to declare the argument invalid.

Though much of the above explanation may seem abstract, you will find that you already have strong intuitions concerning which premise(s), or even which conclusion, is missing. On its face, for example, argument (25) is deductively invalid.

25.   Only children are admitted free. So none of our executives is admitted free.

However, were someone to propose (25), we would probably realize that he was assuming an unstated connection between the premise and the conclusion. No formula exists for finding such connections; but in this example we readily see that some connection must be made between children and executives: namely, 'Our executives are not children.' If we add this statement as a missing premise, the argument is deductively valid.

Exercise 1.4   Missing premises and conclusion

- Figure out which premise(s) or conclusion could be supplied to make arguments (1)–(2) valid.
- But try to choose premises in accordance with the restrictions stated above.

1.   Either the key is in my pocket or it is on the hall table; and if it is on the hall table, we are locked out. ((1) is interesting because it is not at all clear which conclusion is missing, and therefore we can readily see that there is no such thing as conclusion of a set of premises. There will often be more than one reasonable conclusion to draw, and it may be arbitrary which one.[4])
2.   Either I pay Jerry off, or he publishes those photos; but if I pay him off, I'll be broke. So either I will be broke or I will lose my job.

Notes

1 Sometimes spelled 'premisses'.
2 Many philosophers argue that not every indicative sentence is a statement. While avoiding detail at this stage, our definition can accommodate such sentences, should there be any.
3 Sometimes offering a deductively valid argument with known false premises is worthwhile. *Reductio ad absurdum* arguments are examples. See ch. 8 for more on these.
4 I state without proof that for any set of premises there are infinitely many conclusions that we can deductively validly draw from these premises. Of course, some are more appropriate than others.