

Affirming and denying

Exercises

1. Einstein

The following argument, presented by a professional scientist to support Einstein's theory of relativity, seems perfectly plausible, but what's wrong with it?

If Einstein's theory is true then light rays passing close to the sun are deflected. Careful experiment reveals that light rays passing close to the sun *are* deflected. Therefore Einstein's theory is true.

Answer:

The scientist's argument can be summarised in the following way:

1. If Einstein's theory is true, then light rays passing close to the sun are deflected.
2. Careful experiment reveals that light rays passing close to the sun *are* deflected.
3. Therefore Einstein's theory is true.

As you can see, the scientist has affirmed the consequent. Like Stephen's disqualification in *How to Write Better Essays*, it is possible that the deflection of light passing close to the sun may be due to any number of reasons, not just Einstein's theory of relativity.

The argument could be made valid, but only if it was the *sufficient* and *necessary* condition for the deflection – in other words, that it was the *only* reason for it. However, for this to be the case we would have to argue instead, 'If, and only if, Einstein's theory is true, then light rays passing close to the sun are deflected.'

2. Sherlock Holmes

In *The Boscombe Valley Mystery*, Sherlock Holmes develops the following argument.

Explain what's wrong with it.

It was about ten minutes before we regained our cab...Holmes still carrying with him the stone which he had picked up in the wood.

'This may interest you, Lestrade,' he remarked, holding it out. 'The murder was done with it.'

'I see no marks.'

'There are none.'

'How do you know, then?'

'The grass was growing under it. It had only lain there a few days. There was no sign of a place whence it had been

taken. It corresponds with the injuries.’¹

Answer:

The reasoning appears to have been as follows,

If the murder weapon was a heavy object, then we will find
it with grass growing beneath it.

This stone was found with grass growing beneath it.

Therefore, this stone is the murder weapon

As you can see, like the previous argument, Holmes has affirmed the consequent. He has assumed there is only one reason why the stone was lying there, recently discarded, with grass growing beneath it: the murderer had thrown it away as he escaped from the scene. In other words, he assumes

If, and only if, it was the murder weapon, then it would be found with
grass growing beneath it.

But, although this is a *necessary* reason for thinking the stone is the murder weapon, it is not a *sufficient* reason: we can think of a number of other reasons which would explain its discovery just as well. A boy returning from school might have picked it up to see how far he could throw it, or it may have been dropped by a gardener who was collecting stones to build a wall or a rockery in his garden.

¹ Arthur Conan Doyle. ‘The Boscombe Valley Mystery’ in *The Adventures of Sherlock Holmes* (Harmondsworth: Penguin, 1988), p. 92.

3. Management and employees

Read the following argument and explain what you think is wrong with it.

If the employees of a business are involved in its management, then the business will flourish. But, since the employees in this business have no share in its management, it's not surprising that it hasn't flourished.

Answer:

In contrast to the other two arguments, this commits the fallacy of denying the antecedent. The argument can be summarised as follows:

1. If the employees of a business are involved in its management, then the business will flourish.
2. The employees in this business have no share in its management.
3. Therefore it's not surprising that it hasn't flourished.

But, like Stephen's disqualification in *How to Write Better Essays*, although the employees have no share in the management of the business, this may be only one of a number of factors that have prevented it from flourishing. So, even if they had been involved, it might still not have flourished.

Still, you can see how tempting it is to accept the argument. What makes it superficially appealing is that we assume the involvement of the employees is both necessary and sufficient for the business to flourish. It is the only thing needed to ensure that the business flourishes. If this had been the case, then the argument would, indeed, have been valid. However, for this we would have had to argue instead, 'If, and only if, the employees of a business are involved in its management, then the business will flourish.'

Necessary and sufficient conditions

As you can see from these exercises, one of the reasons many of us make these mistakes is that in the proposition 'If X, then Y' we confuse the claim that X is a sufficient condition for Y with the claim that it is the *only* sufficient and necessary condition. If something is 'sufficient' and 'necessary' for the occurrence of something else, no other alternative reasons need be sought. If we were wrongly to assume this, we would in effect confuse the hypothetical 'If X, then Y' with the proposition 'If, and only if, X, then Y.'

In Stephen's case we would in effect be arguing that 'If, and only if, an athlete is found to have taken performance enhancing drugs, then he will be disqualified.' This means that no other reason will count as justification for his disqualification. So, if he is disqualified, it can only be because he has taken banned drugs.