

PY1003 Introduction to Logic

I: Introduction

1. Arguments

An argument consists of one or more *premisses* and a *conclusion*. The premisses are intended to support the conclusion - that is, give us reason to think that the conclusion is true.

Often we state arguments quite informally. For instance, if I am looking for Ross I may reason as follows: "I wonder where Ross is? Around this time, he is always in his office or else in the library, and I know that he is not in his office because I've just looked there, so I guess that he is in the library.'

But in philosophy, we often chose to make the premisses and the conclusion more explicit:

1. Ross is in his office or Ross is in the library
2. It is not the case that Ross is in his office
3. Therefore, Ross is in the library.

2. Validity

An argument is *valid* if and only if it is impossible for the premisses to be true, and the conclusion false. Here are a couple of valid arguments:

1. If it is raining in St Andrews, it is raining in Leuchars
2. It is raining in St Andrews
3. Therefore, it is raining in Leuchars.

1. All humans are mortal
2. Helena is human
3. Therefore, Helena is mortal

An argument is *invalid* if and only if it is possible for the premisses to be true and the conclusion false. Here are a couple of invalid arguments:

1. If it is raining in St Andrews, it is raining in Leuchars
2. It is raining in Leuchars
3. Therefore, it is raining in St Andrews.

1. All humans are mortal
2. Helena is mortal
3. Therefore, Helena is human

Remember that an argument can be valid even if its premisses are false. A valid argument with true premisses is a *sound* argument.

3. Logic

Hopefully, a bit of commonsense enables us to distinguish the valid arguments above from the invalid ones. But sometimes it is a lot more difficult. Consider, for instance, the following argument:

1. If God is willing prevent evil, but is unable to do so, He is impotent.
2. If God is able to prevent evil, but unwilling to do so, he is malevolent.
3. Evil exists if and only if God is unwilling or unable to prevent it.
4. God exists only if He is neither impotent nor malevolent
5. Therefore, if God exists, evil does not.

Is this argument or invalid? At least at first glance, it is pretty difficult to tell.

It is here that we need logic. Logic provides us with systematic and reliable methods of distinguishing between valid and invalid arguments.

4. The aims of this module

The overall aim of this module is to study some of the ways that we can distinguish between valid and invalid arguments. We'll cover the following topics:

- Sentential logic
- Truth-tables for sentential logic
- Predicate logic
- Truth-trees for predicate logic
- Some problematic cases (identity, definite descriptions, multiple-generality etc.)

Further reading

Colin Howson, *Logic with Trees*, pp. 3-5
 Graeme Forbes, *Modern Logic*, pp.3-11