Introduction to Logical Reasoning

Deductive Arguments

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Deduction

Deductive Argument: An argument whose premises are supposed to provide *conclusive* support its conclusion.

The claim is that it is *absolutely impossible* for the conclusion to be false when the premises are true.

Deduction

Deductively *Valid* Argument: An argument where the truth of all its premises *logically* entails the truth of its conclusion.

This means that for a valid argument, *if* all the premises are true, then the conclusion *must* logically be true as well.

Notice that this says nothing whatsoever about whether the premises are actually true or not!

Deduction

Deductively *Invalid* Argument: An argument where it *is* logically possible for the conclusion to be false while the premises are all true.

The easiest way to show that an argument is invalid is to construct a counter-example. That is, make up an example or case where the premises are true and the conclusion is false. If you can make an example like this that makes sense, then the argument is invalid.

Deduction

Deductively *Sound* Argument: An argument that (1) is valid and (2) has premises that are all true.

The tools of logic are used to assess part (1) of soundness. Other realms of knowledge are usually necessary to assess part (2).

Deduction

I postpone discussing the "logically" aspect of validity and invalidity until next week. That is when you will start to learn how to use the tools of logic to assess deductive validity.

This week, we proceed more informally by focusing on the "impossible" and "possible" aspects of validity and invalidity, and how these are different from the concepts of truth and falsity.

Argumentative Form

Consider the following argument:

> Professor Gray must be a millionaire. After all, everyone who works in Qatar is a millionaire and Professor Gray works in Qatar.

To make assessing this argument easier, let us put this into what we will call its argumentative form.

Argumentative Form

To put an argument into argumentative form:

1. Make a numbered list of the premises,
2. Draw a line below the last premise, and
3. Below the line put the conclusion, but with a ∴ in front of it.

This is called "triple dot". It means "therefore" in the language of logic. It indicates the *main* conclusion of an argument.

Argumentative Form

So given the argument:

> Professor Gray must be a millionaire. After all, everyone who works in Qatar is a millionaire and Professor Gray works in Qatar.

It has the following argumentative form:

1. Professor Gray works in Qatar.
2. Everyone who works in Qatar is a millionaire.

∴ Professor Gray is a millionaire.

Argument 1

Assess the following argument:

1. Professor Gray works in Qatar.
2. Everyone who works in Qatar is a millionaire.

∴ Professor Gray is a millionaire.

Argument 2

Assess the following argument:

> Professor Gray teaches philosophy because the Earth has one moon and Doha is the capital of Qatar.

The same argument in its argumentative form:

1. The Earth has one moon.
2. Doha is the capital of Qatar.

∴ Professor Gray teaches philosophy.

Argument 3

Assess the following argument:

If we all did well on the exam, then we will have a logic "pizza for breakfast (or maybe cake)" party. We all did well on the exam. Therefore, we are having a logic party!

The same argument in its argumentative form:

1. If we all did well on the exam, then we will have a logic party.
2. We all did well on the exam.

∴ We are having a logic party.

Next Class…

We will discuss in more detail the difference between validity/invalidity, on the one hand, and truth/falsity on the other.

I am putting Narcis and Sara in charge of a small logic soiree this Thursday. Please give them feedback on what kind of food and drink we should have. That said, keep in mind that this is a *logic* soiree, so we will still have our workshop that day.