Introduction to Logical Reasoning

Lecture #8

Deductive Arguments

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Deduction

Deductive argument: An argument whose premises are supposed to provide *conclusive* support for 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! Validity has us assume (for the sake of argument) that the premises are true, and then see whether the conclusion must actually follow or not. So validity is an assessment of the *inferences* of an argument, not its premises.

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 without contradiction, then the argument is invalid.

Deduction

Deductively *sound* argument: An argument that (1) is valid with (2) premises that are all actually 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 formal 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 they are different from the concepts of truth and falsity.

Argumentative Form

Consider the following argument:

> Professor Gray must be a millionaire. After all, everyone living in Qatar is a millionaire and Professor Gray lives 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 main conclusion, but with a ∴ (called "triple dot", whose symbol means "therefore") in front of it.

Argumentative Form

So given the argument:

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

It has the following argumentative form:

1. Everyone living in Qatar is a millionaire.
2. Professor Gray lives in Qatar.

∴ Professor Gray is a millionaire.

Argument 1

Assess the following argument:

1. Everyone living in Qatar is a millionaire.
2. Professor Gray lives in Qatar.

∴ Professor Gray is a millionaire.

Are the premises true? Is it deductively valid? Is it deductively sound?

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.

Are the premises true? Is it deductively valid? Is it deductively sound?

Argument 3

Assess the following argument:

> If I get an A in logic, then I am burning the textbook. I am getting an A in logic. Therefore, I am burning the textbook!

The same argument in its argumentative form:

1. If I get an A in logic, then I am burning the textbook.
2. I am getting an A in logic.

∴ I am burning the textbook.

Are the premises true? Is it deductively valid? Is it deductively sound?

Next Class...

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

Also, please do not forget to turn in your response to the Lecture #8 Questionnaire on your way out.