Introduction to Logical Reasoning *Deductive Arguments*

David Emmanuel Gray

Northwestern University in Qatar Carnegie Mellon University in Qatar

». Deduction

Deductive Argument: An argument claiming that its premises *conclusively* support its conclusion.

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

Deductively Valid Argument: An argument where the truth of 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 this says nothing 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 true.

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 the deductive validity of an argument.

This week, we proceed informally by focusing on the "impossible" and "possible" aspects of validity and invalidity.

rgumentative Form

Consider the following argument:

All men are mortal. Socrates is a man. Therefore, Socrates is a mortal.

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:

All men are mortal. Socrates is a man. Therefore, Socrates is a mortal.

It has the following argumentative form:

1. All men are mortal.

- 2. Socrates is a man.
- : Socrates is mortal.



Assess the following argument:

- 1. All men are mortal.
- 2. Socrates is a man.
- : Socrates is mortal.

<u>gument 2</u>

Assess the following argument:

All people living in Qatar are millionaires. Professor Gray lives in Qatar. Therefore, Professor Gray is a millionaire.

The same argument in its argumentative form:

- 1. All people living in Qatar are millionaires.
- 2. Professor Gray lives in Qatar.
- : Professor Gray is a millionaire.

- This naturally leads us to develop a new concept for assessing arguments in addition to validity.
- Deductively Sound Argument: A (1) valid argument, whose (2) premises are all true.

So according to soundness, now we do care about whether the premises are actually true or not.

rgument 3

Assess the following argument:

The earth has one moon. Doha is the capital of Qatar. Therefore, Professor Gray teaches logic.

The same argument in its argumentative form:

- 1. The earth has one moon.
- 2. Doha is the capital of Qatar.
- : Professor Gray teaches logic.



We will look at a different sort of argument: inductive arguments.

Deductive Arguments—Introduction to Logical Reasoning—David Emmanuel Gray