305 Lecture 02 - The Nature of Logic

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Plan for This Lecture

We're discussing the nature of arguments, and in particular, the role of premises and conclusions.

Associated Reading

Carnap book, chapter 1, section "Arguments and Reasoning".

Logic studies certain properties of arguments.

An argument, in the sense we're interested in, has two parts:

1. Premises
2. Conclusion

1. All kangaroos are wise.

2. Skippy is a kangaroo.

Skippy is wise.

1. All kangaroos are wise.

2. Skippy is a kangaroo.

Skippy is wise.

The **premises** go above the line, and are numbered.

1. All kangaroos are wise.

2. Skippy is a kangaroo.

Skippy is wise.

The **conclusion** goes below the line, and is not numbered.

The Premise Set

1. All kangaroos are wise.

2. Skippy is a kangaroo.

Skippy is wise.

There can be zero, one or multiple premises. Formally, we'll say there is a set of premises.

All men are created equal.

1. The cinema is closed.

We shouldn't go to the cinema.

1. All kangaroos are wise.

2. Skippy is a kangaroo.

Skippy is wise.

But we don't allow this flexibility to conclusions; arguments have a single conclusion.

- Sometimes a conclusion of one argument will go to be a premise in another argument.
- But any given argument aims to prove just one thing.

1. All kangaroos are wise.

2. Skippy is a kangaroo.

Skippy is wise.

When I write arguments like this, I'm merely presenting them, not asserting that they have any nice features.

What are some virtues of arguments that you can think of? What makes for a good argument?

- Premises are true.

- Premises are true.
- Premises are known.

Virtues of Arguments

- Premises are true.
- Premises are known.
- Premises are accepted in debate.

- Premises are true.
- Premises are known.
- Premises are accepted in debate.
- Premises are evidence for the conclusion.

- Premises are true.
- Premises are known.
- Premises are accepted in debate.
- Premises are evidence for the conclusion.
- Premises guarantee the truth of the conclusion.

To a first approximation, logic is about the last of these virtues.

- Does the truth of a set of premises **guarantee** the truth of the conclusion?

Logic isn't just about guarantees though. It's about a special kind of guarantee, one that holds in virtue of the structure of the premises and conclusion.

Compare the Skippy argument with this one.

1. Today is Wednesday.

Tomorrow is Thursday.

The premise guarantees the truth of the conclusion, but it does so in virtue of meanings of 'Wednesday' and 'Thursday', not structural features.

When the structure of the argument does the guaranteeing, the guarantee would persist through some substitutions.

1. All kangaroos are wise.

2. Skippy is a kangaroo.

Skippy is wise.

When the structure of the argument does the guaranteeing, the guarantee would persist through some substitutions.

1. All kangaroos are wise.

2. Lucky is a kangaroo.

Lucky is wise.

Structure and Substitution

When the structure of the argument does the guaranteeing, the guarantee would persist through some substitutions.

1. All koalas are wise.

2. Lucky is a koala.

Lucky is wise.

When the structure of the argument does the guaranteeing, the guarantee would persist through some substitutions.

1. All koalas are dishonest.

2. Lucky is a koala.

Lucky is dishonest.

- We'll say an argument is **valid** just in case the truth of the premises guarantees the truth of the conclusion.
- We'll say an argument is **sound** just in case it is valid and has true premises.
- We won't have much interest here in soundness; just in validity.

Here are some equivalent ways to define validity.

- An argument is valid if necessarily, when the premises are true, the conclusion is too.
- An argument is valid if it is impossible for the premises to be true and the conclusion to not be true.

We'll use that last formulation a lot.