

Introduction to Logic

PHIL 240
Sections 501 - 509

What is Logic?

Logic has often been called the study of reason, but that isn't entirely correct. Logic does not concern itself with the study of reason broadly, but rather with the methods and principles which distinguish correct from incorrect reasoning. The primary focus of this study is the argument.

What is an argument?

An argument is a collection of two things:

1. A set of statements, which are known as *premises*.
2. A single statement, which is known as a *conclusion*.

The statements involved need to be propositions, that is *declarative* sentences, which are sentences which may be classified as either true or false. Further, it is implied that there is a relationship between 1 and 2 such that the truth of 2 follows from 1. It is this relationship, along with the larger property it reveals, which we will explore this semester.

Induction vs. Deduction

Logicians usually differentiate two different types of arguments:

1. **Inductive:** This involves probabilistic reasoning, i.e. the truth of the premises makes the conclusion *probable*.
2. **Deductive:** This involves necessary reasoning, i.e. the truth of the premises makes the truth of the conclusion *necessary*. Deduction will be the focus of this course.

Validity

The primary objective of this course will be to explore the notion of validity. Validity is defined as follows:

An argument is valid *if and only if* it is NOT possible for the conclusion to be false when ALL the premises are true.

Examples of valid arguments

Premise 1: If Bill drinks a liter of rum, Bill will be intoxicated.
Premise 2: Bill drinks a liter of rum.
Conclusion: Bill is intoxicated

Premise 1: If Bill drinks a liter of Rum, he will be intoxicated.
Premise 2: Bill is not intoxicated.
Conclusion: Bill did not drink a liter of rum.

Premise 1: Either Fred will go to the Rec, or to the Chicken.
Premise 2: Fred will not go to the Rec.
Conclusion: Fred will go to the Chicken.

Examples of invalid arguments

Affirming the consequent:

Premise 1: If Bill drinks a liter of rum, Bill will be intoxicated.

Premise 2: Bill is intoxicated.

Conclusion: Bill drank a liter of rum.

Denying the antecedent

Premise 1: If Bill drinks a liter of rum, Bill will be intoxicated.

Premise 2: Bill did not drink a liter of rum.

Conclusion: Bill is not intoxicated.

Entailment and Soundness.

In a valid argument, the premises are said to entail the conclusion. Whereas validity is a *property* of arguments as a whole, entailment is a *relation* that holds between the premises and conclusion of a valid argument.

Soundness is a property of a valid argument *with* all true premises. Only a sound argument is a “good” argument, as validity only speaks to the *potential* of the argument to yield a true conclusion.
