305 Lecture 03 - Propositional Logic

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Plan for This Lecture

We’re introducing propositional logic, and talking about what it is.

Associated Reading

Carnap book, chapter 1, section “Our Formal Language”.

Key Assumption

We start with one key assumption:

- Every sentence has precisely one of the two truth values: TRUE, FALSE.
- I will often follow *Boxes and Diamonds* as writing these values as T and F.

Unpacking the Assumption

1. There are just two truth values: T, F.
2. Every sentence has one of them. There are no truth-value *gaps*.
3. No sentence has both of them. There are no truth-value *gluts*.

Two Parts of Classical Logic

- Traditionally, classical logic is divided into two parts.
- We're just going to look at the first part here.
- The parts differ on what counts as a **structural** feature of a sentence.

Classical Propositional Logic

The structural features are just five sentential connectives:

- And
- Or
- Not
- If
- If and only if; usually written iff.

The result is a very simple, but very weak, logic. It doesn't even tell us that the arguments about Skippy and Lucky are structurally valid.

Classical Predicate Logic

As well as those structural features, we add:

- The division of parts of sentences into names, variables, predicates, and logical terms.
- The addition of the logical terms **All** and **Some**.

Symbols

The only symbols we need for classical propositional logic are sentence letters, which stand for sentences, and symbols for the five connectives:

- And - $\wedge$
- Or - $\vee$
- Not - $\neg$
- If - $\rightarrow$
- Iff - $\leftrightarrow$

Examples

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- $\neg B \wedge A$ = *Skippy is not a kangaroo and Lucky is a koala.*

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- $\neg B \wedge A$ = *Skippy is not a kangaroo and Lucky is a koala.*
- $(A \vee B) \rightarrow (A \wedge B)$ = *If Lucky is a koala or Skippy is a kangaroo, then Lucky is a koala and Skippy is a kangaroo.*

For Next Time

- Read chapters 1 and 3 of *The Carnap Book*.
- Go to http://carnap.io and register for this course
- The course name is “University of Michigan - S20 - PHIL305”