

## 305 Lecture 03 - Propositional Logic

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# 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.

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 -  $\leftrightarrow$

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

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

## 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”