# Philosophy 220

Syntax of SL

# Semantics and Syntax

## Semantics

- Refers to meaning
- The semantics of SL are the vocabulary of SL (capital letters, truth-functional connectives, and parentheses) and what that vocabulary *means.*

## Syntax

- Refers to structure
- The syntax of SL is the set of rules for how the vocabulary of SL may be arranged and combined.

# Object Language/ Metalanguage

- When we talk about a language, the language that we are talking about is the object language, and the words that we are using to talk about the object language are part of the metalanguage.

- If we talk about Latin in English, then Latin is the object language and English is the metalanguage.

- Often we will use English to talk about SL (and later SD, SD+, and PL).  In these cases, English is the metalanguage and SL the object language.

# Use/Mention

- Sometimes we use words in a language, and sometimes we mention words in a language. When we mention words, it is proper to put those words into single quotes ('word').

- USE: Tom has three children

- Mention: 'Tom' has three letters

# Use/Mention in SL

- There are two conventions to mention sentences of SL:
    - Single quotes: '~B' is a negation
    - Separation:
      The phrase

      A & B

      is a conjunction in SL.

# Use/Mention T/F

- Copper is copper.
- The chemical symbol 'Cu' names 'copper'.
- Copper is the name of copper.
- 'Copper' is a metal.
- Copper is the name of 'copper'

# Use/Mention T/F

- Copper is copper.
  - **TRUE**
- The chemical symbol 'Cu' names 'copper'.
- Copper is the name of copper.
- 'Copper' is a metal.
- Copper is the name of 'copper'

# Use/Mention T/F

- Copper is copper.
  - **TRUE**
- The chemical symbol 'Cu' names 'copper'.
  - **FALSE: The symbol 'Cu' names the metal that is copper, not the name 'copper'.**
- Copper is the name of copper.
- 'Copper' is a metal.
- Copper is the name of 'copper'

# Use/Mention T/F

- Copper is copper.
  - **TRUE**
- The chemical symbol 'Cu' names 'copper'.
  - **FALSE: The symbol 'Cu' names the metal that is copper, not the name 'copper'.**
- Copper is the name of copper.
  - **FALSE: 'Copper' is the name of copper.**
- 'Copper' is a metal.
- Copper is the name of 'copper'

# Use/Mention T/F

- Copper is copper.
  - **TRUE**

- The chemical symbol 'Cu' names 'copper'.
  - **FALSE: The symbol 'Cu' names the metal that is copper, not the name 'copper'.**

- Copper is the name of copper.
  - **FALSE: 'Copper' is the name of copper.**

- 'Copper' is a metal.
  - **FALSE: Copper is a metal, 'Copper' is the name for that metal.**

- Copper is the name of 'copper'
  - **FALSE: 'Copper' is the name of copper.**

# Metalinguistic variables

- For the purposes of supplying rules for the structure of claims in SL (that is, the syntax of SL), the textbook authors use what they call Metalinguistic variables (Metavariables for short) to stand for expressions of SL. Metavariables are part of English, not SL.

- The text uses a bold capital letter to stand for any expression in SL. Since it can be difficult to distinguish bold type onscreen, I shall use outlined letters like '𝔸' and '𝔹' as metalinguistic variables.

- Logicians have long defaulted to using 'p' and 'q' as variables, much as math often uses 'x' and 'y'. This is the probable genesis of the phrase, "Mind your p's and q's.".

# An Effective Syntax

- A syntax is effective if and only if one can determine in a finite number of steps whether any putative expression does or does not follow the syntax.

- Any expression that is allowed in SL is a sentence of SL. The rules for sentences in SL (the syntax of SL) is as follows.

# Syntax of SL

1. Every sentence letter is a sentence
2. If $P$ is a sentence, then $\sim P$ is a sentence.
3. If $P$ and $Q$ are sentences, then $(P \mathbin{\&} Q)$ is a sentence.
4. If $P$ and $Q$ are sentences, then $(P \lor Q)$ is a sentence.
5. If $P$ and $Q$ are sentences, then $(P \supset Q)$ is a sentence.
6. If $P$ and $Q$ are sentences, then $(P \equiv Q)$ is a sentence.
7. Nothing is a sentence unless it can be formed by repeated application of clauses 1-6.

# Sentences in SL?

- B & Z
- J ⊃ (K ⊃ (A ∨ N))
- (I ∨ [T & E])
- (F ≡ K) ⊃ [M ∨ K]
- B ∨ D ∨ R
- B ~& F

# Sentences in SL?

- B & Z
- J ⊃ (K ⊃ (A ∨ N))
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These follow the rules

# Sentences in SL?

- B & Z
- J ⊃ (K ⊃ (A ∨ N))
- (I ∨ [T & E])
- (F ≡ K) ⊃ [M ∨ K]
- B ∨ D ∨ R
- B ~& F

Choice of parentheses style is arbitrary, so long as they are placed and grouped correctly.

# Sentences in SL?

- B & Z
- J ⊃ (K ⊃ (A ∨ N))
- (I ∨ [T & E])
- (F ≡ K) ⊃ [M ∨ K]
- B ∨ D ∨ R
  - **No, cannot be generated by syntax (too few parentheses)**
- B ~& F
  - **No, cannot be generated by syntax (cannot generate '& F' so cannot generate '~& F)**