Next Chapter (3)

Logic (Lecture)
Prop. Logic (Ch 2):
Usefully inadequate
for some things (KK)

First-Order Logic (FOL)
(Quantificational logic;
Predicate logic)

First extention of Prop Logic)

Language of FOL:

1. Pred. symbols
P, Q, R, ...

2. Object symbols
a, b, c, ...
P(a): a has property P
K(b)
Says(b, w)
R

Example:

∃x \forall y \exists z \forall w
K(x) → True(w)
[ K(a) ∧ Says(k, w) ]

→ True(w)

∀y \forall z \forall w
K(x) → True(w)
[ K(x) ∧ Says(k, y) ]

→ True(w)

Quantifiers A, ∃
\[ \forall x \forall y \left[ (K \times \forall S(x, y)) \rightarrow \text{Time}(y) \right] \]

A FOL with can have many meanings.

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**Def.** Given a FOL language, an interpretation consists of:

1. A domain \( D \)
2. For each constant symbol \( c \), an element \( c \in D \) (element of \( D \))
3. For each predicate symbol \( P \), a property \( P \) with \( D \).

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Tarski Worlds

\[
\begin{array}{|c|c|c|c|}
\hline
a & b & D = \{a, b\} \\
\hline
\hline
\Delta & O & \Delta & O \\
\hline
\Delta & \Delta & \Delta & O \\
\hline
\hline
\end{array}
\]

\[ R : aRb \]
\[ R(b, a) \]
\[ R(a, b) \]

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