

Computational Semantics

CS 135
Brandeis University

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Lecture 1: What is Computational Semantics?

Course Outline

- Natural Language as Functional Programming - meaning vs. computing meaning
- The meaning of an expression
- What a speaker means to say
- We focus mostly on what expressions can *mean*

Study of Meaning

- **Semantics**: the study of the relation between strings and their meanings, i.e., their relation with the extralinguistic structure they are about.
- **Pragmatics**: the study of the use of meaningful strings to communicate about extralinguistic structure in an interaction process between users of the language.

Speaker Meaning

- Depends on the context of the interaction
- Situation variables
- Prior context
- Non-verbal modes of communication
- Theory of Mind

Perspectives on Meaning

- Meaning is about truth
- Meaning is about use

Meaning as Truth

- (More specifically, about truth conditions)
- "To know the meaning of a sentence is to know its truth-conditions." (Heim and Kratzer, 1998)
- "To understand a proposition means to know what is the case, if it is true." (Wittgenstein, 1921)

Meaning as Truth

- Central concepts: reference, entailment, compositionality
- Traditional tools of the trade: formal (model-theoretic) semantics
- Building models of the (or a) world, and evaluating the truth of sentences in those models

Meaning as Use

- In some sense, speaker meaning is about use (by some speaker in some context)
- "In a slogan: syntax studies Form, semantics studies Form + Content, and pragmatics studies Form + Content + Use." (van Eijck and Unger, 2010)
- But in another sense, (context-independent) expression meaning can also be about use
- "...the meaning of an expression is an abstraction over [all of] its uses." (Westera and Boleda, 2019)

Meaning as Use

- "You shall know a word by the company it keeps." (Firth, 1957)
- "The meaning of a word is its use in the language." (Wittgenstein, 1953)

Meaning as Use

- Concerned with word similarity and other relations between words
- Methodology: distributional semantics
- Representing words by abstractions over (counts or predictions of) their contexts
- "It may be presumed that any two morphemes A and B having different meanings, also differ somewhere in distribution: there are some environments in which one occurs and the other does not." (Harris, 1951, 1954)

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Course Learning Goals

- Study and computationally model language as a functional process
- Program with functional languages, Haskell and Functional Python
- Appreciate distinction between meaning of expressions and meaning through use
- Modeling use through context in distributional semantics