

Semantics: An Introduction

week 3

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October 6, 2014

- 1 Background
- 2 Fundamental Notions
- 3 Semantic Theory and Linguistic Complexity
- 4 Bibliography

Semantics, Why

一切都是爲了溝通。

Semantics (or Linguistics) makes senses only in the context of communication.

- We confine ourselves in principle to **linguistic interaction between human beings**.
- Linguistic communication (Cruse, 2011): purpose → constructing the message → constructing utterances → transforming utterance (into a signal) → transmitting the signal → receiving the signal → decoding the signal → reconstructing the message → inferring the purpose.

Linguistic Communication: Essential Components

- (purpose) is the motivation for achieving some goal by producing an utterance.
- (message and utterance)
message consists of one or more propositions (with **true or false** value); and **utterances** are constructed to linguistically transmit the messages.

言中有物，言外有情。

- A sentence (confining ourselves to declarative sentence for now) expresses a proposition.
- A proposition or set of propositions does not exhaust the content of a message.
- Messages also contains *non-propositional* meaning, such as **propositional attitude** and **expressive meaning**.

Example

Illocutionary force

whether the speaker presenting the proposition as true (or ridiculing it), with what strength of commitment to its truth; whether it forms part of a question or command; whether it is intended as a promise, warning, prediction, complaint, etc.



: **proposition**(命題), **sentence**(句子) 和 **utterance**(言辭) 有何不同?



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我們用「句子」來表達「命題」用以傳達「訊息」。如果有從「意圖」驅動的「行事語力」「命題態度」等非命題訊息附著在命題裏，這個命題就有了「真假值」，表達這個命題的句子在邏輯上被稱作「敘述」(statement)。至於「言辭」與「句子」是 token-type 的關係。例如「狗在睡覺覺」這句話可以被 A 和 B 說出，是不同言辭，同一句子。

Exercise [1]: 想想攜帶非命題訊息的情境有哪些？



春明愛上志嬌

Constructing and Recovering the Messages

妳剛剛做的是回推我們解碼時從事的語用推理工作

- Utterances rarely directly encode all of the information necessary to understand the message. → thus **pragmatic inference**.

Example

(Implicature: a type of pragmatic inference)

媽：練完琴衣服拿去洗了嗎？

兒：練完琴了。

Context, Context, Context!

Resources at the disposal of the encoder/decoder

沒有脈絡，不成事物。

- **linguistic context**: knowledge of words, grammar, prosodic features (e.g., intonation and stress), discourse (e.g., *Will you get one for me, too, while you're there*, phonetic signs (e.g., abnormally volume, tempo, pitch, voice quality that are departures from baseline or norm).

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- **physical context:** world knowledge and/or common-sense knowledge.
- **human context:** the speaker's assessment of characteristics of the addressee(s), or vice versa.

那個語義學 (18 禁)

你知道那個昨天我那個有多那個嗎？連我那個來了也要那個，實在是很那個欸。

Semantics, Why

- Semantics is the study of meaning (communicated through language).
- Linguistic description is an attempt to reflect a speaker's linguistic knowledge, the semanticist is committed to describing **semantic knowledge**.
- Why it's hard and not popular?
- Key of cognition, communication and culture.

Semantic Knowledge

Example

- Synonymous
- Contradictory
- Ambiguous
- Entailment
-

Semantic Knowledge Processing

- To show how people communicate meanings with pieces of language, knowing what we know is not enough.
- (Linguistic) **meaning processing** is a special subset of the more general human ability to use **signs** to process **signals**.

Signification

the process of crating and interpreting symbols

What does 'mean' mean?

Example

- ① Happiness *means* 'the state of being happy'. → can be defined as
- ② Happiness *means* never having to frown. → results in
- ③ Happiness *means* gladness. → is a synonym of
- ④ Happiness *means* what I'm feeling right now. → refers to
- ⑤ Glädje *means* happiness in Swedish. → can be translated as
- ⑥ Happiness *means* something more ordinary than ecstasy. → connotes, [or, is associated with]

妳的問法關聯著妳的解法

What kinds of semantic theory do we need? relies too heavily on the way
we ask What is Meaning?

- **Disciplines:** Philosophy, Psychology, Neurology, Statistics, Sociology, Linguistics, Semiotics.
- **Branches of Linguistic Semantics:** Lexical Semantics, Grammatical Semantics (Syntax-Semantic Interface), Pragmatics, Formal Semantics, etc.
- **Approaches:** Formal, Cognitive-Functional, Computational.

Note

We are not yet in a position to rule out any approaches which yields insights, even if some such approaches appear at first sight incompatible.

Four important answers to the question ‘what is meaning?’

(Riemer, 2010)

- referential/denotational theory of meaning
- conceptual theory of meaning
- brain states theory
- use theory

Meanings are out in the world

Meanings are not internal to language, are not in the mind, and are not merely social practices. Rather, they are based in language- and mind-external reality. We use language to communicate about things, happenings and states of affairs in the world.

- Stress the role of the referent or denotation as the main component of the meaning of a linguistic expression.
- The knowledge of meaning involves (at least) the knowledge of the conditions under which a sentence is true, and those under which it's false.
- This kind of theory of meaning is called a **truth-conditional theory**. These theories go by names like truth-conditional semantics, formal semantics, model-theoretic semantics, possible world semantics, and situation semantics.

Representational Approach

Meanings are something in the mind: concepts, thoughts or ideas. This approach to meanings is known as the **representational approach** or the idea theory of meaning.

Meanings as Brain States

Reduce Semantics to Brain Science

*According to this line of thinking, semantics, along with the rest of linguistics, will one day be reduced to, or unified with, brain science, in the same way that the classical theory of genetics can be reduced to or unified with that of molecular biology. In other words, once brain science has progressed, we will no longer need the technical vocabulary of semantics, but will be able to talk wholly in terms of **synaptic connections**, **neurotransmitters**, **proteins** and so on. In just the same way, the modern language of molecular biology, involving chromosomes, nucleotides and DNA sequences, has at least partly replaced the older one of genes as the best way of describing the details of inheritance. (Riemer, 2010)pp32-36*

- Still too far from serving as a model to reflect various semantic knowledge.
- **Intensionality**: a philosophical term used to describe the essential **aboutness** or **contentful nature** of language. Electrons (whether in brain or computer), aren't *about* anything! they're just *there*.



Meanings as (Social) Use

- Meanings as socio-linguistic practices.
- Note the difference of **use** (i.e., we are using the word form to identify a substance in the world, prior to predicating something of it) and **mention** (i.e., we are using the word form to identify a word of the language, and then proceed to say something about that word).
- We can apostrophize (or italicize) the unit in question to distinguish the two.

Example

下雪了。

雪是白色的。

Philosophers have a say

Meaning holism

- Proposed by the philosopher **Quine**, the theory of holism claims that the meaning of a word or phrase or sentence depends on its relationship with other words, phrases and sentences. For example, the meaning of tall is that it's opposed to the meaning of short.
- More precisely, holist theories tend to be **functional** in the sense that it is some aspect of the use of a piece of language which makes for that if you call something tall, you should not at the same time call it short, and if you call something tall you should be willing to also call it not short.
- The big issue for holism is to find a way to say which of the relations among words, phrases, and sentences are important to semantics.
- In this case, the semantic system of a language will be a complex, interconnected network, and all meaning will be relative to the whole system

Goal of semantic theory

a systematic account of a native speaker's semantic competence

So what do we do to construct a theory of semantics?

- 1 have to set out the criteria that we expect **minimally** to be met by any part-way reasonable explication of interpretation for natural language expressions.
- 2 then turn to putative models of language to see how well they can meet the target of satisfying those criteria.

Challenges in Doing Semantics

- Problem of **circularity** by adopting a naive **definitions theory**
- Distinction between **linguistic knowledge** and **non-linguistic knowledge** (e.g., encyclopedic knowledge, conceptual knowledge).
- Role of **context** to meaning.

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What would be these minimal criteria?

- needs to tackle with the problem of the compositionality of meaning
→ An adequate semantic theory must provide an account of how the meanings assigned to words are put together in a systematic way by the syntactic constructions of a language to yield interpretations.
- and this process, whatever it is, must allow for recursive complexity in order to account for the multiple-embedding properties of natural languages.

Principle of Compositionality (in broad sense)

(Loebner, 2013)

The meaning of a complex expression is determined by the lexical meanings of its components, their grammatical meanings and the syntactic structure of the whole.

Goal of (Lexical) Semantic Theory

The Generative Lexicon perspective

(Pustejovsky, 1995) Formal theories of natural language semantics have done little to address two important issues:

- 1 the creative use of words in novel contexts.
- 2 an evaluation of lexical semantic models on the base of compositionality.

The most pressing problems for lexical semantics are:

- 1 Explaining the *polymorphic nature* of language;
- 2 Characterizing the *semanticity* of natural language utterances;
- 3 Capturing the *creative use of words* in novel contexts;
- 4 Developing a richer, *co-compositional* semantic representation.

In sum: Keep updating yourself (多讀書的意思)

- Semantics is the articulation of the relation between natural language expressions and the world around which language enables humans to talk about.
- Yet, in the research that has been developing over the last twenty years, the assumptions on which semantics has been grounded have been progressively shifting;
- in consequence, **earlier disputes over the relation between semantics and the cognitive enterprise in general can be seen in an entirely different light.**

Recent Developments in Semantics

Developing theories on a broader basis of **empirical evidence**, taking into account *cross-linguistically data, diachronic data, psycho- and neurolinguistic data* as well as *corpus and computational linguistic resources*.

Scope of this Class

- **lexical semantics**: meanings stored and organized in the mental lexicon.
- **semantics of word formation**: meanings that are formed by the productive rules of morphology.
- **semantics of grammatical forms**: meaning contribution of grammatical forms.
- **compositional sentence semantics**.
- discourse and pragmatics.

Exercise [2]

Describe the meanings of the following compounds. Try to explain how the meanings come about, and estimate the potentials it can survive/extend if it is newly coined.

- ① *schoolhouse*
- ② *criminal lawyer*
- ③ 裸考
- ④ 撞 -(衣, 衫, 臉, ...)

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Fundamental Notions

(Riemer, 2010)

- (lexeme) the abstract unit which unites all the morphological variants of a single word.
- (sense and reference) the abstract, general meaning of it which can be translated from one language to another, paraphrased, or defined in a dictionary / any one occasion of use
- (denotation and connotation) the set of all its referents / those aspects of meaning which do not affect a word's sense, reference or denotation, but which have to do with secondary factors such as its emotional force, its level of formality, its character as a euphemism, etc.
- (compositionality)
- (object language) (language whose meanings are described) and (metalanguage) (languages in which meanings are described)

Form and Meaning

Minimal unit for analysis

既然認為語義是組合而成的，那麼就無法迴避去決定「攜帶語義的 (組合) 單位為何」?

- Words vs lexical units.
- Sinclair (Sinclair, 2004): the basic units of meaning, the units out of which utterances were constructed, were not words, but **lexical items**.
 - ① They represent fully functioning semantic units.
 - ② They have holistic meanings, i.e., their meanings are not fully predicable as a compositional function of the meanings of their constituent parts.

Form and Meaning

Chinese Wordhood and Word Segmentation

- 漢語語言分析的基礎沒有你想的那麼穩固。
- 自然語言處理先卡關才引起注意。

Example

昨天阿里巴巴創辦人馬雲端上新的網路服務。
全台大都會受到影響。

Not all languages have a word for 'word'

Not all languages have a word corresponding to English 'word': Warlpiri, again, makes no distinction between 'word', 'utterance', 'language' and 'story', all of which are translated by the noun *yimi*. In Cup'ik (Yup'ik, Central Alaska), the word for 'word' also means 'sayings, message' and 'Bible' (Woodbury 2002: 81). Dhegihan (Siouan, North America) has a single word, *te*, referring to words, sentences and messages (Rankin *et al.* 2002).

Exercise [3]

造一個/組自然的中文句子，裏面有愈多結構歧義 (structural ambiguity) 愈好。

Concepts and Meaning

(一個字詞的) 概念和意義有何不同？

Concepts help us to *the codification of experience, learning, and communication.*

- ? The descriptive meaning of a content word is a **concept** for its potential referents. (Löbner, 2013)
- ? A concept is a **mental construct** that stands in a relation of correspondence to a coherent category of things in some world, prototypically the real world, but potentially also fictional or virtual worlds. (Cruse, 2011)
- ? The notion **conceptual category** encompasses two aspects: **the mental construct** and **the category of entities.**

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概念 (concept) 指的是我們所感知的一切事物的心相投射。詞意 (sense) 指的是在內部相對關係系統的架構下對於概念的語言描述。

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Dynamic construal

不是所有的概念都會找到一個詞彙宿主。Thus **non-lexicalized concepts** (THINGS TO TAKE ON A PICNIC, SUITABLE BIRTHDAY PRESENTS FOR A TEN-YEAR-OLD)

Tools for Representing Semantic Knowledge

Why Formal Method (First)?

- Formalization allows the construction of very precise theories, and precise theories are better because they do not allow the theorists to fudge the data quite so easily as less precise theories do.
- good for computational implementation and exploring the relations between semantics and the other sub-disciplines of linguistics which have a formal flavor, like syntax, as well the interdisciplinary field known as cognitive science, in particular computer science, psychology, philosophy and neuroscience.

Example

set, logic, matrix(linear algebra), network(graph), probability(statistics),
.....

Logic

- **natural deduction: a syntactic mode of inference**

- conditional elimination: *Modus Ponens*

$$\frac{\phi \rightarrow \psi, \phi}{\psi}$$

- conditional introduction: conditional proof

Logic and other formal requirements

Provide a formal model of meaning in natural language means: Providing a formal basis for the mapping of strings of a given language onto some assigned content in a way that reflects the general principles within the language for mapping the meaning of the individual words onto the meaning of all more complex expressions that can be formed from them.

- propositional and predicate logic (together constitute the so-called *classic logic*)
- proof theory and model theory
- feature structure representation (e.g, attribute-value matrix)

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- Words are **protean** in nature. i.e., they can shift meanings in different **contexts** of use.
- For example, Conventional meanings for *zero* includes 'naught', 'freezing temperature', and 'nonentity'. BUT,

Example

Clark et al, 1983 a. You'll have to ask a zero. ('people you can reach on a telephone by dialing zero')

b. All the zeros must redo their papers. ('people with a grade of zero on a paper')

Example

Clark et al. 1983

- a. A crab scuttled along the beach.
- b. I like crab. ('crab meat')
- c. There's crab on the menu. ('a dish with crab meat')
- d. How many crabs do you have there? ('said by a grocery clerk, 'cans of crab meat')
- e. I stopped in Perry's for a quick crab. ('meal of crab meat')
- f.

Example

- a. France is a country of outstanding natural beauty. (geographical landmass)
- b. France is one of the leading nations in the European Union. (political nation state)
- c. France beat New Zealand in the 2007 Rugby World Cup. (rugby team)
- d. France voted against the EU constitution in the 2005 referendum. (French electorate)

Polysemy: Theoretical approaches to polysemy fall into two schools of thought:

- **The monosemy position:** there is no need to represent multiple senses of lexemes in the mind (e.g., **The Generative Lexicon**), the senses of a word can be derived by predicable processes from a single semantic representation;
- **The polysemy network position:** the senses of a word have separate, albeit connected representations. (e.g., **Radial Network of Senses**)

Regular Polysemy: A variety of polysemy that gets a fair amount of linguistic attention is **regular (or systematic)** polysemy. This refers to word senses that are distinct, but which follow a general pattern or rule in the language.

- *container/contents:*
I put some sand into a box/bottle/tin/canister.
I dumped the whole box/bottle/tin/canister onto the floor.
- location/government/inhabitants:city
- physical object/information: book
-

Meaning Underspecification: Challenges to Polysemy

Within lexical semantics, polysemy is the issue that has received the most attention. At least three distinct approaches to handle it:

Lexical rules They deduce secondary readings of a word from a presumed "primary" reading.

Underspecification Represent the "kernel meaning" underlying all the word's readings, formulate rules for spelling it out in a particular context

Spreading activation either in a neural network or in a (symbolically represented) semantic network.

Underspecified Meanings: 1 (Pustejovsky, 1995)

begin is *syntactically polymorphic*:

Example

- Mary **began** [*to eat her breakfast*].
- Mary **began** [*eating her breakfast*].
- Mary **began** [*her breakfast*].

but *semantically underspecified*:

Example

- Mary **began**
her beer/thesis/dinner/class/homework/bath
- John **enjoyed**
his coffee/movie/cigar/discussion/appointment

Underspecified Meanings: 2

How many meanings for **good**?

Example

- (a) a *good* car
- (b). a *good* meal
- (c). a *good* knife

What does *noisy* select for?

Example

- (a). a *noisy*₁ car
- (b). a *noisy*₁ dog
- (c). a *noisy*₂ room
- (d). a *noisy*₂ cafeteria

Underspecified Meanings: 3

What about distinct but overlapping word senses?

Example

- a. John *baked* the potatoes.
- b. Mary *baked* a cake.
- a. Mary *cooked* a meal.
- b. Mary *cooked* the carrots.
- a. John *fried* an omelet.
- b. John *fried* an egg.

What can be opened? (Searle, 1983)

Example

- a. John opened the window.
- b. John opened his mouth.
- c. John opened his book.
- d. John opened his briefcase.
- e. John opened the curtains.
- f. The carpenter opened the wall.
- g. The surgeon opened the wound.
- h. The sapper opened the dam.

More figurative examples ... (Evans, 2009)

Example

- a. The discussant opened the conversation.
- b. John opened a bank account.
- c. John opened the meeting.
- d. John opened a dialogue.
- e. John opened the curtains.
- f. The Germans opened hostilities against the Allies in 1940.
- g. The skies opened.
- h. He opened his mind to a new way of thinking.
- g. He finally opened up to her.

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