Reference and Context Sensitivity

Intention & Acts of Meaning Seminar, Week 8

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1   Data and Questions

Many expressions seemingly refer to different things on different occasions:

1. **He** smokes.   PRONOUNS
   Who's he?

2. **That** is disgusting.   DEMONSTRATIVES
   What is interesting?

3. **The table** is wobbly.   QUANTIFIERS
   Which table?

4. Bob is **tall**.   GRADABLE ADJECTIVES
   How tall? Tall for a mouse or tall for a Scandinavian man?

5. It's raining.   METEOROLOGICAL PREDICATES (?)
   Where? When?

6. Stephen **ought** to be here this week.   MODALS
   Is this a moral claim, a legal claim, a claim about Stephen's interests, or a claim about what seems likely in light of our evidence?

   Some standard claims:

- These sentences all contain *context-sensitive* expressions.

- What makes them context-sensitive is that they have semantic contents only relative to particular contexts of utterance. (Or maybe only particular *utterances* or *tokens* of these expressions have contents.)

- (A semantic content is an expression's contribution to the truth conditions of sentences in which it appears)

- Some of the expressions, as the context-sensitive element in 'it's raining', are not uttered out loud. They're *aphonic*: they show up only at underlying levels of syntactic representation. Maybe that's true in some or all of the other cases as well.

Many other natural-language expressions seem to be context-sensitive in similar ways: tense markers, propositional attitude attributions, knowledge and justification attributions, evaluative claims, etc. In fact, there is probably no natural-language sentence that isn't context sensitive.

All of this raises the following question:

The Metasemantic Question about Context-Sensitive Expressions
For any context c and any context-sensitive expression e, in virtue of what does an utterance of e in c have the content that it has?

This question raises more questions:

(Q1) What are contexts, anyway?

(Q2) Whatever they are, can they really do the metasemantic work demanded of them?

(Q3) Does it really make sense to talk about expressions (or expressions-in-contexts, or utterances of expressions) referring to things?

(Q4) Wouldn't it be better to say that people use expressions to refer to things?

(Q5) If so, how much of the standard picture has to change?

2   Some Assumptions Built into Mainstream Semantics

First, what is compositional semantics?

- A compositional semantic theory is an algorithm that outputs the semantic values of complex expressions (including sentences) when fed their syntactic structures and the semantic values of their parts as inputs.

- An expression's *semantic value* is whatever aspect of its meaning the semantic-composition algorithm takes in as inputs and spits out as outputs. Different kinds of semantic theory posit different kinds of semantic values; it is a (relatively) theory-neutral term.

- The semantic-composition algorithm operates on a level of syntactic representation called LF. At this level of representation, all structural ambiguities are resolved (e.g.: quantifier-scope ambiguities; ambiguities between bound and unbound readings of pronouns).
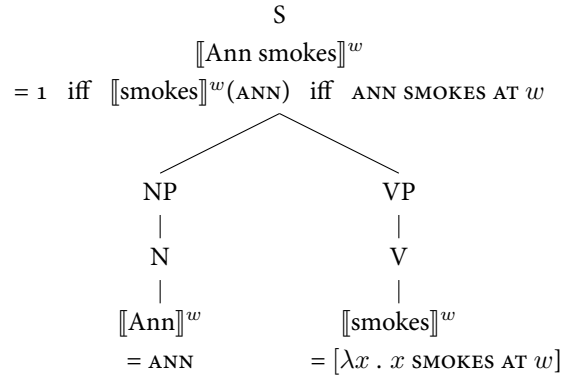
And here are some widely-held assumptions that are built into the dominant mainstream compositional-semantic framework (Heim and Kratzer, 1998; von Fintel and Heim, 2011):

- The semantic value of a sentence is a proposition.

- Propositions are (or are modeled as) functions from possible worlds to truth values. Intuitively: a proposition maps a world to 1 (true) iff the proposition is true at that world. This is equivalent to thinking of a proposition as the set of world at which it is true.[1]

- The semantic value of a referring expression (a name, a pronoun, an indexical, a demonstrative) is a function from possible worlds to referents. (Rigid designators pick out the same referent at every world.)

- The semantic value of a predicate (a common noun, an intransitive verb, or a verb phrase) is a property. This is modeled as a function from worlds to a function from entities to propositions.

- The semantic value of a quantifer (a determiner phrase) is a property of properties. This is modeled as a function from worlds to one that maps properties to truth values.

- Other kinds of expressions have other kinds of functions as their semantic values.

- All of these semantic values are intensions.

- For the most part, semantic composition is just functional application. At any branching node in an LF, the semantic-composition algorithm applies one daughter's semantic value to the semantic value of the other daughter. (There are some exceptions.)

An example:

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[1] There are *tons* of well-known problems with this idea: it collapses all necessarily true propositions into the set of all worlds, and all necessarily false propositions into the empty set. If propositions are the contents of beliefs, then it makes us logically omniscient. Why do people still assume it? They will tell you that either (a) it is an idealization, or (b) they think these problems can be explained away with complicated tricks currently in development at MIT.

6.

$$\text{S}$$
$$[\![\text{Ann smokes}]\!]^{w}$$
$$= 1 \quad \text{iff} \quad [\![\text{smokes}]\!]^{w}(\textsc{ann}) \quad \text{iff} \quad \textsc{ann smokes at } w$$

NP   VP

N   V

$$[\![\text{Ann}]\!]^{w}$$ $$[\![\text{smokes}]\!]^{w}$$
$$= \textsc{ann}$$ $$= [\lambda x \,.\, x \textsc{ smokes at } w]$$

Some notational conventions:

- $[\![e]\!]^{w}$ is the extension of e relativized to a possible world w.

- Within trees, I use SMALL CAPS to refer to semantic values and regular text to mention expressions.

- '$[\lambda x.Fx]$' is a formalization of 'the property of being F'; it maps an entity to 1 iff it is F.

- '$[\lambda x.Fx]e$' says 'e has the property of being F.[2]

3   Semantic Underspecification

So what are the semantic values of these referring expressions?[3]

PRONOUNS   she, her, herself, him, it, they, we

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[2] λ-abstraction notation is totally standard within semantics. It is not hard once you learn it, and it is impossible to make sense of much contemporary philosophy of language without it.

[3] Many of these, including all of the pronouns and maybe some of the others, don't always function as referring expressions. They can be bound by other expressions in the sentence. Some people also think that there is also a third, *anaphoric* reading of some pronouns, on which their semantic values depend, in grammatically well-behaved ways, on expressions uttered earlier in the discourse. This is one of the ideas behind dynamic semantics, discourse representation theory, file-change semantics, etc.

INDEXICALS PRONOUNS   I, you, here, now, we

DEMONSTRATIVE PRONOUNS   this, that, those

We can't just assign them referents, since they can be used to refer to different things on different occasions.

But in order for our semantic theory to be systematic, it seems that their semantic values have to be the same kinds of things as the semantic values of names (i.e., their referents). After all: they seem to be rigid designators, and they can go (almost) anywhere in a sentence where a name goes!

3.1   Deictic Pronouns as Free Variables

The solution given by Heim and Kratzer (1998) is to think of pronouns as free variables. To see what this means, consider a simple sentence of first-order logic.

7. $(\exists x)Fx$

Tarski showed how to define an algorithm for generating the model-theoretic truth conditions first-order sentences like this one.

- Three basic pieces of our model:

  - D is a *domain* of entities
  - $g, g*, g\prime \ldots$ are *assignment functions*, each of which assigns each variable of the language an entity in D. (For any assignment function f and any variable 'x', $f(x) \in$ D.)
  - $[\![\cdot]\!]$ is an *interpretation function* that maps each expression ϕ of the language to a semantic value $[\![\phi]\!]^{f}$, relative to an assignment function f.

- We then have rules that map each of the expressions of the language to a semantic value:[4]

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[4] These rules are only as complex as they need to be to handle our example sentence. A full semantics for first-order logic also needs rules for individual constants, relations, the connectives, and the universal quantifier.

- For any variable x, $[\![x]\!]^g = g(x)$
  gloss: The semantic value of a variable relative to an assignment function is whatever the function maps it to.

- For any predicate F, $[\![F]\!]^g \subseteq D$
  gloss: The semantic value of a predicate is a subset of the domain—intuitively, the set of things it is true of.

- For any predicate F and variable x, $[\![Fx]\!]^g = 1$ iff $[\![x]\!]^g \in [\![F]\!]^g$.
  gloss: An open sentence is true, relative to an assignment function, iff the semantic value of its variable belongs to the set that is the semantic value of its predicate.

- For any open sentence Fx, $[\![(\forall x)Fx]\!]^g = 1$ iff, there is at least one assignment function $g*$ such that $[\![Fx]\!]^{g*} = 1$.
  gloss: An existentially quantified sentence is true, relative to an assignment function, iff the open sentence within it is true relative to at least one assignment function.

Notice that the truth conditions of closed sentences (in which the variables are bound) don't depend on the assignment function relative to which they're interpreted. But the semantic values of open sentences *are* assignment-relativized.

Heim & Kratzer argue that pronouns in natural language are just like variables. Sometimes they're bound, in which case the semantic value of the sentence doesn't depend on an assignment function. E.g.:
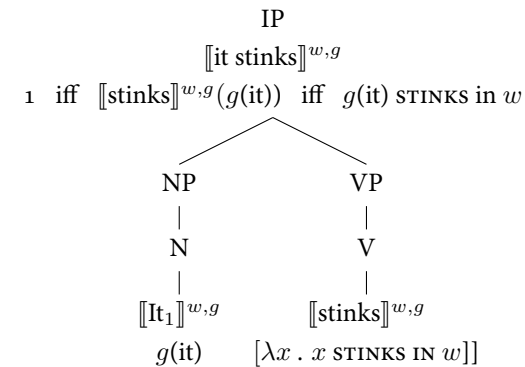
8. Every dog$_1$ bites the Pope that blesses it.

Here, 'it' is bound by 'every dog'. (This is represented by their matching numerical indices.) But then there's this example:

9. It stinks.

Here, 'it' is unbound. Heim & Kratzer treat it like an unbound variable, whose referent is determined by an assignment function. So here's the LF of 'it stinks':

10.
$$\text{IP}$$
$$[\![\text{it stinks}]\!]^{w,g}$$
$$1 \quad \text{iff} \quad [\![\text{stinks}]\!]^{w,g}(g(\text{it})) \quad \text{iff} \quad g(\text{it}) \text{ STINKS in } w$$

NP — VP

N — V

$[\![\text{It}_1]\!]^{w,g}$ — $[\![\text{stinks}]\!]^{w,g}$

$g(\text{it})$ — $[\lambda x \,.\, x \text{ STINKS IN } w]]$

So, according to H&K, the semantic value of (10) as a whole is a proposition, but it is a proposition whose identity depends on the assignment function g—specifically, it depends on what g assigns to 'it'.

So, the million-dollar question: what makes it the case that a particular assignment function is operative when a speaker utters a sentence on a particular occasion? Here's what they say:

> …let us think of assignments as representing the contribution of the utterance situation. The physical and psychological circumstances that prevail when an LF is processed will (if the utterance is felicitous) determine an assignment to all the free variables occurring in this LE Let's implement this formally.
>
> If you utter a sentence like
>
> (6) She is taller than she
>
> then your utterance is felicitous only if the utterance situation provides values for the two occurrences of the pronoun "she". Given that referring pronouns bear indices at LF, (6) has some representation such as (7),
>
> (7) She$_1$ is taller than she$_2$

and we can think of an utterance situation as fixing a certain partial function from indices to individuals. An appropriate utterance situation for LF (7) is one that fixes values for the indices 1 and 2. (Heim and Kratzer, 1998, 243)

Okay, but this really just turns a million-dollar question into a billion-dollar question:

- In virtue of what facts about a context (utterance situation) does it fix a certain assignment function?

4   A Proposal

Instead of thinking of the semantic value of a (declarative) sentence as a proposition, we should think of it as a *type* of proposition. Or, equivalently, as a property of propositions. For example:

11. $[\![\text{it stinks}]\!] = \lambda p_{\langle s,t \rangle} \ . \ (\exists x) \ p = [\lambda w \ . \ x \text{ stinks at } w]$
    gloss: The semantic value of 'it stinks' is a property that a proposition p has just in case, for some entity x, p is the proposition that x stinks.

In 'Semantics without Semantic Content', I show how to derive this semantic value compositionally in a way that deviates only in small ways from H&K's system.[5]
  Some reasons for liking this proposal:

- The role of sentence meaning is to provide the hearer with evidence of the speaker's communicative intentions. But the meaning of a sentence doesn't do this *fully*. It only narrows down the space of options.

- (11) captures the context-independent meaning of 'it stinks' and nothing else.

  - If you heard someone say 'it stinks', you would know, solely by being semantically competent with English, that they expressed a proposition with this property.

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[5]That part of the paper is already finished. Email me for a copy.

- So this proposal gives us a nice, clean semantics/pragmatics boundary.

- The argument from the hearer's cognitive architecture:

  - The part of comprehension represented by a compositional semantic theory is an algorithmic process.
  - Algorithmic processes happen in parts of the mind that are modular (in Fodor's sense).
  - Reference-resolution is a central process that involves our mindreading capabilities.
  - Modular processes pass their outputs to central processes, not the other way around (except in special cases).
  - But the standard view requires that a central process outputs to a modular process.
  - On my view, we can reverse the order.

- It rids of some mysterious and dubious posits:

  - No more contexts!
  - No more assignment functions! (see paper)

- We get to have a very clean theory of reference:

  - There is only speaker reference. No semantic reference.
  - We need only Schiffer's notion of referring-in, not his notion of referring-with. (I think.)

References

Heim, I. and Kratzer, A. (1998). *Semantics in Generative Grammar*. Blackwell.

von Fintel, K. and Heim, I. (2011). *Intensional Semantics*. Ubpublished Lecture Notes, online at http://web.mit.edu/fintel/fintel-heim-intensional.pdf, spring 2011 edition.