

PLING 228: Frameworks

Nathan Klinedinst, Daniel Rothschild, and Yasu Sudo

About the class

Our goal is to explore some non-standard frameworks in semantic. What makes a framework non-standard? Perhaps the best way to explain this is to articulate some of the assumptions of the standard framework.

The first is a claim about the what the meaning of sentences consists in. The standard view takes it that the meaning of sentences determines the truth-conditions of the sentence.

Some variations:

- Sentences express propositions (e.g. Russellian structured entities) and propositions have truth-conditions.
- Frege?/Montague/Lewis/Stalnaker/Heim sentential meaning is captured by set of possible circumstances (i.e. worlds in which a sentence is true).

Picture in natural language there is mapping from sentence $\rightarrow$ proposition/truth-condition (this mapping determined by a combination of semantic and pragmatics, though much controversy over how this work is divided up.)

Pragmatics also plays a role in determining affect of sentences on communicative situations.

- (1) Edmund is tall.
- (2) Edmund is not very tall $\rightsquigarrow$ Edmund is not short.

One crucial assumption: the major unit of meaning is the sentence, and meaning at that level is exhausted by propositions/truth-conditions. Some exception: conventional implicature.

- (3) Edmund is tall but foolish.

(One might ask why not just build these into the propositional content, and allow propositional content to go beyond truth-conditions.)

We're going to look at two more serious revisions to this picture.

- The dynamic view: this a major revision of the basic units of semantic theory in two respects: first, truth-conditional meaning is associated now (primarily) at the level of the discourse rather than at the level of the sentence. Second sentential meaning is now understood in an *instructional* way as a means of updating the conversational context, rather than as propositional. (Of course these two revisions are intimately linked.)
- The treatment of subject-matter/truth-makers/aboutness. Here we will look mainly at works by philosophers that seeks to enrich the picture of meaning by not just giving an account of the propositions and truth-conditions of sentences but also an account of the subject-matter of sentences.

While the dynamic view was developed and motivated to deal with empirical questions about natural language, including anaphora, quantification, presupposition, epistemic modality, etc, philosophical accounts of subject-matter were mostly developed for conceptual reasons. However, we will assess whether there are *linguistic* motivations for thinking that subject matter should form a part of our semantic competence.

Dynamic Semantics

Classical treatment of pronouns as variables

Let us start with the classical view of quantification and pronouns.

Bound uses of pronouns:

- (4) Every man thinks he is a genius.

Different treatments of this in semantics literature but most treat 'he' as a bound variable.

Deictic uses:

- (5) He is tall.

Some contextually relevant man referred to by ‘he’.

Unified Tarskian view: pronouns are indexed, e.g. he_1 , and semantic value of pronouns $\llbracket he_1 \rrbracket$ relative to an assignment function g . Assignment function given by context as default, but quantifiers quantify over variations of them.

$\llbracket Px \rrbracket^f = f(x)$ is in extension of P.

$\llbracket \forall x \phi \rrbracket^f = 1$ iff $\forall o \llbracket \phi \rrbracket^{f_{x \rightarrow o}} = 1$

Problems for classical treatment

The classical treatment presupposes a dichotomy in pronoun interpretation: pronouns either pick out a particular individual or they covary with a quantifier they are bound by.

An initial problem:

- (6) A dog got sick. It has rabies.

We might think that no particular dog needs to be picked out for this sentence to be felicitous. Consider for instance this variation:

- (7) If a dog gets sick and it has rabies, it must be put down.

Clearly no dog is referred to. Classical semantics, however, does not allow binding of variables across sentences or between conjuncts.¹

One way to respond to it is to adopt what has come to be known as an ‘e-type’ semantics for pronouns in sentence such as (6). Here we view ‘it’ as short for some sort of definite description, such as ‘the dog’.

- (8) A dog got sick. The dog has rabies.

This solution however, merely pushes back the question to the interpretation of definite descriptions. In particular what sort of uniqueness is

¹I will argue later that this is not an arbitrary syntactic restriction but a deep consequence of the classical picture.

implied by the description? Surely neither (6) or (8) implies that there is only one dog that got sick (though there is some kind of implication at least about what the speaker knows...).

Conditional and quantificational cases (donkey anaphora) provide even more severe challenges:

- (9) Every man who owns a donkey beats it.

- (10) If a man owns a donkey, he beats it.

Stalnaker’s view of conversational pragmatics

Stalnaker [1978, 1970], while working within a classical framework (with some possible exceptions) gave a picture of pragmatics that heavily influenced those who developed dynamic semantics. For Stalnaker conversation takes place against a background of common assumptions of the conversational participants, the context or common ground. These Stalnaker models by a set of possible worlds, those worlds compatible with the conversational context.

Sentences in context, likewise, have meanings which can be modeled by a set of possible worlds, the worlds where they are true. If an assertion is made the conversational context is updated to reflect the new information in the assertion. So if the context was, $c \in 2^w$ and the proposition $p \in 2^w$ was asserted the new conversational context is $c \cap p$.

Heim’s File Change Semantics

Files

Heim takes as the basic background information in a conversation not to be a set of possible worlds, but rather what she calls a file. A file consists of a set of information about certain discourse referents.

The notion of discourse referent will not be *defined* directly, but rather we will see the role it plays in Heim. Nonetheless here are some starting thoughts.

- (11) Nathan or Yasu came for dinner yesterday. He and I ate vegan foie gras.

He does not seem referential. Nonetheless by using ‘he’ we have introduced a discourse entity i.e. the person who came for dinner. See Karttunen [1976].

How do we model discourse referents? Let’s begin with the intuitive level take this discourse:

(12) A vegan sausage_{*x*} is on the plate. It_{*x*} is tasty. A man_{*y*} eats it_{*x*}.

Here we have two discourse referents, *x* and *y*, with respective information...

This however is an informal gloss. Let us give a more formal implementation.

A crucial tool here is the assignment function, a function from variables (a set *V*) to objects (a set *O*). We will make this a *partial* function, to represent the fact that in some discourses not every variable has yet been ‘used’.

Here are two ways of thinking about files:

- (1) Files are sets of assignment functions (the assignment left open by the information in hand—the empty set if the file cannot be satisfied) [Heim, 1983]
- (2) Files are sets of pairs of assignment functions and worlds (assignment-worlds) [Heim, 1982a]

We put the following constraint on both notions: every assignment function is partial to the same degree, so that for any *g* in *g* is defined over the same set $D \subseteq V$. These are just different tools, while the former has simplicity, the latter allows us to have a more fine-grained, realistic idea of the conversational context. We’ll work with the latter notion for now.

More formally, given a set *W* of worlds, and a set *O* of objects, and a set *V* of variables. We let *A* set of partial functions from *V* to *O*. A file is a set *F* of pairs of $\langle g, w \rangle$ where for each $\langle g', w' \rangle$ and $\langle g'', w'' \rangle$ in *F*, *g* and *g'* share the same domain, called *F_D*. (In notion 1 it is just a set of assignment functions with the same domain).

Contexts thus are more articulated than Stalnakerian contexts: they contain not just worlds, but assignment functions as well. Files admit of an obvious notion of truth: a file *F* is true, iff there is a pair $\langle g, w \rangle$ in *F* such that *w* is actual. Recall the sample context above.

Note there is a special file, the empty file, where $\emptyset$ is the function with no domain: $\{\langle \emptyset, w \rangle : w \in W\}$. This file has no information about either discourse referents or worlds.

Building files

What we need is to give a story how a discourse builds up the context. For reasons to be discussed at length, we will treat all indefinite descriptions, definite descriptions, and pronouns as being variables (this is not as implausible syntactically as you might think...). Many complications here but let us work with these simple logical forms:

(13) A man walked in.
man(*x*). walked in(*x*).

(14) He walked in.
walked in(*x*)

Now we need to work on some of the most basic parts of the semantics. We will first define an operation of adding a discourse referent *x* to the file without adding any information about *x*:

$F[x] = \{\langle g, w \rangle : \exists \langle g', w \rangle \in F, g'[x]g\}$ (where $g'[x]g$ means that *g* and *g'* differ only in *x*).

Supposing a variable *x* is already in the file what is it to add the information that *x* satisfies a predicate *P*?

$F[Px] = \{\langle g, w \rangle : g(x) \text{ satisfies } P \text{ in } w\}$ ²

In Heim though, adding information about new discourse referents and adding information about old ones have the same logical form, ‘*Px*’ so we need a more general definition to cover both cases.³ This would go as follows:

if *x* is in domain of *x*, $F[Px] = \{\langle g, w \rangle \in F : g(x) \text{ satisfies } P \text{ in } w\}$
otherwise $F[Px] = \{\langle g, w \rangle \in F[x] : g(x) \text{ satisfies } P \text{ in } w\}$

This gives us the resources to deal with some of the simple examples above:

²Generalizing to *n* place relations we get:

$F[R(x_1 \dots x_n)] = \{\langle g, w \rangle : \langle g(x_1) \dots g(x_n) \rangle \text{ is in the extension of } R \text{ in } w\}$

³Heim herself has a slightly different system...

(15) A man walked in. He ordered a drink. It was cold.

Consecutive sentences simply continue to modify the context. Following a suggestion of Stalnaker we can think of conjunction as consecutive assertion:

$$F[\phi \& \psi] = F[\phi][\psi]$$

We now need a subtraction operator: this takes a file and eliminates the possibilities allowed in another file: $\{ \langle g, w \rangle \in F : \text{there is no } \langle g', w \rangle \in F' \text{ such that } g' \geq g \}$

$$F \ominus F' = \{ \langle g, w \rangle : \langle g, w \rangle \text{ and there is no } \langle g', w' \rangle \in F' \text{ such that } g' \geq g \}$$

(where $g' \geq g$ if g' agrees with g in the domain of g).

Using this operator we can then define negation as follows:

$$F[\neg \phi] = F \ominus F[\phi]$$

The following definition of the conditional will handle some surprisingly complex examples (it is different from Heim's own definition which owes more Lewis and Krazter):

$$F[\phi \rightarrow \psi] = F \ominus F[\phi][\neg \psi]$$

Dynamic Predicate Logic

Groenendijk and Stokhof [1991] give a different but very similar treatment of pronouns and quantifiers which is known as Dynamic Predicate Logic.⁴

⁴They bizarrely claim that no previous semantics of this type “makes compositionally its starting point”, and then they qualify this with the parenthetical remark that “it seems that Heim [1982, Ch.3], does attach some value to compositionality.” This is deeply misleading, as Heim's semantic system is clearly and straightforwardly compositional. One would think would think given the importance they accord to compositionality they would explain what lack of compositionality they found in Heim's work. In fact, Groenendijk and Stokhof do not discuss Heim's semantics at all, saying that they “feel justified in restricting comparison to just [Kamp's DRT]” since it is the most “formally explicit” theory in this area. As any careful reader of Heim (1982b, Ch 3, 1983) is aware, the basic semantics there is precise or explicit. The suggestion that Heim's work need not be discussed in this context due to any lack of formal rigor is bizarre. The truth is quite simple: Heim gave a compositional dynamic semantics in her 1982 dissertation (though the term *dynamic semantics* was not yet

The classic statement of DPL is *superficially* quite different from Heim's. To begin with the language of DPL includes an existential quantifier. Second, the semantic values of DPL formulas are expressed not as updates of contexts, but rather as relations between assignment functions.

Here is DPL, we will relativize to a world w to make clear the relationship between DPL and FCS:

$$\begin{aligned} \llbracket P(x) \rrbracket^w &= \{ \langle g, g \rangle : g(x) \text{ is a } P \text{ in } w \} \\ \llbracket \neg \phi \rrbracket^w &= \{ \langle g, g \rangle : \nexists h : \langle g, h \rangle \in \llbracket \phi \rrbracket^w \} \\ \llbracket \exists x \phi \rrbracket^w &= \{ \langle g, h \rangle : \exists k : k[x]g \& \langle k, h \rangle \in \llbracket \phi \rrbracket^w \} \\ \llbracket \phi \wedge \psi \rrbracket^w &= \{ \langle g, h \rangle : \exists k : \langle g, k \rangle \in \llbracket \phi \rrbracket^w \& \langle k, h \rangle \in \llbracket \psi \rrbracket^w \} \end{aligned}$$

Let us define DPL-contexts as sets of assignment worlds (not allowing partiality). We can then define DPL-update as follows. For a DPL-context c and a formula in DPL ϕ :

$$c[\phi] = \{ \langle g, w \rangle : \exists \langle h, w \rangle \in c \& \langle h, g \rangle \in \llbracket \phi \rrbracket^w \}$$

The empty context here could be defined as follows (though we can consider other options as well): $c_\emptyset = \{ \langle g, w \rangle : g \text{ is an assignment function and } w \in W \}$.

This spells out as follows:

$$c[P(x)] : \{ \langle g, w \rangle \in c : x \text{ is a } P \text{ in } w \}$$

in currency) and, seven years later, Groenendijk and Stokhof published a different compositional, dynamic semantics. The interest and importance of their work is clear: it does not, however, rest in its claim to being the first compositional dynamic semantics. (I emphasize this point since some later commentators have followed Groenendijk and Stokhof in suggesting Heim's account is somehow not overtly compositional: Geurts and Beaver [2011] label Heim's semantics as “intended to be compositional” with no further explanation, Dekker [1996], while noting that Heim anticipates Groenendijk and Stokhof, describes her as only doing so “implicitly”, saying that the compositional presentation is “wrapped up in the representational metaphor of changing files and file cards”—as if presenting a helpful metaphor obscures the technical account. Jäger [1996] makes some interesting, and accurate, comments about how Heim's semantics lacks certain forms of compositionality, but these relate to her felicity conditions on definiteness and the particular level of syntactic representation she works at, and so seem orthogonal to any concerns Groenendijk and Stokhof might have had.)

$$c[\neg\phi] : \{\langle g, w \rangle \in c : \nexists h : \langle g, h \rangle \in \llbracket \phi \rrbracket^w\}^5$$

$$c[\phi \wedge \psi] = c[\phi][\psi] \text{ (hopefully)}$$

$$c[\exists x\phi] = \{\langle g, w \rangle : \exists \langle h, w \rangle \in c \exists k : k[x]h \langle k, g \rangle \in \llbracket \phi \rrbracket\}$$

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⁵Can we simplify?

$$c[\neg\phi] : \{\langle g, w \rangle \in c : \nexists h : \langle h, w \rangle \in \{\langle g, w \rangle\}[\phi]\}$$