PLING 228: Frameworks

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Preliminary: Stalnaker on Dynamic Semantics

Stalnaker: contexts are sets of possible worlds.

Heim/Kamp: contexts are files/DRT structures.

Partee sentences:

(1) a. Exactly one of the ten marbles is not in the bag.
It's under the sofa.
b. Exactly nine out of the ten marbles are in the bag.
? It's under the sofa.

Stalnaker's move: context shift associated with semantics is same in both cases (content is also just truth-conditions) but sentence contexts are different as different sentences have been uttered.

Idea (from later in paper) seems to be that certain linguistic expressions make clear that speaker has 'something in mind' and this can then be referred to by pronouns.

Obvious problem: how do we get from this to a treatment of donkey anaphora:

(2) Every sailor who had an enemy threw him overboard.

Of course, these are not a problem themselves for static picture as we can simply give truth conditions for this sentence (and posit that some semantics does this). So what is issue? Well, if picture given of sentential semantics is dynamic semantics, this suggest most felicitous representation of discourse contexts involves files?

Static treatments of inter sentential and donkey anaphora: e-type theories where pronouns play role of definite descriptions.

Notions of Dynamicness

> *Compositional dynamicness.* The compositional semantic values of sentences [and constituents of sentences that could be sentences] are context-change potentials—functions which map a conversational state to a new conversational state.
>
> *Conversation systems dynamicness.* The context-change potentials of the sentences of the language are not each equivalent to an operation which adds a proposition to the background information of the conversation.
>
> *Discourse dynamicness.* The truth-conditions associated with a discourse as a whole cannot always be understood as the result of first associating the sentential parts of the discourse with truth-conditions and then combining these truth-conditions.

Preliminaries

We take it that when one performs a speech act, one (*inter alia*) makes a bid to induce a certain dynamical change to the state of the conversation, a change that has something intimately to do with the meaning (compositional semantic value) of the linguistic expression that is uttered. We take this simple idea to be common ground between dynamic and non-dynamic theorists.

Relatedly, we take it that every sentence (or sentence in context[1]) has a *context-change potential* (CCP). This is a function which, roughly speaking, captures the change that uttering the sentence produces in the state of the conversation when the speech act is accepted. A context-change potential is a function from conversational states to conversational states.

[1] By 'context' in 'sentence in context', we mean the sense in play in, for example, Kaplan [1977/1989]: in this sense, the context is the concrete location where the discourse takes place, something formalizable as a centered world. The 'context' in 'context-change potential' adverts, by contrast, to a different notion of context—namely, the notion of a conversational state. For some discussion of the relations between these two notions of context, see Rothschild and Yalcin [2012], Stalnaker [2014].

Compositional dynamics

At first glance, this is a simple and straightforward idea. On this understanding of 'dynamic', dynamic semantics is meant to be a clear alternative to a more ordinary, static truth-conditional compositional semantics in the style of, say, Lewis [1970] or Montague [1973]. The question whether to go dynamic in this sense is the question whether the most elegant and explanatory semantics-pragmatics for the language fragment in question identifies the semantic values of sentences with their context-change potentials. That would seem to be a substantive question.

> Defs. A *model* $\mathcal{M}$ for L is a pair $\langle W, I\rangle$ where W is a set of possible worlds, and I is an *interpretation function* mapping the propositional letters of L to sets of worlds.
>
> Def. A *conversational state* in $\mathcal{M}$ is any subset of $W_{\mathcal{M}}$.

The first system recursively associates sentences with meanings which are CCPs:

> System 1
>
> Def. For any $\mathcal{M}$, an *update function* $\cdot[\cdot]$ (for $\mathcal{M}$) is a function from wffs of L to functions from conversational states (in $\mathcal{M}$) to conversational states (in $\mathcal{M}$) defined as follows, where α is any propositional letter, ϕ and ψ are any wffs, and c is any context set in $\mathcal{M}$:[2]
>
> $$c[\alpha] = c \cap \mathcal{I}(\alpha)$$
> $$c[\neg\phi] = c - c[\phi]$$
> $$c[\phi \wedge \psi] = c[\phi][\psi]$$
>
> Def. ϕ is *true* at w iff $w \in W[\phi]$
>
> Def. ψ is a *consequence* of a set of sentences Γ iff at any world w where all the sentences in Γ are true, ψ is true.

Here, the compositional semantic value of any sentence ϕ is a CCP, viz., $[\phi]$. So officially we have compositional dynamicness. We want to compare this system to the following non-dynamic system:

[2] We use postfix notation when formalizing CCPs.

> System 2
>
> Def. For any $\mathcal{M}$, a *static semantic value function* $[\![\cdot]\!]$ (for $\mathcal{M}$) is a function from wffs of L to subsets of $W_{\mathcal{M}}$ defined as follows, where α is any propositional letter, ϕ and ψ are any wffs, and c is any context set in $\mathcal{M}$:
>
> $$[\![\alpha]\!] = \mathcal{I}(\alpha)$$
> $$[\![\neg\phi]\!] = W - [\![\phi]\!]$$
> $$[\![\phi \wedge \psi]\!] = [\![\phi]\!] \cap [\![\psi]\!]$$
>
> Def. ϕ is *true* at w iff $w \in [\![\phi]\!]$
>
> Def. ψ is a *consequence* of a set of sentences Γ iff at any world w where all the sentences in Γ are true, ψ is true.

This second system adopts a semantic value function mapping sentences to propositions (sets of worlds) along ordinary static lines. We assume this system comes packaged with a straightforward pragmatic rule of assertion, in the style of Stalnaker:

> Assertion rule. For all ϕ, the CCP of ϕ, $[\phi]$, is defined as follows: for all conversation states c, $c[\phi] = c \cap [\![\phi]\!]$.

System 2 is obviously not compositionally dynamic. The thing to notice is that despite this, it associates all sentences with just the same CCPs as System 1. In a sense, System 2 supplies a means of writing compositional dynamicness out of the story altogether, compatible with preserving all the CCPs associated with sentences by System 1.

Conversation systems dynamicness

> Def. A *conversation system* is a triple $\langle L, C, \cdot[\cdot]\rangle$, where L is a set of sentences, C is a set of conversational states, and $\cdot[\cdot]$ is an update function from L to a set of CCPs on C (i.e., $\cdot[\cdot] : L \to (C \to C)$).

> PROPOSITIONALITY. Conversational update is always just a matter of adding a proposition to the conversational state.
>
> INSENSITIVITY. Conversational update is always insensitive to the input conversational state.

Def. A conversation system $\langle L, C, \cdot[\cdot]\rangle$ is *intersective* just in case $C \subseteq \mathcal{P}(W)$ for some set W, and there exists some set $P \subseteq \mathcal{P}(W)$ such that for all $\phi \in L$, there exists $p \in P$ such that for any $c \in C$, $c[\phi] = c \cap p$.

Fact 1 (van Benthem [1986]). A conversation system $\langle L, C, \cdot[\cdot]\rangle$ is intersective just in case for all $\phi \in L$ and $c \in C$:

(i) $c[\phi] \subseteq c$ (*eliminativity*)

(ii) $c[\phi] = \bigcup_{w \in c}\{w\}[\phi]$ (*distributivity*)

Def. A conversation system $\langle L, C, \cdot[\cdot]\rangle$ is *static* just in case there exists an intersective conversation system $\langle L, C', \cdot[\cdot]'\rangle$ and a bijection f from C to C' such that $f(c)[\phi]' = f(c[\phi])$, for all $\phi \in L$ and $c \in C$.

Fact 2 (Rothschild and Yalcin [2012]). A conversation system $\langle L, C, \cdot[\cdot]\rangle$ is static just in case for all $\phi, \psi \in L$ and $c \in C$:

(i) $c[\phi] = c[\phi][\phi]$ (*idempotence*)

(ii) $c[\phi][\psi] = c[\psi][\phi]$ (*commutativity*)

Def. A conversation system $\langle L, C, \cdot[\cdot]\rangle$ is *eliminative* just in case $C \subseteq \mathcal{P}(W)$ for some set W, and there exists some set $P \subseteq \mathcal{P}(W)$ such that for all $\phi \in L$ and any $c \in C$, there exists $p \in P$ such that $c[\phi] = c \cap p$.

This definition brings out the similarity to the definition of intersective systems given above. The only difference is that we swap the final two quantifiers. An equivalent, simpler definition is:

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Def. A conversation system $\langle L, C, \cdot[\cdot]\rangle$ is *information-sensitive* just in case there exists an eliminative conversation system $\langle L, C', \cdot[\cdot]'\rangle$ and a bijection f from C to C' such that $f(c)[\phi]' = f(c[\phi])$, for all $\phi \in L$ and $c \in C$.

Def. A conversation system $\langle L, C, \cdot[\cdot]\rangle$ is *antisymmetric* just in case, for all $c, c' \in C$: if c is reachable from c' by some sequence of updates, and c' is reachable by c by some sequence of updates, then $c = c'$.[3]

To state it explicitly:

Fact 3 (Rothschild and Yalcin [2012]). A conversation system is information-sensitive just in case it is antisymmetric.

Weak conversation systems dynamicness. The conversation system of the language fragment is not both commutative and idempotent.

Strong conversation systems dynamicness. The conversation system of the language fragment is not antisymmetric.

[3] The relevant notion of "reachable" is the obvious one: c' is *reachable* from c in a conversation system $\langle L, C, \cdot[\cdot]\rangle$ just in case there exists a sequence $[\phi_1], ..., [\phi_n]$, with $\phi_1, ..., \phi_n \in L$, such that $c[\phi_1], ..., [\phi_n] = c'$.

Discourse dynamicness

> *Discourse dynamicness.* The truth-conditions associated with a discourse as a whole cannot always be understood as the result of first associating the sentential parts of the discourse with truth-conditions and then combining these truth-conditions.

Suppose $\langle L, C, \cdot[\cdot]\rangle$ is a conversation system. Consider a function t from C into $\mathcal{P}(W)$, where intuitively, t maps states in C to their truth-conditions: $t(c)$ is the way the world is, according to conversation state c. Call a pair of a conversation state together with a function from its states to truth-conditions an *extended* conversational system. Any extended conversational system $\langle L, C, \cdot[\cdot], t\rangle$ induces an object we can call its *truth-conditional counterpart*:

> Def. Given an extended conversation system $\langle L, C, \cdot[\cdot], t\rangle$, its *truth-conditional counterpart* is the triple $\langle L, P, R\rangle$, where $P = \{t(c) : c \in C\}$, and where R is a function which takes any $\phi \in L$ to relation on P such that for all $p, q \in P$, $R^{\phi}(p, q)$ iff for some $c, c' \in C$: $t(c) = p$, $t(c') = q$ and $c' = c[\phi]$.

Related to this, an elementary fact is the following:

> *Fact 4.* If an extended conversation system is static, it does not follow that its truth-conditional counterpart is a static conversation system.

Example.

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