The Modularity of Meaning: Is Meaning Dynamic?

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Static vs. Dynamic Semantics

- **Static View:**
  - **Semantics:** Truth conditions
  - 1970's
  - **Pragmatics:** Reasoning about beliefs

- **Dynamic View:**
  - **Semantics:** Context Change Potentials
  - 1980's
  - = instructions to change belief states

- **Motivations for the dynamic view**
  a. Presupposition projection (= computation)
  b. 'Donkey' Anaphora

- **Result:** a non-modular semantics-cum-pragmatics.
- **Goal:** try to regain a semantics/post-semantics distinction.
1980's: the Dynamic Turn

- **Example:** $C[F \text{ and } G] = C[F][G]$
  
  $C$ = belief state = set of contexts ('context set')
  
  $C[F]$ = update of $C$ with $F$ = set of $F$-contexts within $C$
  
  $C[F][G]$ = successive update of $C$ with $F$, and then with $G$.

- **Presuppositions:** John smoked and he **stopped smoking**

- **Pronouns:** [A man]$_i$ entered and he$_i$ sat down.
Example: $C[F \text{ and } G] = C[F][G]$

1. $C[F]$ is defined iff $C$ satisfies the presupposition of $F$. If so, $C[F] = \{w \in C: w \text{ satisfies } F\} = \text{set of } F\text{-contexts within } C$
2. $C[F \text{ and } G] = C[F][G]$

- Presuppositions: John smoked and he stopped smoking
- Pronouns: [A man]$_i$ entered and he$_i$ sat down.
[Motivation I: Presupposition]

- **Presupposition**  
  e.g. John stopped smoking
  
  **a. Intuitive motivation**  
  (i) a presupposition must be satisfied in the context set...  
  (ii) ... which may result from the earlier discourse.

  **b. Technical implementation**  
  (i) context sets as belief states are sets of possible worlds...  
  (ii) ... and connectives manipulate sets of possible worlds.

- **C[F and G] = C[F][G]**  
  e.g. John smoked and he stopped

  C[John_smoked and John_stopped_smoking]
  = (C[John_smoked])[John_stopped_smoking]
  = \{w \in C: \text{John smoked in } w\}[\text{John_stopped_smoking}]

  The presupposition isn't satisfied in the original context set C, but it is in the intermediate context set C[F]
Motivation I: Presupposition

- Sue is abroad, and her brother is wasting his time, too.
  
  a. her brother blah too presupposes:
     someone other than her brother [here: Sue] blah.
  
  b. The presupposition is satisfied if for every $w \in C$:
     Sue is abroad in $w \Rightarrow$ she is wasting her time in $w$
Motivation I: Presupposition

- Sue is abroad, and her brother is wasting his time, too.

- a. her brother blah too presupposes:
  someone other than her brother [here: Sue] blah.

- b. The presupposition is satisfied if for every \( w \in C \):
  \[
  \text{Sue is abroad in } w \implies \text{she is wasting her time in } w
  \]
Motivation II: Donkey Anaphora

- Pronouns
  - Intuitive motivation
    1. A pronoun must refer to a salient entity in the context set...
    2. ... which may result from earlier discourse.
  - Technical implementation
    1. Context sets as belief states are sets of \(<\text{world},\text{assignment function}>\) pairs...
    2. ... and operators manipulate these sets.

\[ \text{C}[\text{F and G}] = \text{C}[\text{F}][\text{G}] \]

- e.g. A man entered and he sat down

\[ \text{C}[\ [a\_mani \ entered\] and [hei sat down]] = (C[a\_mani entered])[hei sat down] = \{c[i \rightarrow d] : c \in C \text{ and } c(i) \text{ entered in } \text{world}(c)\}[hei sat\_dn] = \{c[i \rightarrow d] : c \in C \text{ and } c(i) \text{ entered and sat dn in } \text{world}(c)\} \]

☞ i isn’t in C but it is in the intermediate context set C[F]
Motivation II: Donkey Anaphora

- **Example:** $C[F \text{ and } G] = C[F][G]$
  
  $C$ = belief state = set of contexts (‘context set’)
  
  $C[F]$ = update of $C$ with $F$ = set of $F$-contexts within $C$
  
  $C[F][G]$ = successive update of $C$ with $F$, and then with $G$.

- **Presuppositions:**
  
  a. John smoked and he stopped smoking
  
  b. Pronouns: [A man]$_i$ entered and he$_i$ sat down.

  $\{ c[i \rightarrow d] : c \in C \text{ and } c(i) \text{ entered and sat down in } \text{world}(c) \}$
(My) Impression in 2000

- Presupposition Projection provided a strong argument for the dynamic approach: no non-dynamic game in town.

- Donkey Anaphora provided a very weak one: the data could be analyzed in an E-type framework, without non-standard binding: **no real coindexing** because *he* goes proxy for *the man*, or *the man who entered*

- **Suggestion: it's the other way around.**
  a. A better, more modular, more predictive and non-dynamic theory of presupposition can be offered.
  b. By contrast, one aspect of the dynamic analysis of anaphora is vindicated by new data, from sign language.
Results of Dynamic Semantics

a. Result 1: \((p \text{ and } q'')\) presupposes: \(p \Rightarrow q\)
Sue is abroad, and her brother is wasting his time, too.

b. Result 2: \((\text{if } p, q'')\) presupposes: \(p \Rightarrow q\)
If Sue goes abroad, her brother will waste his time, too.

c. Result 3: \((p \text{ or } q'')\) presupposes: \((\text{not } p) \Rightarrow q\)
Sue won't go abroad, or her brother will waste his time, too.

a. The original approach (Stalnaker 1974) was pragmatic: belief update did the work for and. But it didn't generalize...

b. ... and in dynamic semantics the 'context change potentials' of various operators had to be stipulated.
The Explanatory Problem

- **A problem of overgeneration**
  
  \[
  C[F \text{ and } G] = (C[F])[G] \\
  C[F \text{ and* } G] = (C[G])[F] \\
  C[F \text{ and** } G] = C[F] \cap C[G]
  \]

- **We haven't derived presupposition projection behavior**

  When \( F \) and \( G \) are presupposition-free,
  \[
  C[F \text{ and } G] = C[F \text{ and* } G] = C[F \text{ and** } G]
  \]
**A Derived Property: Transparency**

- **Result 1:** \((p \text{ and } q'') \text{ presupposes: } p \Rightarrow q\)
  ... and when \(p \Rightarrow q\), then: \((p \text{ and } q'') \Leftrightarrow (p \text{ and } q')\)

- Sue is abroad, and her brother is wasting his time, too presupposes Sue is abroad \(\Rightarrow\) she is wasting her time

- **Derived Property:** if Sue is abroad \(\Rightarrow\) she's wasting her time then the presupposition *Sue is wasting her time* is 'erasable':

- **Transparency:** C guarantees that for all *blah*
  Sue is abroad and *[she is wasting her time and *blah]*
  \(\Leftrightarrow\) Sue is abroad and *blah*

- **Transparency \(\Leftrightarrow\) if Sue is abroad, she's wasting her time**
Transparency-based Theories

a. Result 1: \((p \text{ and } q q')\) requires: \(C \models \text{ if } p, q\)
Sue is abroad, and her brother is wasting his time, too.
... and if \(C \models \text{ if } p, q\), \(C \models (p \text{ and } q q') \Leftrightarrow (p \text{ and } q')\)

b. Result 2: \((\text{if } p, q q')\) requires: \(C \models \text{ if } p, q\)
If Sue goes abroad, her brother will waste his time, too.
... and if \(C \models \text{ if } p, q\), \(C \models (\text{if } p, q q') \Leftrightarrow (\text{if } p, q')\)

b. Result 3: \((p \text{ or } q q')\) requires: \(C \models \text{ if } \text{not } p, q\)
Sue won't go abroad, or her brother will waste his time, too.
... and if \(C \models \text{ if } \text{not } p, q\), \(C \models (p \text{ or } q q') \Leftrightarrow (p \text{ or } q)\)
[because \((p \text{ or } q q') \Leftrightarrow (p \text{ or } ((\text{not } p) \text{ and } q q'))\)]
Transparency-based Theories

- **Derived Property: Transparency**
  A sentence with the presupposition ‘erased’ has the same meaning relative to C as the original sentence.

<table>
<thead>
<tr>
<th><strong>Transparency-Based Analyses</strong> (Schlenker 2008, 2009, 2010)</th>
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<tbody>
<tr>
<td>a. Turn the Derived Property into the <strong>centerpiece of a theory of presupposition projection</strong>.</td>
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<td>b. The derived property can be stated <strong>without</strong> dynamic sem.</td>
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<td>=&gt; <strong>non-dynamic, modular and predictive algorithm</strong></td>
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- **Incrementalism**

  We need a difference between *(p and qq’) vs. (qq’ and p)*  
  => require that presuppositions be transparent **no matter how the sentence ends**.
Dynamic Semantics

Semantics 1

truth

<table>
<thead>
<tr>
<th>True</th>
<th>True</th>
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<tbody>
<tr>
<td>Non-true</td>
<td>False</td>
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<td></td>
<td>Failure</td>
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</table>

CCPs

Transparency for all blah,

... [she is wasting her time and blah] ⇔ ... blah

Presuppositional data

Sue is abroad and her brother is wasting his time too
Semantics 1

| True       | Non-true |

Transparency for all blah,

\[ \text{... [she is wasting her time and blah]} \]
\[ \Leftrightarrow \text{... blah} \]

Presuppositional data

Sue is abroad and her brother is wasting his time too
[Informal Example]

- **Generalization:**
  
  \[(p \text{ and } q'q')\text{ is presuppositionally acceptable}\]

  iff \[C \models \text{if } p, q\]

- **Transparency:** \(C\) should guarantee that \(q\) is 'erasable', i.e.

  for all \(b\)lah, \(C \models (p \text{ and } b\)lah) ⇔ (p and (q and b\)lah))

- \(C \models \text{if } p, q \Rightarrow \text{Transparency}\)

  Clearly, when \(q\) follows from \(p\), \(q\) is redundant here.

- **Transparency \(\Rightarrow\) \(C \models \text{if } p, q\)**

  Take \(b\)lah to be a tautology \(T\); we have:

  \[C \models p \Leftrightarrow (p \text{ and } q)\]

  hence \[C \models p \Rightarrow q\]
Predictive Theories

- **Explanatory Depth**
  Find an algorithm which predicts how presuppositions are projected by various operators once their syntax and their bivalent truth-conditional behavior has been specified.

- **Modularity** (see Fox, Chemla; George, Rothschild; Beaver, v Sandt)

<table>
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<tr>
<th>Semantics</th>
<th>Post-semantics / Pragmatics</th>
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Projection
Donkey Anaphora

**Problem:** A pronoun can depend on an indefinite *without* being in its c-command domain.
Donkey Anaphora

- **Theory I. Dynamic semantics + pronouns as variables**
  
  **Intuition:** Indefinites introduce ‘discourse referents’
  
  => a new kind of logic, ‘dynamic logic’, is needed: variables can depend on non-c-commanding quantifiers.

- **Theory II. Standard semantics + pronouns as descriptions**
  
  **Intuition:** Pronouns are concealed definite descriptions – e.g. *he ≈ the man (who drinks)*
  
  => no real coindexing, hence no need for a new logic
  
  => **definite descriptions are presupposition triggers, hence a reduction to presupposition theory.**
Initial Arguments

- **Dynamic Semantics** is often considered ‘intuitive’ and it does not have to posit ‘concealed’ linguistic material.

- **But there might be independent arguments for the ‘pronouns as descriptions’ view**
  a. Either this house has no bathroom or it is well hidden.
     \[ it \approx \text{the bathroom} \] (after B. Partee)

  b. I doubt that this house has no bathroom – but it must be well hidden.
     \[ it \approx \text{the bathroom} \]

- **Indices are not pronounced, hence arguments have been indirect... and complex.**
Sign Language Pronouns as Indices
(Lillo-Martin and Klima 1990)

- **English**
  I know Bush$_i$ and I know Obama$_k$. He$_{i/k}$ is smarter than him$_{i/k}$

- **ASL** (Inf 1, 4, 179)
  IX-1 KNOW PAST PRESIDENT IX-a
  IX-1 KNOW NOW PRESIDENT IX-b.

  IX-b SMART BUT IX-a NOT SMART.

  ‘I know [the previous President]$_a$ and I know [the current President]$_b$. He$_b$ is smart but he$_a$ isn't.'
<table>
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<th>shared formal properties</th>
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<tr>
<th></th>
<th>English</th>
<th>Sign Languages</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Ambiguity w/o ellipsis</strong></td>
<td>Sarkozy&lt;sub&gt;1&lt;/sub&gt; told Obama&lt;sub&gt;2&lt;/sub&gt; that he&lt;sub&gt;1/2&lt;/sub&gt; would win.</td>
<td>ASL: overt indices</td>
</tr>
<tr>
<td></td>
<td></td>
<td>LSF: overt indices</td>
</tr>
<tr>
<td><strong>Ambiguity in ellipsis</strong></td>
<td>Peter&lt;sub&gt;1&lt;/sub&gt; loves his&lt;sub&gt;1&lt;/sub&gt; wife. John&lt;sub&gt;2&lt;/sub&gt; does too.</td>
<td>ASL: Yes</td>
</tr>
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<td></td>
<td></td>
<td>LSF: Yes</td>
</tr>
<tr>
<td><strong>Condition B</strong></td>
<td>*John&lt;sub&gt;1&lt;/sub&gt; admires him&lt;sub&gt;1&lt;/sub&gt; John&lt;sub&gt;1&lt;/sub&gt; admires himself&lt;sub&gt;1&lt;/sub&gt;</td>
<td>ASL: Yes (but…)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>LSF: Yes (but…)</td>
</tr>
<tr>
<td><strong>Weak/Strong Crossover</strong></td>
<td>??Who&lt;sub&gt;1&lt;/sub&gt; do his&lt;sub&gt;1&lt;/sub&gt; students like?</td>
<td>ASL: Yes (but…)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>LSF: ?</td>
</tr>
</tbody>
</table>
Argument from Sign Language

- Sign language pronouns and spoken language pronouns have enough properties in common that they can be taken as **two instantiations of the same abstract system**.

- But sign language pronouns **make explicit (by way of pointing) what is their antecedent is**.

- In crucial examples, sign language shows that
  - the antecedent **introduces a locus** (e.g. IX-a)
  - the pronoun **retrieves this locus** (usually IX-a)
  - this formal connection is **semantically interpreted without c-command** between the pronoun and its antecedent.

- **This yields evidence for coindexing without c-command.**
Sign Language Data

- **ASL** (Schlenker, to appear; Inf 1 i P1040966)

  WHEN \(_a\) ONE AND \(_b\) ONE LIVE TOGETHER,
  ‘When someone and someone live together,

  a. \(\text{IX-}a\) LOVE \(\text{IX-b}\)  
  the former loves the latter.’

  b. \(\text{IX-}b\) LOVE \(\text{IX-a}\)  
  the latter loves the former.’

  a'. \#IX-\(a\) LOVE IX-\(a\)  

  b'. \#IX-\(b\) LOVE IX-\(b\)

- **Dynamic Semantics:** everything is as expected, i.e.
  indexing without c-command, semantically interpreted

- **Pronouns as descriptions:** which description?
  When someone and someone live together,
  the person loves the person?
  the person that lives with a person loves, etc.?
[Sign Language Data]

- **LSF**
  IX-b GERMAN\(_b\) GERMAN\(_a\) a,b-MEET.
  IX-b KNOW IX-a LONG-TIME
  ‘A German met a German. He had long known him.’ (Inf H, 13, 14-15)

- **Dynamic Semantics: appropriate analysis**
  a. The antecedents each introduces a position.
  b. Pronouns retrieve this position by way of pointing.
  c. Thus there is a formal and visible connection between an indefinite and a pronoun in another sentence.

- **Pronouns as descriptions: difficulty even in English**
  A German and a German met. The German knew the German...? 
The German who met a German knew the German who a German met?
Surprising New Data: Negative Antecedents

- **English**
  a. Either this house has no bathroom or it is well hidden.
  b. I doubt that this house has no bathroom – but it must be well hidden.

- **ASL**
  a. EITHER NO aONE WILL GO MARS, EITHER-OR IX-a WILL FAMOUS
     ‘No one will go to Mars, or he [= the person who goes to Mars] will be famous.’  (Inf 1, i P1040984; i P1040985)
  
  b. IX-1 DOUBT NO aONE WILL GO M.A.R.S. IX-a WILL FAMOUS.  (Inf 1, i, P1040980; i, P1040981)
     ‘I don’t think no one will go to Mars. He [= the person who goes to Mars] will be famous.’
[More Examples: Negative Antecedents]

**ASL**

a. IX-1 THINK \(a\)[SOMEONE DEMOCRAT PERSON] WILL MATCH SUPPORT HEALTH CARE BILL WITH \(b\)[SOMEONE REPUBLICAN PERSON]. IX-1 THINK IX-a WILL a-GIVE-b A-LOT MONEY.

‘I think that a Democrat will co-sponsor the healthcare bill with a Republican. I think he [= the Democrat] will give him [= the Republican] a lot of money.’ (Inf 1, 2, 228a; i P1040976)

b. IX-1 THINK NO \(a\)[DEMOCRAT PERSON] WILL MATCH SUPPORT HEALTH CARE BILL WITH \(b\)[REPUBLICAN CL]. IX-1 THINK IX-a WILL a-GIVE-b A-LOT MONEY. (Inf 1, 2, 228b; i, P1040976)

c. IX-1 DOUBT \(a\)[NO DEMOCRAT PERSON aIX-open-hand] WILL MATCH SUPPORT HEALTH CARE BILL WITH \(b\)[REPUBLICAN CL]. IX-1 THINK IX-a WILL a-GIVE-b A-LOT MONEY. (Inf 1, 2, 229 (see also 228c); i, P1040976)

‘I don’t think no Democrat will cosponsor the healthcare bill with a Republican. I think he [= the Democrat] will give him [= the Republican] a lot of money.’

Follow-up: Who will give money? Answer: ‘the person who cosponsors’ (2, 229) / ‘the Democrat who cosponsors the bill’ (i, P1040976)
[More Examples: Negative Antecedents]

- **LSF**

  *Note:* UMP is the (right-wing) governing party in France; PS is the opposition socialist party

\[
\text{c[PERSON UMP] IX-c ACCEPT WRITE LAW a-WITH}
\]

\[
\text{a[PERSON PS] – NONE; IX-b TRUE NOT. BUT IX-c MONEY c-GIVE-a.}
\]

‘It is not true that no UMP member will accept to write a bill with a member of PS. But he [= the member of UMP] will give him [= the member of PS] money.’ (Inf F, 3, 107)
Conclusion

- **Explanatory Problem:** Dynamic semantics is *very* expressive. But for this reason it lacks explanatory depth.

- **Result 1: Presupposition without Dynamic Semantics**
  It is possible to derive similar or better results from a theory which (i) is modular, and (ii) is more predictive.

- **Result 2: Donkey Anaphora with Dynamic Semantics**
  - E-type analyses make it possible reduce (in part) donkey anaphora to a (non-dynamic) theory of presupposition.
  - But indexing without c-command is clearly available in SL.

- **Finally:** Result 2 provides an argument for **indexing without c-command**, not for **all** of dynamic semantics. Can we interpret such indexings without *dynamic* semantics?
Special thanks to

Jon Lamberton (ASL data), and to

Jeff Labes            Maleni Chaitoo
Kim Bouveret          Kyle Duarte
Yann Cantin           Isabelle Charnavel
Igora Casas           Vincent Homer
Gaurav Mathur         Jonah Katz
David Rivera          Dominique Sportiche

and to many colleagues in linguistics, and signers of LSF and ASL.

The present work was supported in part by an NSF grant (BCS 0902671) and by a Euryi grant from the European Science Foundation (‘Presupposition: A Formal Pragmatic Approach’). Neither foundation is responsible for the claims made here.