The anaphoric semantics of partial control

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The big picture

- Two mechanisms for handling dependencies between syntactic positions
  - identity – traditionally raising, unbounded dependencies, resumption
  - coindexation – traditionally control, binding

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  - identity – traditionally raising, unbounded dependencies, resumption
  - coindexation – traditionally control, binding
- But uniform semantics using bound variables

Variable binding in the semantics

Sketch analyses

relativization	$\lambda x.P(x) \wedge Q(x)$	($P =$head noun, $Q =$ relative clause)
binding	$\exists/\forall/\lambda x.\Phi(x, x)$	($\Phi =$ some (complex) formula)
control	$\lambda x.P(x, Q(x))$	($P =$ control verb, $Q =$ infinitive)

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- I will argue against implicit material and for bridging in partial control

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- EC involves identity and therefore no case independence and no anaphoric semantics
- PC involves coindexation and therefore case independence and binding of a real (logophoric) pronoun

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     b.   The chair preferred to gather at six.
     c.   The chair agreed to gather at six.

(2) a.   *The chair tried to gather at six.
     b.   *The chair began to gather at six.
     c.   *The chair managed to gather at six.

Correlation with tense

This correlates with the ability to shift the time:

(3) a. The chair wanted to hold the meeting tomorrow.
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        b. *The chair began to hold the meeting tomorrow.
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Semantic plural, syntactic singular

No plural anaphor

(5)   a. *The chair wanted to meet each other.
         b. *The chair preferred to meet each other.
         c. *The chair agreed to meet each other.

Obligatory *de se*

Mistaken identity (Pearson, 2013, p. 307)

(6)   John is an amnesiac. He is watching footage of an Olympic figure
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    a. #John expects to win the medal by working well together.

    b. John$_i$ expects that they$_{i+}$ will win the medal by working well together.

White & Grano (2013)
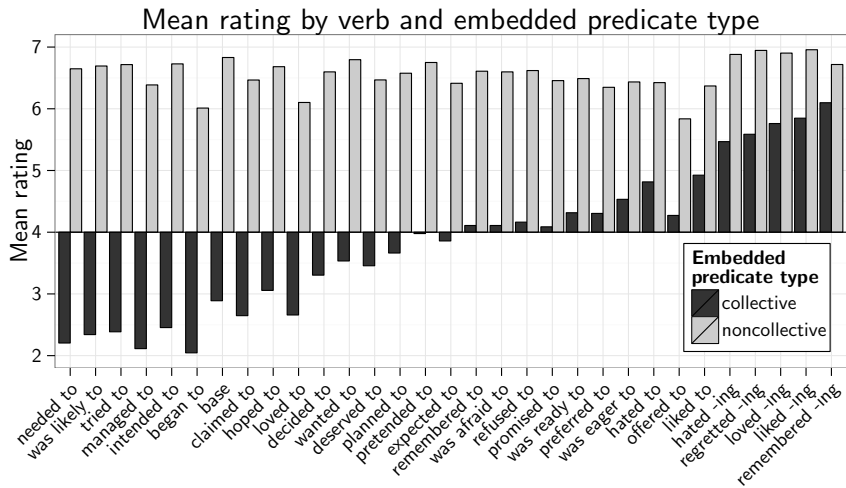
Mean rating by verb and embedded predicate type

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- Only one developed analysis, foundational paper, though ultimately problematic analysis
- Basic idea found already in Asudeh (2005):
  $\lambda x.\lambda P.\exists y.want(x, P(y) \wedge x \subseteq y)$
- The control verb 'shifts' the interpretation of the controllee to a superset containing the controller

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- So the shifting of the time and the individual coordinates is hardcoded in the lexical semantics of PC verbs

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    - PC is "tolerated" rather than great (White & Grano, 2013)
- Also, since the time and subject are both shifted in the semantics of the verb, we predict that the shifted times take the same, low scope

Scope problems I: Quantification

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- Much easier to get a distribute reading of the time (... but they all had different time preferences)

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- Instead PRO refers to controller $+$ discourse participants

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- All of these scope facts motivate an anaphoric approach, which predicts the context sensitivity of PC

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- So PC is essentially a repair strategy in cases where a singular interpretation does not make sense
- This strategy is not available for EC verbs, which involve syntactic identity rather than coindexation and therefore no bound pronoun
- On the other hand, we would expect PC to show variability according to context (including choice of matrix verb)

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(14)   When Little Johnny threw up, was there any pencil-eraser in it?

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- The lack of descriptive content in PRO should make bridging more difficult; but the grammatically specified antecedent should make it easier

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- This overgenerates and leaves unexplained why PRO isn't syntactically plural
- So we assume that PRO is bound to the matrix controller (Maier, 2011) and reflects the agreement features of its antecedent, although its reference can be affected by bridging

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Parallel with complement anaphora (Nouwen, 2003, p. 79)

This account, where complement anaphora are considered to be an extra-ordinary case of anaphora, might (at least partly) explain where this discomfort with pronominal reference to the complement set comes from

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- Based on CDRT (Muskens, 1996), which equips DRT with lambdas
- Move to a partial logic to deal with anaphora without coindexation
- Drefs are object language entities (type π), not just type e variables
- So we can talk about drefs and their reference in our logic
- Generally we only want to say "x_1 must have an accessible antecedent" and leave the actual resolution to the pragmatics

Sample discourse

John$_1$ hid Bill's$_2$ key$_3$.

x_1 x_2 x_3
$john(x_1)$
$bill(x_2)$
$key(x_3)$
$poss(x_2, x_3)$
$hide(x_1, x_3)$

,

$\mathcal{A} = \{ \ \}$

Sample discourse

John$_1$ hid Bill's$_2$ key$_3$. He$_4$ was drunk.

$$\begin{array}{|l|}
\hline
x_1 \;\; x_2 \;\; x_3 \;\; \bar{x_4} \\
\hline
john(x_1) \\
bill(x_2) \\
key(x_3) \\
poss(x_2, x_3) \\
hide(x_1, x_3) \\
drunk(x_4) \\
\\
\\
\\
\hline
\end{array} \;\; ,$$

$\mathcal{A} = \{ \; x_4 \mapsto x_1 \}$

Sample discourse

$John_1$ hid $Bill's_2$ key_3. He_4 was drunk. So he_5 shouldn't drive.

$$
\left.
\begin{array}{|c|}
\hline
x_1 \ x_2 \ x_3 \ \bar{x_4} \ \bar{x_5} \\
\hline
john(x_1) \\
bill(x_2) \\
key(x_3) \\
poss(x_2, x_3) \\
hide(x_1, x_3) \\
drunk(x_4) \\
shouldn't.drive(x_5) \\
\\
\\
\hline
\end{array}
\right. ,
$$

$\mathcal{A} = \{\ \cancel{x_4 \mapsto x_1}, x_4 \mapsto x_2, x_5 \mapsto x_4\}$

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drunk(x_4) \\
shouldn't.drive(x_5) \\
ant(x_4) \\
ant(x_5) \\
\hline
\end{array}
,
$$

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- Haug (2013) put *ant* directly in the DRS, but this leads to beliefs about anaphoric accessibility
- Haug (2013) assumed $\mathcal{A}$ always encoded identity, but we need an account of bridging

Extending PCDRT with bridging

John entered the room.

x_1 $\bar{x_2}$
$john(x_1)$
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Extending PCDRT with bridging

John entered the room. The chandelier sparkled brightly.

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  $\partial(\mathcal{B}(\bar{x})(\bar{x}, \mathcal{A}(\bar{x}))) \wedge (\mathcal{A}(\bar{x}) \prec \bar{x})$
  (i.e. the bridging relation holds)

Extending PCDRT with centered worlds

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- If x is a dref and K a DRS, $want(x, K)$ is a DRS condition
- $[\![want(x, K)]\!]$ is true iff **want**$_x \subseteq [\![K]\!]$

Compositional semantics

PRO: $\quad \lambda P.$

$\bar{x}_2$
$\mathcal{B}(x_2)(x_2, \mathcal{A}(x_2))$
$center(\mathcal{A}(x_2))$

$; P$

- Logophor $\rightarrow$ dual semantics reflecting *aboutness* and *awareness*

Compositional semantics

PRO: $\lambda P.$ $\boxed{\begin{array}{c} \bar{x}_2 \\ \hline \mathcal{B}(x_2)(x_2, \mathcal{A}(x_2)) \\ center(\mathcal{A}(x_2)) \end{array}}$; P

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wants: $\lambda P.\lambda x.\boxed{\begin{array}{c} \\ wants(x, P\ ;\ \boxed{\begin{array}{c} \\ center(x) \end{array}}\ ) \end{array}}$

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- The semantics of attitude verbs specify an attitude center

the chair: $\lambda P.$
$$\boxed{\begin{array}{c} \bar{x_1} \\ \hline chair(x_1) \end{array}}$$ $; P(x_1)$

to gather at six: $\lambda x.$
$$\boxed{\begin{array}{c} \\ gather.at.six(x) \end{array}}$$

A worked example

PRO to gather at six

x_2
$\mathcal{B}(x_2)(x_2, \mathcal{A}(x_2))$
$center(\mathcal{A}(x_2))$
$gather.at.six(x_2)$

A worked example

wants(PRO to gather at six)
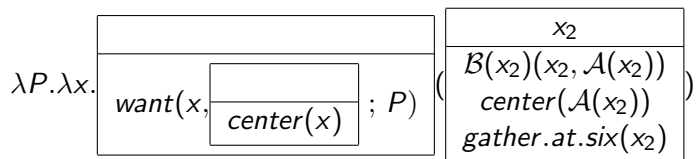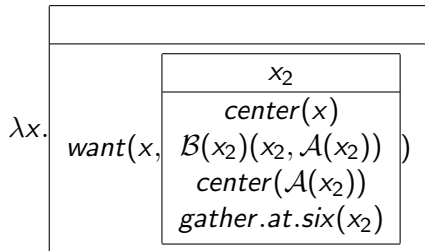
$\lambda P.\lambda x.$
$\left[\begin{array}{|c|} \hline \\ \hline want(x, \boxed{center(x)} \; ; P) \\ \hline \end{array}\right]$
$\left(\begin{array}{|c|} \hline x_2 \\ \hline \mathcal{B}(x_2)(x_2, \mathcal{A}(x_2)) \\ center(\mathcal{A}(x_2)) \\ gather.at.six(x_2) \\ \hline \end{array}\right)$

A worked example

wants PRO to gather at six

$\lambda x.$ $want(x,$
$$
\begin{array}{|c|}
\hline
x_2 \\
\hline
center(x) \\
\mathcal{B}(x_2)(x_2, \mathcal{A}(x_2)) \\
center(\mathcal{A}(x_2)) \\
gather.at.six(x_2) \\
\hline
\end{array}
$$
$)$

A worked example

the chair wants PRO to gather at six

$$\begin{array}{|c|}
\hline
x_1 \\
\hline
chair(x_1) \\
\hline
want(x_1, \begin{array}{|c|}
\hline
x_2 \\
\hline
center(x_1) \\
\mathcal{B}(x_2)(x_2, \mathcal{A}(x_2)) \\
center(\mathcal{A}(x_2)) \\
gather.at.six(x_2) \\
\hline
\end{array}) \\
\hline
\end{array}$$

A worked example

the chair wants PRO to gather at six
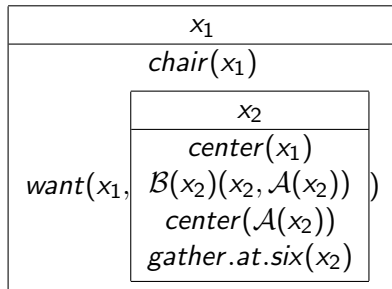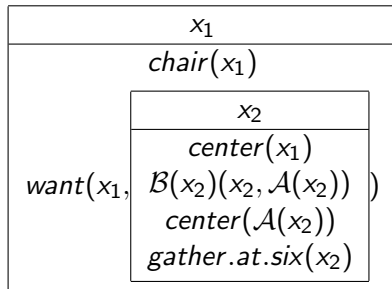
$$
\begin{array}{|c|}
\hline
x_1 \\
\hline
chair(x_1) \\
\hline
\begin{array}{|c|}
\hline
x_2 \\
\hline
center(x_1) \\
\mathcal{B}(x_2)(x_2, \mathcal{A}(x_2)) \\
center(\mathcal{A}(x_2)) \\
gather.at.six(x_2) \\
\hline
\end{array} \\
want(x_1, \qquad\qquad\qquad\qquad) \\
\hline
\end{array}
\;,\; \mathcal{B}(x_2) = \lambda x.\lambda y. y \text{ \textbf{chairs} } x
$$

A worked example

$$
\boxed{
\begin{array}{c}
\hline
x_1 \\
\hline
chair(x_1) \\
\hline
want(x_1, \boxed{\begin{array}{c} \hline x_2 \\ \hline center(x_1) \\ chairs(\mathcal{A}(x_2), x_2) \\ center(\mathcal{A}(x_2)) \\ gather.at.six(x_2) \\ \hline \end{array}}) \\
\hline
\end{array}
}
$$

A worked example

$$\begin{array}{|c|}
\hline
x_1 \\
\hline
chair(x_1) \\
\begin{array}{|c|}
\hline
x_2 \\
\hline
center(x_1) \\
chairs(x_1, x_2) \\
center(x_1) \\
gather.at.six(x_2) \\
\hline
\end{array} \\
want(x_1, \qquad\qquad\qquad) \\
\hline
\end{array}$$
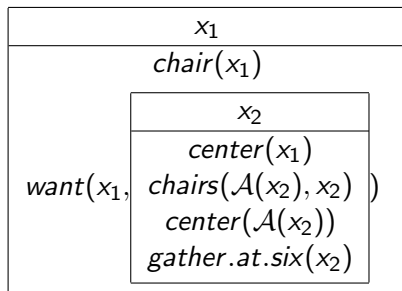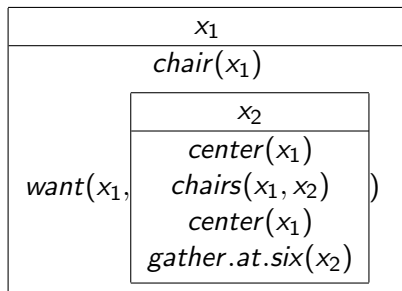
by uniqueness of *center*

Conclusions

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- No superset reading follows from bridging principles (uniqueness)
- Well modelled in PCDRT because of split between monotonic content (binding) and non-monotonic content (bridging)
- PC/EC predicate split follows from a syntactic difference, which now has a well-defined semantic correlate

The missing part: distribution of PC/EC

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- EC verbs could take "smaller" complements, e.g. properties

References I

Andrews, Avery. 1982. Long distance agreement in Modern Icelandic. In Pauline Jacobson & Geoffrey Pullum (eds.), *The nature of syntactic representation*, 1–33. Dordrecht: D. Reidel.

Asudeh, Ash. 2005. Control and semantic resource sensitivity. *Journal of Linguistics* 41(3). 465–511.

Bresnan, Joan. 1982. Control and complementation. In Joan Bresnan (ed.), *The mental representation of grammatical relations*, 282–390. Cambridge, MA: MIT Press.

Cinque, Guglielmo. 2006. *Restructuring and functional heads*. Oxford: Oxford University Press.

Geurts, Bart. 2011. Accessibility and anaphora. In Klaus von Heusinger, Claudia Maienborn & Paul Portner (eds.), *Semantics*, vol. 2, 1988–2011. Berlin: Mouton de Gruyter.

References II

Grano, Thomas. 2012. *Control and restructuring at the syntax-semantics interface*: Chicago dissertation.

Haug, Dag. 2013. Partial dynamic semantics for anaphora: Compositionality without syntactic coindexation. *Journal of Semantics* Advance access online.

Landau, Idan. 2000. *Elements of control: Structure and meaning in infinitival constructions*. Dordrecht: Kluwer.

Maier, Emar. 2009. Presupposing acquaintance: a unified semantics for de dicto, de re and de se belief reports. *Linguistics and Philosophy* 32(5). 429–474.

Maier, Emar. 2011. On the roads to de se. In *Proceedings of salt*, vol. 21, 393–412.

Muskens, Reinhard. 1996. Combining Montague semantics and discourse representations. *Linguistics and Philosophy* 19. 143–186.

References III

Nouwen, Rick. 2003. *Plural pronominal anaphora in context*: Utrecht dissertation.

Pearson, Hazel. to appear. The semantics of partial control. *Natural Language and Linguistic Theory* .

Pearson, Hazell. 2013. *The sense of self: topics in the semantics of de se expressions*: Harvard dissertation.

Schlenker, Philippe. 2003. A plea for monsters. *Linguistics and Philosophy* 26(1). 29–120.

Sheehan, Michelle. to appear. Portuguese, russian and the theory of control. In *Proceedings of the 43rd annual meeting of the North East linguistic society*, .

Stephenson, Tamina. 2010. Control in centred worlds. *Journal of semantics* 27. 409–436.

References IV

van Urk, Coppe. 2010. On obligatory control: A movement and pro approach.
http://web.mit.edu/cvanurk/www/onobligatorycontrol.pdf.

White, Aaron Steven & Thomas Grano. 2013. An experimental investigation of partial control. In Urtzi Etxeberria, Anamaria Fălăuș, Aritz Irurtzun & Bryan Leferman (eds.), *Proceedings of Sinn und Bedeutung 18*, University of the Basque Country.