The anaphoric potential of indefinites under negation and disjunction

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Discourse Referents

(1) Mary has [a car]$^\nu$. It$_\nu$ is red.

- Anaphor: Gets a meaning in relation to previous linguistic context
- Antecedent: Expression that the anaphor gets its meaning from
- We capture the relation by assuming that indefinites introduce discourse referents that can be picked up by anaphora.

Karttunen (1969); Heim (1991)
A DRT representation

I will be using Discourse Representation Theory (DRT) to model anaphoric dependencies.

- A Discourse Representation Structure (DRS) contains:
  - List of newly introduced discourse referents ($\nu_1, \ldots, \nu_n$)
  - Series of conditions on their interpretation

(1) Mary$^{\nu_1}$ has [a car]$^{\nu_2}$. It$^{\nu_2}$ is red.

<table>
<thead>
<tr>
<th>$\nu_1, \nu_2$</th>
</tr>
</thead>
<tbody>
<tr>
<td>$\nu_1 = Mary_e$</td>
</tr>
<tr>
<td>$car{\nu_2}$</td>
</tr>
<tr>
<td>$have{\nu_1, \nu_2}$</td>
</tr>
<tr>
<td>$red{\nu_2}$</td>
</tr>
</tbody>
</table>
A Generalization

Indefinites under negation cannot normally be antecedents for anaphora

(Karttunen (1969))

(2) Mary doesn’t have [a car]^{v_2}.
    # It_{v_2} is red.
Negation in dynamic semantics

- Semantic systems used to model anaphora are called dynamic semantic systems.
- In dynamic semantics: Negation classically understood as *externally static*:
  - Expressions embedded under negation cannot be antecedents for anaphora outside of negation.
  - They can never introduce drefs outside of negation.
- Here: Focus on DRT.
Negation in DRT

- Negation is externally static because it introduces a subordinate discourse representation structure box (DRS-box)
- And anaphora need an antecedent that is (at least) on the same level of embedding

(3) Mary$^{v_1}$ doesn’t have [a car]$^{v_2}$. # It$_{v_2}$ is red.

\[
\begin{array}{c|c}
  v_1 \\
  \hline
  v_1 = Mary_e \\
  \hline
  v_2 \\
  \hline
  \neg \\
  \hline
  car\{v_2\} \\
  \hline
  have\{v_1, v_2\} \\
  \hline
  red\{v_2\} X
\end{array}
\]
Some counterexamples

(4) a. Double negation: (Karttunen (1969); Krahmer and Muskens (1995))
   \[\text{It's not true that there is } [\text{no bathroom}]^{v_1} \text{ in this house.}\]
   \[\text{It}^{v_1} \text{ is just in a weird place.}\]

b. Disjunction: (Krahmer and Muskens (1995))
   \[\text{Either there is } [\text{no bathroom}]^{v_2} \text{ in this house,}\]
   \[\text{or it}^{v_2} \text{ is in a weird place.}\]

c. Modal subordination: (c.f. Roberts (1989))
   \[\text{There is } [\text{no bathroom}]^{v_3} \text{ in this house.}\]
   \[\text{It}^{v_3} \text{ would be easier to find.}\]

d. Disagreement:
   A: \text{There's } [\text{no bathroom}]^{v_4} \text{ in this house.}\]
   B: \text{(What are you talking about?) It}^{v_4} \text{ is right over there.}\]
Krahmer and Muskens (1995)

- Point out some of the counterexamples, and that the standard analyses don’t get those
- Propose an account of the double negation and disjunction cases, . . .
  - That is specific to the structures of double negation and disjunction
  - Doesn’t extend to cases w/o overt negation or disjunction (disagreement, modal subordination)
This talk

- Presents an analysis of the above cases in an intensional version of DRT (intensional CDRT, following Muskens (1996); Brasoveanu (2010))
  - Negation as externally dynamic: Negated content can always introduce new drefs
  - Drefs store the information if they were introduced under negation or not
  - This information determines under what circumstances they can be antecedents for anaphora
- The analysis can account for all the above cases
- But I will illustrate this with the disjunction case

\[(4-b) \quad Either \, there \, is \, [no \, bathroom]^{\nu_2} \, in \, this \, house, \, or \, it_{\nu_2} \, is \, in \, a \, weird \, place.\]
Section 2

The account
The intuition behind the analysis, pt. I

- Drefs introduced under negation are *counterfactual*: Speaker committed to their non-existence
  
  (cf. hypothetical drefs in Stone (1999); Stone and Hardt (1999))

(5) \textit{There is [no bathroom]$^\nu$ in this house.}
The intuition behind the analysis, pt. 1

- Drefs introduced under negation are \textit{counterfactual}: Speaker committed to their non-existence
  
  (cf. hypothetical drefs in Stone (1999); Stone and Hardt (1999))

- Pronoun use is \textit{factive}:
  Presupposes existence of a referent

(5) \textit{There is [no bathroom]}^{\nu} \textit{in this house}. 
\# \textit{It}^{\nu} \textit{is in a weird place}. 
The intuition behind the analysis, pt. 1

- Drefs introduced under negation are *counterfactual*: Speaker committed to their non-existence
  (cf. hypothetical drefs in Stone (1999); Stone and Hardt (1999))

- Pronoun use is *factive*: Presupposes existence of a referent

- Use of a pronoun is inconsistent with a counterfactual dref antecedent

(5) *There is [no bathroom]\textsuperscript{\nu} in this house.*
\# *It\textsuperscript{\nu} is in a weird place.*
The intuition behind the analysis, pt. II

- BUT: Pronoun can co-refer with counterfactual dref, if
The intuition behind the analysis, pt. II

- BUT: Pronoun can co-refer with counterfactual dref, if
  - It is itself in a non-factual context (pronoun use not inconsistent any more)

(4-c) Modal subordination:

There is \([\text{no bathroom}]^{v3}\) in this house.

\(lt_{v3}\) would be easier to find.
The intuition behind the analysis, pt. II

- BUT: Pronoun can co-refer with counterfactual dref, if
  - It is itself in a non-factual context (pronoun use not inconsistent any more)
  - The discourse segments of the antecedent and pronoun do not have to be consistent

(4-b) Disjunction:

Either there is \([\text{no bathroom}]^{v_2}\) in this house, or \(it^{v_2}\) is in a weird place.
The intuition behind the analysis, pt. II

- **BUT:** Pronoun can co-refer with counterfactual dref, if
  - It is itself in a non-factual context (pronoun use not inconsistent any more)
  - The discourse segments of the antecedent and pronoun do not have to be consistent\(^1\)

\[\text{(4-b) Disjunction:} \]

Either there is [no bathroom]\(^2\) in this house, or it\(^2\) is in a weird place.

\(^1\)Note how disjunction is completely ok with having contradictory disjuncts, while conjunction isn’t:

\[(i)\]

a. #It’s sunny and it isn’t.
b. Either it’s sunny or it isn’t.
Intensional Semantics

Possible world Semantics

- Propositions: The concept expressed by a sentence
  - Formally the set of possible worlds where the sentence is true
- The discourse commitments of the speaker:
  - The set of worlds compatible with all the assertions (and public assumptions) of a speaker
Propositional anaphora and Negation

- A full sentence can be the antecedent for propositional anaphora
- Negative sentences additionally introduce a propositional dref for the negated content

(6) *There is no bathroom in this house.*

a. *That is very surprising.*
   
   (*That* \(\simeq\) that there is no bathroom in this house)

b. *Even though the architect claimed that.*
   
   (*that* \(\simeq\) that there was a bathroom in this house)
Relativizing individual drefs

Intensional CDRT

- Propositional Drefs
- $\phi$ is the set of worlds s.t. Mary has a car
- $\phi$ is compatible with the speakers commitments
- Individual drefs introduced *in relation to* propositions
  (Stone (1999); Stone and Hardt (1999), see also Brasoveanu (2007))

(7) Mary has a car $\leadsto$

<table>
<thead>
<tr>
<th>$\phi, \phi : v_1, v_2$</th>
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<tr>
<td>$\phi_{DC_s} \subseteq \phi$</td>
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<td>$v_1 = Mary_e$</td>
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Relative variable update

(7) Mary has a car

$$\phi, \phi : \nu_1, \nu_2$$

$$\phi_{DC_S} \subseteq \phi$$

$$\nu_1 = \text{Mary}_e$$

$$\text{car}_\phi[\nu_2]$$

$$\text{have}_\phi[\nu_1, \nu_2]$$

- The relative update $$[\phi : \nu_1, \nu_2]$$ requires that the referents of $$\nu_1, \nu_2$$ exist in all and only the $$\phi$$-worlds
Negation

Negation introduces a propositional dref for the negated content

\[(8) \quad \text{There is } [\text{no bathroom}]^{\nu_1}.\]
\[\text{NOT(there is a bathroom)}\]

\[\begin{array}{|c|}
\hline
\phi_1, \phi_2, \phi_2 : \nu_1 \\
\hline
\phi_{DC_S} \subseteq \phi_1 \\
\phi_1 = \phi_2 \\
bathroom_{\phi_2}\{\nu_1\} \\
\hline
\end{array}\]

- **New drefs:**
  - \(\phi_1: \) There is no bathroom
  - \(\phi_2: \) There is a bathroom
  - \(\nu_1: \) a bathroom

- **Conditions:**
  - \(\phi_1\) is true in all the worlds compatible with the speakers discourse commitments \((\phi_{DC_S})\)
  - \textbf{NOT}: \(\phi_1\) and \(\phi_2\) are complements (opposites)
  - \textit{a bathroom}:
    - \(\nu_1\) is a bathroom in \(\phi_2\)
The non-existent bathroom

(8)  \[ \text{There is } \neg \text{bathroom} ]^\nu_1. \]
\[ \text{NOT}(\text{there is a bathroom}) \]
\[ \phi_1, \phi_2, \phi_2 : \nu_1 \]
\[ \phi_{DC} \subseteq \phi_1 \]
\[ \phi_1 = \overline{\phi_2} \]
\[ \text{bathroom}_{\phi_2 \{\nu_1\}} \]

(9)  \[ \# \text{lt}_{\nu_3 = \nu_1} \text{ is in a weird place.} \]
\[ \phi_3, \phi_3 : \nu_2 \]
\[ \phi_{DC} \subseteq \phi_3 \]
\[ \text{place}_{\phi_3 \{\nu_2\}} \]
\[ \text{weird}_{\phi_3 \{\nu_2\}} \]
\[ \text{in}_{\phi_3 \{\nu_3, \nu_2\}} \]

- \(\nu_1\) exists in all and only the negated \(\phi_2\)-worlds
- \(\nu_1\) doesn't exist in any worlds in \(\phi_1\), the opposite of \(\phi_2\)
- The anaphor \(\nu_3\) is interpreted in the condition \(\text{in}_{\phi_3 \{\nu_3, \nu_2\}}\)
- Condition on interpretation: \(\nu_3\) needs to exist in all \(\phi_3\)-worlds
- For \(\nu_3 = \nu_1\), \(\nu_1\) needs to exist in all \(\phi_3\)-worlds
- \(\phi_{DC}\) is compatible with both \(\phi_1\) and \(\phi_3\), and non-empty
- So, there are \(\phi_1\)-worlds in \(\phi_3\), i.e. worlds where \(\nu_1\) doesn't exist
- \(\nu_3\) can't refer to \(\nu_1\)
The optional bathroom

(10) \( S: \) Either there is \([\text{no bathroom}]^{v_1}\), or \(it_{v_3=v_1}\) is in a weird place.

\[
\begin{array}{|c|c|}
\hline
\phi_1, \phi_2, \phi_3, \phi_4, \phi_4 : \phi_1, \phi_3 : \phi_2 \\
\hline
\phi_{DC} \subseteq \phi_1 \\
\phi_1 = \phi_2 \cup \phi_3 \\
\phi_2 = \phi_4 \\
bathroom_{\phi_4}\{v_1\} \\
place_{\phi_3}\{v_2\} \\
weird_{\phi_3}\{v_2\} \\
in_{\phi_3}\{v_3, v_2\} \\
\hline
\end{array}
\]

- Assertion compatible with speaker’s commitments
- Disjunction introduces two sets of worlds that don’t have to be compatible
- First disjunct: Analogous to the above negative sentences
  - \(v_1\) exists in all and only the \(\phi_4\)-worlds, and in none of the worlds in \(\phi_2\)
- Second disjunct:
  - For \(v_1\) to be an antecedent for \(v_3\), \(v_1\) needs to exist in all \(\phi_3\)-worlds
  - There is a compatible interpretation where \(v_1\) exists in \(\phi_3\)
    where \(\phi_2 \cap \phi_3 = \emptyset\), the disjuncts are opposites, and \(\phi_3 \subseteq \phi_4\)
Section 3

Conclusion
Conclusion

- Proposed a dynamic semantics where expressions in the scope of negation introduce drefs along with the information about the sets of worlds in which they exist.
- The analysis provides an understanding of when the surrounding context allows for an anaphoric relation between expressions introducing anaphora and potential antecedents.
- It constitutes a step forward from previous approaches to anaphoric accessibility in classical DRT (Kamp and Reyle (1993), Stone (1999)) and the double negation and disjunction cases (Krahmer and Muskens (1995)), by extending the empirical coverage.


References II


