The anaphoric potential of indefinites under negation and disjunction

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A generalization

Indefinite DPs under non-veridical operators such as negation do not usually introduce a discourse referent (dref) that is available for subsequent reference (Karttunen (1969)):
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(1) \textit{There is [no bathroom]_\nu \textit{ in this house.}}
\textit{ #lt_\nu \textit{ is in a weird place.}}
Some counterexamples

(2) a. Double negation: (Karttunen (1969); Krahmer and Muskens (1995))
   *It’s not true that there is [no bathroom]$_{v_1}$ in this house.*
   *It$_{v_1}$ is just in a weird place.*
Some counterexamples

(2) a. Double negation: (Karttunen (1969); Krahmer and Muskens (1995))

_It’s not true that there is [no bathroom]_{\text{v}_1} in this house._

_It_{\text{v}_1} is just in a weird place._

b. Disjunction: (Krahmer and Muskens (1995))

_Either there is [no bathroom]_{\text{v}_2} in this house, or it_{\text{v}_2} is in a weird place._
Some counterexamples

(2) a. Double negation: (Karttunen (1969); Krahmer and Muskens (1995))

It’s not true that there is \([\text{no bathroom}]^{v_1} \ \text{in this house.}\)

\(lt_{v_1} \ \text{is just in a weird place.}\)

b. Disjunction: (Krahmer and Muskens (1995))

Either there is \([\text{no bathroom}]^{v_2} \ \text{in this house,}\)

or \(it_{v_2} \ \text{is in a weird place.}\)

c. Modal subordination: (Roberts (1989))

There is \([\text{no bathroom}]^{v_3} \ \text{in this house.}\)

\(lt_{v_3} \ \text{would be easier to find.}\)
Some counterexamples

(2) a. Double negation: (Karttunen (1969); Krahmer and Muskens (1995))
   *It’s not true that there is [no bathroom]_{v1} in this house.*
   *It_{v1} is just in a weird place.*

b. Disjunction: (Krahmer and Muskens (1995))
   *Either there is [no bathroom]_{v2} in this house, or it_{v2} is in a weird place.*

c. Modal subordination: (Roberts (1989))
   *There is [no bathroom]_{v3} in this house.*
   *It_{v3} would be easier to find.*

d. Disagreement:
   A: *There’s [no bathroom]_{v4} in this house.*
   B: *(What are you talking about?) It_{v4} is right over there.*
Krahmer and Muskens (1995)

Standard Discourse Representation Theory (DRT, Kamp (1981); Kamp and Reyle (1993)) (and other classic dynamic semantic frameworks) don't account for the counterexamples
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- Semantics for negation that symmetrically switches between the extension and anti-extension of an expression
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  - Semantics for negation that symmetrically switches between the extension and anti-extension of an expression
  - Semantics for disjunction that analogizes it to conditionals, both truth-conditionally and dynamically
  - Doesn’t extend to cases w/o overt negation or disjunction (disagreement, modal subordination)
This talk

Presents an analysis of the above cases in intensional Compositional DRT (CDRT) (following Muskens (1996); Brasoveanu (2010)), based on the assumption that a pronoun can be co-referential with a preceding DP only if the referent of the DP exists in the worlds of evaluation of the pronoun.
This talk

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  - Uses analyses of modal subordination in terms of simultaneous reference to sets of possible worlds (propositions) and individuals (Stone (1999); Stone and Hardt (1999); Brasoveanu (2007, 2010))
  - Extends them to disjunction, double negation and disagreement cases
Introduction

The account
   Intensional CDRT
   Drefs in relation to their local context
   Drefs under negation

Discussion
   Propositional anaphora under negation and disjunction

Conclusion
Section 2

The account
The intuition behind the analysis

- Counterfactual drefs under negation: Speaker committed to their non-existence
  
  (cf. hypothetical drefs in Stone (1999); Stone and Hardt (1999))
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- BUT: Pronoun can co-refer with counterfactual dref if
  - It is in a counterfactual context (Modal subordination)
  - The discourse segments of the antecedent and pronoun do not have to be consistent (disjunction, disagreement)
The account in a nutshell

- Antecedents and pronouns are interpreted relative to their local intensional context
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  - Relation between local and global context sets is constrained semantically by the interpretation of linguistic expressions

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Karttunen (1973); Heim (1983)
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    Karttunen (1973); Heim (1983)
  - And pragmatically by set of worlds compatible with a speaker’s commitments
A dynamic intensional system

CDRT with propositional discourse referents
Muskens (1996); Brasoveanu (2007, 2010)
A dynamic intensional system

CDRT with propositional discourse referents
Muskens (1996); Brasoveanu (2007, 2010)

- Four basic types: $t$ (truth-values), $e$ (entities), $w$ (possible worlds), and $s$ (variable assignments)
Variable assignments

- Objects manipulated and updated in context
Variable assignments

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- In classic static systems: Functions from variables to entities
Variable assignments

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- Here: Basic type s (discourse states)
Discourse referents (drefs)

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  - Variables: $\nu, \nu_1, \nu_2, \ldots$
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- Propositional drefs: type $s(wt)$
  - Drefs for sets of worlds
  - Variables: $\phi, \phi_1, \phi_2, \ldots$
Sentence meanings

- Conceptualized in terms of their context-change potential
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- Binary relations between discourse states: Type $s(st)$
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- Binary relations between discourse states: Type $s(st)$
- Anaphoric potential: Updating variable assignments
- Truth-conditions: Imposing conditions on propositional drefs
DRSs and Relativizing individual drefs

- A Discourse Representation Structure (DRS) contains a list of new drefs ($\phi, \phi : \nu_1, \ldots, \nu_n$)
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DRSs and Relativizing individual drefs

- A Discourse Representation Structure (DRS) contains a list of new drefs ($\phi, \phi : \nu_1, \ldots, \nu_n$)
  - Where individual drefs are introduced relative to propositional ones
- and a series of conditions of type $st$, i.e. properties of the output state ($C_1, \ldots, C_n$)

(3) Mary has a car $\rightsquigarrow$

<table>
<thead>
<tr>
<th>$\phi, \phi : \nu_1, \nu_2$</th>
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<tbody>
<tr>
<td>$\nu_1 = Mary$</td>
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<td>$car_{\phi}{\nu_2}$</td>
</tr>
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Relative variable update

Individual drefs map to an individual for all worlds in which their referent exists, and to an indeterminate value $\#_e$ in all other worlds.
Drefs in relation to their local context

Relative variable update

Individual drefs map to an individual for all worlds in which their referent exists, and to an indeterminate value \( \#_e \) in all other worlds

\[
(4) \quad i[\phi : \nu]j \text{ iff:}
\]

\[
j \text{ is an update of } i \text{ with } \nu \text{ in relation to } \phi, \text{ iff}
\]
Drefs in relation to their local context

Relative variable update

Individual drefs map to an individual for all worlds in which their referent exists, and to an indeterminate value $\neq e$ in all other worlds

(4)  $i[\phi : \nu]j$ iff:

$\succ i[\nu]j$

$j$ is an update of $i$ with $\nu$ in relation to $\phi$, iff

$\succ j$ is an update of $i$ that differs at most wrt the value assigned to $\nu$
Relative variable update

Individual drefs map to an individual for all worlds in which their referent exists, and to an indeterminate value $\#_e$ in all other worlds

\[(4) \quad i[\phi : \nu]j \text{ iff:} \]
\[
\begin{align*}
\&i[\nu]j \\
\&\forall w.(\phi(j)(w) \rightarrow \nu'(i)(w) \neq \#)
\end{align*}
\]

$j$ is an update of $i$ with $\nu$ in relation to $\phi$, iff

\[
\begin{align*}
\&j \text{ is an update of } i \text{ that differs at most wrt the value assigned to } \nu \\
\&\text{for each world } w \text{ in } \phi(j), \nu(j)(w) \text{ doesn’t map to } \# \text{ (but an individual)}
\end{align*}
\]
Relative variable update

Individual drefs map to an individual for all worlds in which their referent exists, and to an indeterminate value $\#_e$ in all other worlds

\[(4) \quad i[\phi : \nu]j \text{ iff:} \]

\> $i[\nu]j$

\> $\forall w. (\phi(j)(w) \rightarrow \nu'(i)(w) \neq \#)$

\> $\forall w. (\neg \phi(j)(w) \rightarrow \nu(j)(w) = \#)$

$j$ is an update of $i$ with $\nu$ in relation to $\phi$, iff

\> $j$ is an update of $i$ that differs at most wrt the value assigned to $\nu$

\> for each world $w$ in $\phi(j)$, $\nu(j)(w)$ doesn’t map to $\#$ (but an individual)

\> for each world $w$ not in $\phi(j)$, $\nu(j)(w)$ maps to $\#$
Negation

Negation introduces a counterfactual set of worlds wrt which its prejacent is interpreted
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Negation introduces a counterfactual set of worlds wrt which its prejacent is interpreted

(5)  S: Mary doesn’t sleep.
    S: (\textsc{not}(Mary sleep)) \simply
Negation

Negation introduces a counterfactual set of worlds wrt which its prejacent is interpreted

(5)  $S$: Mary doesn’t sleep.

$S : \neg (\text{Mary sleep}) \leadsto$

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Negation

Negation introduces a counterfactual set of worlds wrt which its prejacent is interpreted

\[(5) \quad S: \text{Mary doesn’t sleep.} \quad S: (\text{NOT(Mary sleep)}) \sim\]

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- **New drefs:**
  - Matrix \(\phi_1\)
  - **NOT:** Embedded \(\phi_2\)
  - \(\text{Mary: } \nu\)
Negation

Negation introduces a counterfactual set of worlds wrt which its prejacent is interpreted

\[
S: \text{Mary doesn’t sleep.}
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\[
S : (\neg (\text{Mary sleep})) \rightsquigarrow \\
\phi_1, \phi_1 : \nu, \phi_2 \\
\phi_{DC_S} \subseteq \phi_1 \\
\nu = \text{Mary}_e \\
\phi_1 = \phi_2 \\
sleep_{\phi_2}\{\nu\}
\]

- **New drefs:**
  - Matrix $\phi_1$
  - $\neg$: Embedded $\phi_2$
  - $\text{Mary}$: $\nu$

- **Conditions:**
  - $\phi_1$ is entailed by the commitments of $S$ $\phi_{DC_S}$
  - $\text{Mary}$: $\nu$ refers to $\text{mary}_e$
  - $\neg$: $\phi_1$ and $\phi_2$ are complements
  - Verb: $\nu$ sleeps in $\phi_2$
Drefs in relation to their local context

**Accessibility**

Accessibility condition on pronominal reference:
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- A dref is accessible for reference by a variable, iff the referent exists in the local context of the variable. (Stone and Hardt (1999))
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- Local context defined wrt the evaluation of DRS conditions:
Accessibility

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\[
\begin{array}{|c|c|}
\hline
\phi, \phi : \nu_1, \nu_2 \\
\hline
\nu_1 = Mary_e \\
\hline
\text{car}_{\phi}\{\nu_2\} \\
\hline
\text{have}_{\phi}\{\nu_1, \nu_2\} \\
\hline
\end{array}
\]

(3) Mary has a car \implies
Accessibility

Accessibility condition on pronominal reference:

- A dref is accessible for reference by a variable, iff the referent exists in the local context of the variable. (Stone and Hardt (1999))

- Local context defined wrt the evaluation of DRS conditions:

  \[(6) \quad \text{Predicates with their arguments as conditions (type } st\text{):} \]
  \[
  car_{\phi}\{\nu_2\} := \lambda i. \forall w \in \phi(i). car(\nu_2(i)(w))(w)
  \]
Accessibility

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- A dref is accessible for reference by a variable, iff the referent exists in the local context of the variable. (Stone and Hardt (1999))

- Local context defined wrt the evaluation of DRS conditions:

\[(6)\] Predicates with their arguments as conditions (type \textit{st}):
\[
car_\phi\{v_2\} := \lambda i.\forall w \in \phi(i).\text{car}(v_2(i)(w))(w)
\]

- \(v_2\) is a car in \(\phi\) wrt the variable assignment \(i\), iff
- Each world \(w\) in \(\phi(i)\) is s.t.
  - \(v_2(i)(w) \neq \#\) (i.e. a referent of \(v_2\) wrt \(i\) exists in \(w\)) and
  - \(v_2(i)(w)\) is a car in \(w\)
Accessibility condition on pronominal reference:

- A dref is accessible for reference by a variable, iff the referent exists in the local context of the variable. (Stone and Hardt (1999))

- Local context defined wrt the evaluation of DRS conditions:
  - A dref is an accessible antecedent for a variable in the context of $i_s, \phi_s(\omega_t)$ iff the dref refers to something other than $\#$ (i.e. an actual individual) in each world in $\phi$, wrt $i$
The non-existent bathroom

(6) \( S: \) There is \([\text{no bathroom}]^{\nu_1}.\)

\[
\begin{array}{|c|}
\hline
\phi_1, \phi_2, \phi_2 : \nu_1 \\
\hline
\phi_{DCs} \subseteq \phi_1 \\
\phi_1 = \phi_2 \\
bathroom_{\phi_2}\{\nu_1\} \\
\hline
\end{array}
\]
The non-existent bathroom

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\[
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\]

▸ New drefs:
▸ Matrix \(\phi_1\)
▸ Embedded \(\phi_2\)
▸ \(v_1\) exists in \(\phi_2\)
The non-existent bathroom

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- **New drefs:**
  - Matrix $\phi_1$
  - Embedded $\phi_2$
  - $v_1$ exists in $\phi_2$

- **Conditions:**
  - $\phi_1$ is entailed by the commitments of $S$ ($\phi_{DCS}$)
  - $\phi_1$ and $\phi_2$ are complements
  - $v_1$ is a bathroom in $\phi_2$
The non-existent bathroom

(6) S: There is [no bathroom] \( u_1 \).

\[
\begin{array}{|c|c|}
\hline
\phi_1, \phi_2, \phi_2 : u_1 & \\
\phi_{DCS} \subseteq \phi_1 & \\
\phi_1 = \phi_2 & \\
bathroom_{\phi_2}\{u_1\} & \\
\hline
\end{array}
\]

(7) \# S: It \( u_3 = u_1 \) is in a weird place.

\[
\begin{array}{|c|c|}
\hline
\phi_3, \phi_3 : u_2 & \\
\phi_{DCS} \subseteq \phi_3 & \\
place_{\phi_3}\{u_2\} & \\
weird_{\phi_3}\{u_2\} & \\
in_{\phi_3}\{u_3, u_2\} & \\
\hline
\end{array}
\]
The non-existent bathroom

(6) \( S: \text{There is } \lbrack \text{no bathroom} \rbrack^\nu_1. \)

(7) \( \# S: \text{It}^\nu_1 \text{is in a weird place}. \)

\[ \begin{array}{|c|} \hline \phi_1, \phi_2, \phi_2 : \nu_1 \\ \hline \phi_{DCS} \subseteq \phi_1 \\ \phi_1 = \phi_2 \\ \text{bathroom}^{\phi_2}_\{\nu_1\} \\ \hline \end{array} \]

\[ \begin{array}{|c|} \hline \phi_3, \phi_3 : \nu_2 \\ \hline \phi_{DCS} \subseteq \phi_3 \\ \text{place}^{\phi_3}_\{\nu_2\} \\ \text{weird}^{\phi_3}_\{\nu_2\} \\ \text{in}^{\phi_3}_\{\nu_3, \nu_2\} \\ \hline \end{array} \]

\( \nu_1 \) exists in all and only the counterfactual \( \phi_2 \)-worlds
The non-existent bathroom

(6) \( S: \) There is [no bathroom]^{u_1}.

\[
\begin{array}{|c|}
\hline
\phi_1, \phi_2, \phi_2 : u_1 \\
\hline
\phi_{DC_S} \subseteq \phi_1 \\
\phi_1 = \phi_2 \\
bathroom_{\phi_2} \{u_1\} \\
\hline
\end{array}
\]

(7) \( \# S: \) It^{u_3=v_1} is in a weird place.

\[
\begin{array}{|c|}
\hline
\phi_3, \phi_3 : u_2 \\
\hline
\phi_{DC_S} \subseteq \phi_3 \\
place_{\phi_3} \{u_2\} \\
weird_{\phi_3} \{u_2\} \\
in_{\phi_3} \{u_3, u_2\} \\
\hline
\end{array}
\]

- \( u_1 \) exists in all and only the counterfactual \( \phi_2 \)-worlds
- \( u_1 \) doesn't exist in any worlds in \( \phi_1 \), the complement of \( \phi_2 \)
The non-existent bathroom

(6) S: There is [no bathroom]$_{\nu_1}$.

<table>
<thead>
<tr>
<th>(\phi_1, \phi_2, \phi_2 : \nu_1)</th>
</tr>
</thead>
<tbody>
<tr>
<td>(\phi_{DCS} \subseteq \phi_1)</td>
</tr>
<tr>
<td>(\phi_1 = \phi_2)</td>
</tr>
<tr>
<td>bathroom$_{\phi_2}{\nu_1}$</td>
</tr>
</tbody>
</table>

(7) \# S: \(lt_{\nu_3=\nu_1}\) is in a weird place.

<table>
<thead>
<tr>
<th>(\phi_3, \phi_3 : \nu_2)</th>
</tr>
</thead>
<tbody>
<tr>
<td>(\phi_{DCS} \subseteq \phi_3)</td>
</tr>
<tr>
<td>place$_{\phi_3}{\nu_2}$</td>
</tr>
<tr>
<td>weird$_{\phi_3}{\nu_2}$</td>
</tr>
<tr>
<td>in$_{\phi_3}{\nu_3, \nu_2}$</td>
</tr>
</tbody>
</table>

- \(\nu_1\) exists in all and only the counterfactual \(\phi_2\)-worlds
- \(\nu_1\) doesn't exist in any worlds in \(\phi_1\), the complement of \(\phi_2\)
- \(\nu_3\) is interpreted in the condition \(in_{\phi_3}\{\nu_3, \nu_2\}\)
The non-existent bathroom

(6) S: *There is [no bathroom]*\(^{v_1}\).

(7) \# S: *It\(_{v_3=v_1}\) is in a weird place.*

<table>
<thead>
<tr>
<th>φ₁, φ₂, φ₂ : v₁</th>
</tr>
</thead>
<tbody>
<tr>
<td>( \Phi_{DCS} \subseteq \Phi₁ )</td>
</tr>
<tr>
<td>( \Phi₁ = \Phi₂ )</td>
</tr>
<tr>
<td>bathroom(\text{φ}_2{v₁})</td>
</tr>
</tbody>
</table>

- \( v₁ \) exists in all and only the counterfactual \( φ₂ \)-worlds
- \( v₁ \) doesn't exist in any worlds in \( φ₁ \), the complement of \( φ₂ \)
- \( v₃ \) is interpreted in the condition \( in_{φ₃}\{v₃, v₂\} \)
- For \( v₁ \) to be an antecedent for \( v₃ \), \( v₁ \) needs to exist in all \( φ₃ \)-worlds
The non-existent bathroom

(6) \( S: \) *There is [no bathroom]\(^{v_1}.*

<table>
<thead>
<tr>
<th>( \phi_1, \phi_2, \phi_2 : v_1 )</th>
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<tbody>
<tr>
<td>( \phi_{DCS} \subseteq \phi_1 )</td>
</tr>
<tr>
<td>( \phi_1 = \phi_2 )</td>
</tr>
<tr>
<td>( \text{bathroom}_{\phi_2{v_1}} )</td>
</tr>
</tbody>
</table>

(7) \# \( S: \) *\( l_{v_3=v_1} \) is in a weird place.*

<table>
<thead>
<tr>
<th>( \phi_3, \phi_3 : v_2 )</th>
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</thead>
<tbody>
<tr>
<td>( \phi_{DCS} \subseteq \phi_3 )</td>
</tr>
<tr>
<td>( \text{place}_{\phi_3{v_2}} )</td>
</tr>
<tr>
<td>( \text{weird}_{\phi_3{v_2}} )</td>
</tr>
<tr>
<td>( \text{in}_{\phi_3{v_3, v_2}} )</td>
</tr>
</tbody>
</table>

- \( v_1 \) exists in all and only the counterfactual \( \phi_2 \)-worlds
- \( v_1 \) doesn't exist in any worlds in \( \phi_1 \), the complement of \( \phi_2 \)
- \( v_3 \) is interpreted in the condition \( \text{in}_{\phi_3\{v_3, v_2\}} \)
- For \( v_1 \) to be an antecedent for \( v_3 \), \( v_1 \) needs to exist in all \( \phi_3 \)-worlds
- \( \phi_{DCS} \) contains only worlds that are in \( \phi_1 \cap \phi_3 \)
The non-existent bathroom

(6) \( S: \text{There is [no bathroom]}^{v_1}. \)

<table>
<thead>
<tr>
<th>( \phi_1, \phi_2, \phi_2 : v_1 )</th>
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<tbody>
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<tr>
<td>( \phi_1 = \phi_2 )</td>
</tr>
<tr>
<td>( \text{bathroom}_{\phi_2}{v_1} )</td>
</tr>
</tbody>
</table>

(7) \# \( S: \text{It}_{v_3=v_1} \text{ is in a weird place}. \)

<table>
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<tr>
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<tr>
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</tr>
<tr>
<td>( \text{in}_{\phi_3}{v_3, v_2} )</td>
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</table>

- \( v_1 \) exists in all and only the counterfactual \( \phi_2 \)-worlds
- \( v_1 \) doesn't exist in any worlds in \( \phi_1 \), the complement of \( \phi_2 \)
- \( v_3 \) is interpreted in the condition \( \text{in}_{\phi_3}\{v_3, v_2\} \)
- For \( v_1 \) to be an antecedent for \( v_3 \), \( v_1 \) needs to exist in all \( \phi_3 \)-worlds
- \( \phi_{DC_S} \) contains only worlds that are in \( \phi_1 \cap \phi_3 \)
- So, there are \( \phi_1 \)-worlds in \( \phi_3 \), i.e. worlds where \( v_1 \) doesn't exist
Drefs under negation

The non-existent bathroom

(6) \( S: \) There is [no bathroom]\(^{\nu_1}. \)

(7) \# \( S: \) It\(^{\nu_3=\nu_1}\) is in a weird place.

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

\[
\begin{array}{|c|}
\hline
\phi_3, \phi_3 : \nu_2 \\
\phi_{DC_S} \subseteq \phi_3 \\
place_{\phi_3}\{\nu_2\} \\
weird_{\phi_3}\{\nu_2\} \\
in_{\phi_3}\{\nu_3, \nu_2\}
\hline
\end{array}
\]

- \( \nu_1 \) exists in all and only the counterfactual \( \phi_2 \)-worlds
- \( \nu_1 \) doesn’t exist in any worlds in \( \phi_1 \), the complement of \( \phi_2 \)
- \( \nu_3 \) is interpreted in the condition \( in_{\phi_3}\{\nu_3, \nu_2\} \)
- For \( \nu_1 \) to be an antecedent for \( \nu_3 \), \( \nu_1 \) needs to exist in all \( \phi_3 \)-worlds
- \( \phi_{DC_S} \) contains only worlds that are in \( \phi_1 \cap \phi_3 \)
- 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 hypothetical bathroom

(6) S: There is [no bathroom]_{v_1}.

<table>
<thead>
<tr>
<th>$\phi_1, \phi_2, \phi_2 : v_1$</th>
</tr>
</thead>
<tbody>
<tr>
<td>$\phi_{DC_S} \subseteq \phi_1$</td>
</tr>
<tr>
<td>$\phi_1 = \overline{\phi_2}$</td>
</tr>
<tr>
<td>bathroom_{\phi_2} {v_1}</td>
</tr>
</tbody>
</table>
The hypothetical bathroom

(6) S: *There is [no bathroom]_{v1}.*

<table>
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<tr>
<td>$\phi_1 = \overline{\phi_2}$</td>
</tr>
<tr>
<td>*bathroom}_{\phi_2{v_1}}</td>
</tr>
</tbody>
</table>

(8) S: *It would be (more) accessible.*

<table>
<thead>
<tr>
<th>$\phi_3$</th>
</tr>
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<tbody>
<tr>
<td>$\phi_{DC_S} \subseteq \phi_3$</td>
</tr>
<tr>
<td>*would}_{\phi_3{\phi_4}}</td>
</tr>
<tr>
<td>*accessible}_{\phi_4{v_2}}</td>
</tr>
</tbody>
</table>
The hypothetical bathroom

(6) S: There is [no bathroom]^{υ_1}.

<table>
<thead>
<tr>
<th>φ_1, φ_2, φ_2 : υ_1</th>
</tr>
</thead>
<tbody>
<tr>
<td>φ_{DC_S} ⊆ φ_1</td>
</tr>
<tr>
<td>φ_1 = ¬φ_2</td>
</tr>
<tr>
<td>bathroom_{φ_2}^{φ_1}</td>
</tr>
</tbody>
</table>

(8) S: It would be (more) accessible.

<table>
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<tr>
<th>φ_3</th>
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<tbody>
<tr>
<td>φ_{DC_S} ⊆ φ_3</td>
</tr>
<tr>
<td>would_{φ_3}^{φ_4}</td>
</tr>
<tr>
<td>accessible_{φ_4}^{φ_2}</td>
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</table>

▶ Modal subordination Stone (1999); Stone and Hardt (1999); Brasoveanu (2007, 2010):
The hypothetical bathroom

\( S: \text{There is [no bathroom]}^\nu_1. \)

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

\( S: \text{It would be (more) accessible}. \)

\[
\begin{array}{|c|}
\hline
\phi_3 \\
\phi_{DCS} \subseteq \phi_3 \\
\text{would}_{\phi_3}\{\phi_4\} \\
\text{accessible}_{\phi_4}\{\nu_2\} \\
\hline
\end{array}
\]

_modal subordination_ Stone (1999); Stone and Hardt (1999); Brasoveanu (2007, 2010):

\textit{would} is anaphoric to a proposition that is not taken to be true in \( \phi_{DCS} \), this can be the counterfactual \( \phi_2 \)
The hypothetical bathroom

(6) \( S: \) There is \([\text{no bathroom}]^u_1\).

(8) \( S: \) It would be (more) accessible.

\[
\begin{array}{|c|}
\hline
\phi_1, \phi_2, \phi_2 : u_1 \\
\phi_{DCS} \subseteq \phi_1 \\
\phi_1 = \phi_2 \\
\text{bathroom}_{\phi_2\{u_1\}} \\
\hline
\end{array}
\]

\[
\begin{array}{|c|}
\hline
\phi_3 \\
\phi_{DCS} \subseteq \phi_3 \\
\text{would}_{\phi_3\{\phi_4\}} \\
\text{accessible}_{\phi_4\{u_2\}} \\
\hline
\end{array}
\]

Modal subordination Stone (1999); Stone and Hardt (1999); Brasoveanu (2007, 2010):

- \textit{would} is anaphoric to a proposition that is not taken to be true in \( \phi_{DCS} \), this can be the counterfactual \( \phi_2 \)
- The local set of worlds for the interpretation of its prejacent is provided compositionally
The hypothetical bathroom

(6) S: There is [no bathroom] \( \nu_1 \).

<table>
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<th>( \phi_1, \phi_2, \phi_2 : \nu_1 )</th>
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<td>( \phi_1 = \overline{\phi_2} )</td>
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<tr>
<td>bathroom_{\phi_2}{\nu_1}</td>
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(8) S: It would be (more) accessible.

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<tr>
<td>would_{\phi_3}{\phi_4}</td>
</tr>
<tr>
<td>accessible_{\phi_4}{\nu_2}</td>
</tr>
</tbody>
</table>

- Modal subordination Stone (1999); Stone and Hardt (1999); Brasoveanu (2007, 2010):
  - \textit{would} is anaphoric to a proposition that is not taken to be true in \( \phi_{DCS} \), this can be the counterfactual \( \phi_2 \)
  - The local set of worlds for the interpretation of its prejacent is provided compositionally

- Now we have \( \text{accessible}_{\phi_2}\{\nu_2\} \), so we get \( \nu_1 = \nu_2 \)
The optimal bathroom

(9) S: Either there is [no bathroom]_{v_1}, or \( i_{v_3} = v_1 \) is in a weird place.
The optional bathroom

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

\begin{align*}
\phi_1, \\
\phi_{DC_S} \subseteq \phi_1
\end{align*}

- Assertion compatible with speaker’s commitments
The optional bathroom

(9) \( S: \) Either there is [no bathroom]\(^v_1\), or it\(^v_3 = v_1\) is in a weird place.

\[
\begin{array}{|c|}
\hline
\phi_1, \phi_2, \phi_3, \\
\phi_{DC_S} \subseteq \phi_1 \\
\phi_1 = \phi_2 \cup \phi_3 \\
\hline
\end{array}
\]

- Assertion compatible with speaker's commitments
- Disjunction introduces two local sets of worlds that don’t have to be compatible
The optional bathroom

(9)  \( S: \) Either there is [no bathroom]^{\nu_1}, or it^{\nu_3=\nu_1} is in a weird place.

\[
\begin{array}{|c|}
\hline
\phi_1, \phi_2, \phi_3, \phi_4, \phi_4 : \nu_1, \\
\phi_{DC_S} \subseteq \phi_1 \\
\phi_1 = \phi_2 \cup \phi_3 \\
\phi_2 = \overline{\phi_4} \\
bathroom_{\phi_4}\{\nu_1\} \\
\hline
\end{array}
\]

- Assertion compatible with speaker’s commitments
- Disjunction introduces two local sets of worlds that don’t have to be compatible
- First disjunct: Analogous to the above negative sentences
  - \( \nu_1 \) exists in all and only the \( \phi_4 \)-worlds, and in none of the worlds in \( \phi_2 \)
The optional bathroom

(9) S: Either there is [no bathroom]$^\nu_1$, or it$^\nu_3$ = $^\nu_1$ is in a weird place.

\[
\begin{array}{|c|}
\hline
\phi_1, \phi_2, \phi_3, \phi_4, \phi_4 : \nu_1, \phi_3 : \nu_2 \\
\hline
\phi_{DC_S} \subseteq \phi_1
\\
\phi_1 = \phi_2 \cup \phi_3
\\
\phi_2 = \phi_4
\\
\text{bathroom}_{\phi_4}(\nu_1)
\\
\text{place}_{\phi_3}(\nu_2)
\\
\text{weird}_{\phi_3}(\nu_2)
\\
\text{in}_{\phi_3}(\nu_3, \nu_2)
\\
\hline
\end{array}
\]

- Assertion compatible with speaker’s commitments
- Disjunction introduces two local sets of worlds that don’t have to be compatible
- First disjunct: Analogous to the above negative sentences
  - $\nu_1$ exists in all and only the $\phi_4$-worlds, and in none of the worlds in $\phi_2$
- Second disjunct:
  - For $\nu_1$ to be an antecedent for $\nu_3$, $\nu_1$ needs to exist in all $\phi_3$-worlds
The optional bathroom

(9) \( S: \) Either there is [no bathroom]\(^{\psi_1}\), or it\(^{\psi_3}=\psi_1\) is in a weird place.

\[
\begin{array}{|c|}
\hline
\phi_1, \phi_2, \phi_3, \phi_4, \phi_4 : \psi_1, \phi_3 : \psi_2 \\
\hline
\phi_{DC} \subseteq \phi_1 \\
\phi_1 = \phi_2 \cup \phi_3 \\
\phi_2 = \overline{\phi_4} \\
\text{bathroom}_{\phi_4}(\psi_1) \\
\text{place}_{\phi_3}(\psi_2) \\
\text{weird}_{\phi_3}(\psi_2) \\
in_{\phi_3}(\psi_3, \psi_2) \\
\hline
\end{array}
\]

- Assertion compatible with speaker’s commitments
- Disjunction introduces two local sets of worlds that don’t have to be compatible
- First disjunct: Analogous to the above negative sentences
  - \( \psi_1 \) exists in all and only the \( \phi_4 \)-worlds, and in none of the worlds in \( \phi_2 \)
- Second disjunct: For \( \psi_1 \) to be an antecedent for \( \psi_3 \), \( \psi_1 \) needs to exist in all \( \phi_3 \)-worlds
- Compatible with an output discourse state, s.t. \( \psi_1 \) exists in \( \phi_3 \), i.e. the one where \( \phi_2 \cap \phi_3 = \emptyset \), and \( \psi_3 \) can be resolved as \( \psi_1 \)
The contested bathroom

(6) S: *There is [no bathroom]_υ1*.  

\[
\begin{array}{|c|}
\hline
\phi_1, \phi_2, \phi_2 : \upsilon_1 \\
\phi_{DCS} \subseteq \phi_1 \\
\phi_1 = \overline{\phi_2} \\
\text{bathroom}_{\phi_2}\{\upsilon_1\} \\
\hline
\end{array}
\]
The contested bathroom

(6) S: There is [no bathroom]_{\nu_1}.

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<tr>
<td>$\phi_1 = \phi_2$</td>
</tr>
<tr>
<td>bathroom$_{\phi_2(\nu_1)}$</td>
</tr>
</tbody>
</table>

(10) B: It$_{\nu_1}$ is (right over) there.

<table>
<thead>
<tr>
<th>$\phi_3$</th>
</tr>
</thead>
<tbody>
<tr>
<td>$\phi_{DC_B} \subseteq \phi_3$</td>
</tr>
<tr>
<td>there$_{\phi_3(\nu_2)}$</td>
</tr>
</tbody>
</table>
The contested bathroom

(6) S: There is [no bathroom]$_{\nu_1}$.

<table>
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<tr>
<th>$\phi_1, \phi_2, \phi_2 : \nu_1$</th>
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<td>$\phi_1 = \overline{\phi_2}$</td>
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<tr>
<td>bathroom$_{\phi_2{\nu_1}}$</td>
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(10) B: it$_{\nu_1}$ is (right over) there.

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▶ Since the two speakers disagree, $\phi_{DC_S} \subseteq \phi_1$ and $\phi_{DC_B} \subseteq \phi_2$ don’t have to be compatible with each other.
The contested bathroom

(6) S: *There is [no bathroom]*$^{v_1}$.

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<td>$\phi_1 = \overline{\phi_2}$</td>
</tr>
<tr>
<td><em>bathroom</em>$_{\phi_2{v_1}}$</td>
</tr>
</tbody>
</table>

(10) B: $lv_1$ is (right over) there.

<table>
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<tbody>
<tr>
<td>$\phi_{DC_B} \subseteq \phi_3$</td>
</tr>
<tr>
<td>there$^{\phi_3{v_2}}$</td>
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</table>

▶ Since the two speakers disagree, $\phi_{DC_S} \subseteq \phi_1$ and $\phi_{DC_B} \subseteq \phi_2$ don’t have to be compatible with each other

▶ This allows for the possibility that $v_1$ exists in $\phi_3$, i.e. the one where $\phi_1 \cap \phi_3 = \emptyset$, similar to the disjunction case
Section 3

Discussion
Upshot

An indefinite in the scope of negation is available for subsequent reference only if the pronoun making reference to it is interpreted wrt a set of worlds in which the referent of the indefinite exists
Upshot

An indefinite in the scope of negation is available for subsequent reference only if the pronoun making reference to it is interpreted wrt a set of worlds in which the referent of the indefinite exists.

That can be the case, if
Upshot

An indefinite in the scope of negation is available for subsequent reference only if the pronoun making reference to it is interpreted wrt a set of worlds in which the referent of the indefinite exists

- That can be the case, if
  - Anaphoric *would* anaphorically retrieves a hypothetical set of worlds for the interpretation of its prejacent (like in Stone (1999) analysis of modal subordination).
Upshot

An indefinite in the scope of negation is available for subsequent reference only if the pronoun making reference to it is interpreted wrt a set of worlds in which the referent of the indefinite exists

- That can be the case, if
  - Anaphoric *would* anaphorically retrieves a hypothetical set of worlds for the interpretation of its prejacent (like in Stone (1999) analysis of modal subordination).
  - The discourse segments including the pronoun and the anaphor aren’t required to be compatible with each other (like in the disjunction or disagreement cases).
Propositional anaphora under negation and disjunction

Propositional anaphora

Propositional anaphora present a challenge:

(11) a. If Mary is sick, she knows that.
    b. Either Mary is not sick, or she #(is and) knows that.
Propositional anaphora under negation and disjunction

Propositional anaphora

Propositional anaphora present a challenge:

(11) a. If Mary is sick, she knows that.
    b. Either Mary is not sick, or she #(is and) knows that.

We might expect the propositional dref in the scope of negation (where Mary is sick) to be accessible in the second disjunct.
Propositional anaphora

Propositional anaphora present a challenge:

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    b. Either Mary is not sick, or she #(is and) knows that.

▶ We might expect the propositional dref in the scope of negation (where Mary is sick) to be accessible in the second disjunct
▶ Krahmer and Muskens (1995): Disjunctions and conditionals are dynamically equivalent, asymmetry ruled out
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▶ Therefore provides a vantage point over asymmetries between individual and propositional anaphora, to be explored in future research
Section 4

Conclusion
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Conclusion

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- 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)), as well as analyses of modal subordination (Stone (1999)) and the double negation and disjunction cases (Krahmer and Muskens (1995)), by extending the empirical coverage.
References I


References II


