Resolving Complement Anaphora

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Complement Anaphora

- Few of the children ate their ice-cream.
  They ate the strawberry flavor first.

They: the children who *did* eat their ice-cream

Complement Anaphora

- Few of the children ate their ice-cream.
  They ate the strawberry flavor first.

They: the children who *did* eat their ice-cream

- Few of the children ate their ice-cream.
  They threw it around the room instead.

They: the children who *did not* eat their ice-cream

Definitions: Reference set reference

- Structure: $D(A)(B)$ ... *they* ... :

Ref(erence) set = $A \cap B$

Few congressmen admire Kennedy,
and they are very junior.
(Evans, 1980: 7)

they =the set of congressmen who admire Kennedy.

Definitions: Maximal set reference

- Structure: $D(A)(B)$ ... *they* ... :

Max(imal) set = A

Few congressmen attend morning meetings,
but they all attend the Friday afternoon drinks.
(Nouwen, 2003: 4)

they = the set of ALL congressmen
(regardless of whether they attend morning meetings).

Definitions: Complement set reference

- Structure: $D(A)(B)$ ... *they* ... :

Comp(lement) set = $A \cap \neg B$

Few congressmen admire Kennedy.
They think he's incompetent.
(Nouwen, 2003: 5)

they = the set of congressmen who do NOT admire Kennedy.

Talk outline

- $\surd$ Introduction and definitions
- $\Rightarrow$The reality of complement anaphora
- The problem with complement anaphora
- Resolving complement anaphora

The Moxey-Sanford experiments

- Experiments by Moxey&Sanford, early 1990s.
- Functional difference between related determiners:
  - *a few, few, very few, only a few, not many*
  - *less than n%*, *n%, only n%* and *more than n%.*
- Continuation experiments:
  - Q of the MPs attended the meeting. They...
  - Q of the MPs attended the meeting, because they...

Control measures

"Few of the MPs attended the meeting. They... "

- Reference question:
  - *MPs in general,*
  - *all MPs,*
  - *MPs who went to the meeting,*
  - *MPs who did not go to the meeting*,
  - *none of the above*.
- Independent judges: 98% agreement.

Results of the M&S experiments

- ***hardly any, not many, very few***, ***few*** *and* ***less than n%***. license CA.
- ***a few, n%, only n%*** and ***more than n%*** never allow CA.
- In the absence of connectives, ***only a few*** $\equiv$ ***a few***.
  - because $\Rightarrow$ CA prominent.

complement anaphora is *never required*.

Reference to the reference set

reference to the reference set is always possible, regardless what the antecedent determiner is:

Most MPs attended the meeting.
They discussed a lot.

Few/less than thirty MPs attended the meeting.
Nevertheless, they managed to discuss a lot.
(Nouwen, 2003: 12,13)

Hebrew experiment

- Translated sentences
  - 15 sentences: Ref-set/Comp-set/Max-set reference
  - Ungrammatical sentences
- Similar results to English

Back to Outline

- $\surd$ Introduction and definitions
- $\surd$ The reality of complement anaphora
- $\Rightarrow$ The problem with complement anaphora
- Resolving complement anaphora

The problem with complement anaphora

Discourse Representation Theory (DRT, Kamp, 1981; Heim, 1982).

- Solves *donkey anaphora*
  Every farmer who owns a donkey, beats it.

Problem for predicate calculus:

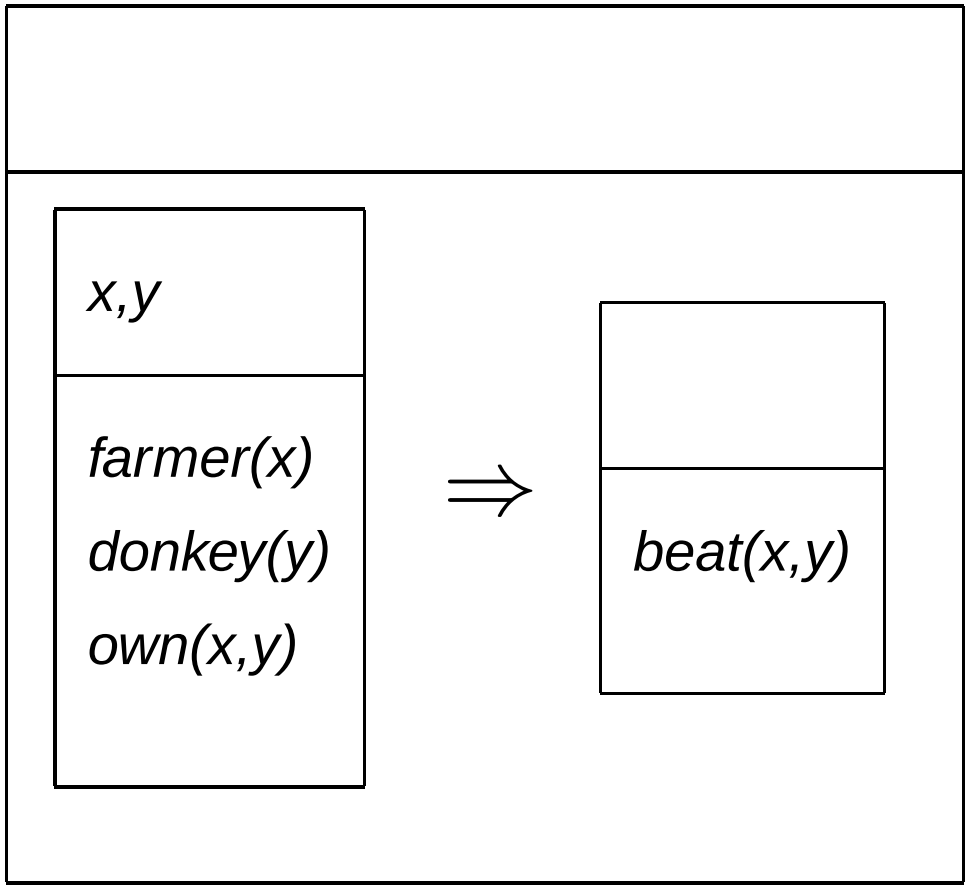
- $\forall x(FARMER(x) \wedge \exists y(DONKEY(y) \wedge OWN(x,y)) \rightarrow BEAT(x,y))$
- $\forall x \exists y(FARMER(x) \wedge DONKEY(y) \wedge OWN(x,y) \rightarrow BEAT(x,y))$
- $\forall x \forall y(FARMER(x) \wedge DONKEY(y) \wedge OWN(x,y) \rightarrow BEAT(x,y))$

DRT basics

- Discourse = updates on the existing body of information
  - Discourse Representation Structures (DRSs)
    - The “matrix” DRS
    - Embedded DRSs: conditions, assumptions, denied facts, etc
  - Variables
    - Indefinites = introduce new variables
    - Definites = updates on existing variables
  - Accessibility relation

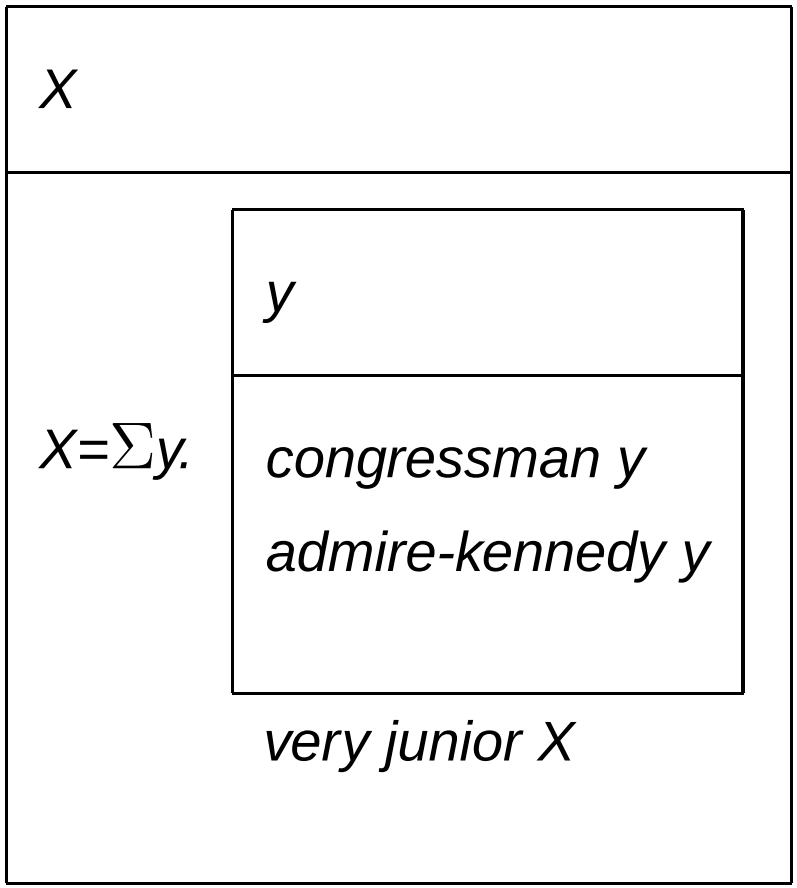
DRT translations

Every farmer who owns a donkey, beats it.
(*It's name is Pedro)



DRT and complement anaphora

Few congressmen admire Kennedy, and *they* are very junior



Few congressmen admire Kennedy.
They think he's incompetent.

Solution desiderata

- Explain complement anaphora cases
- Predict when complement anaphora is possible
- Solve DRT difficulty

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Analyzing complement anaphora

Two possible solutions:

- Pseudo-reference
  - pragmatics
- Genuine reference
  - semantics

I propose: combined solution

Facts about complement anaphora

- Semantic fact: Possible only under **proportional quantifiers**, which are **monotone decreasing on their second argument**
  - O is a DE operator iff
    if $A \Rightarrow B$ then $O(B) \Rightarrow O(A)$
  - few, not many, only a few, less than n%...
- Pragmatic fact: **Last resort strategy**
  - Few of the students went to the party. I know who *they* are.

$\Rightarrow$ Optimality Theory (Nouwen, 2003)

OT constraints (1)

- *Forward Directionality*: The topic range included by the domain of quantification of a determiner is reduced to the topic range induced by the intersection of the two argument sets of this determiner
- $\Rightarrow$ set Reference set as default.
  - Ten students attended the meeting. Three spoke.

OT constraints (2)

- *Emptiness*: As the antecedent of an expression do not choose a set which is potentially empty, except when this set is the reference set of a quantificational sentence.
- $\Rightarrow$ allow complement set reference only in downward proportional cases.

OT constraints (3)

- *AvoidContradiction*: Prefer reference to the reference set, as long as this does not cause a contradiction with previously introduced assertions in the discourse.
- $\Rightarrow$ choose complement set reference in these cases

OT constraints (4)

The system:

- Sets Ref-set as default
- Allows Comp-set in downward proportional cases
- Choose Comp-set as last resort strategy

OT: application (1)

		Emp	AvC	FwD
Most (A)(B). They¬B	☞Ref		*	
Most (A)(B). They¬B	Comp	*		*
Most (A)(B). They C	☞Ref			
Most (A)(B). They C	Comp	*		*

A: students
B: went to the party
¬B: stayed at home
C: had a great time

OT: application (2)

		Emp	AvC	FwD
Less than ten (A)(B). They¬B	☞Ref		*	
Less than ten (A)(B). They¬B	Comp	*		*
Less than ten (A)(B). They C	☞Ref			
Less than ten (A)(B). They C	Comp	*		*

A: students
B: went to the party
¬B: stayed at home
C: had a great time

OT: application (3)

		Emp	AvC	FwD
Less than half (A)(B). They¬B	Ref		*	
Less than half (A)(B). They¬B	☞Comp			*
Less than half (A)(B). They C	☞Ref			
Less than half (A)(B). They C	Comp			*

A: students
B: went to the party
¬B: stayed at home
C: had a great time

Solution desiderata

- $\surd$ Explain complement anaphora cases
- $\surd$ Predict when complement anaphora is possible
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Presuppositions-as-anaphors

- weak NPs can triggeran existence presupposition, when accented(Krahmer&van Deemter, 1998 (partial matches)).
  - If a new teacher is hired, there are {NO/FEW} girls in this class who immediately have a crush on him. In fact, *they* are primarily interested in the Backstreet Boys.
- Accommodation $\Rightarrow$ presuppositional DRS, which introduces the set of *girls in this class* into the discourse.

Proportional quantifiers&presuppositions

'it is feasible that proportional quantifiers introduce a referent for their restrictor, since they presuppose this set to be non-empty' (Nouwen, footnote 9, p. 101).

- Pivotal information:
  - CA only under proportional DE quantifiers
  - proportional quantifiers always introduce restrictor as presupposition
  - variable for restrictor = maximal set available in discourse
  - $\Rightarrow$ *more economical to resolve to maximal set*

$\Longrightarrow$ complement anaphora == confusion with reference to the maximal set

Maximality effects

When referring to the complement set, reference must be made to the *maximal* set.

- Few of the MPs attended the meeting. They were too busy.

$\neq$ some non-attending MPs too busy, others had other excuses.

Nouwen: Inferability, Uniqueness.

Advantages

- Independently motivated
- Economical:
  - less work to do
  - naturally explains maximality effects
- Pragmatic implication:
  - brain performance
  - why less easy to process
- Why so few

Conclusion

Argumentation:

- Last resort strategy
- Only under proportional quantifiers, which are monotone decreasing on their second argument.
- Proportional quantifiers always introduce restrictor as presupposition
- Maximal set can act as antecedent for anaphora
- $\Rightarrow$ Complement anaphora = reference to the maximal