Information Structure and Discourse Modelling

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Outline

1. Introduction
   - Central claims
   - Motivation

2. Preliminaries

3. Descriptive anaphors

4. Problems for a strict anaphoricity approach

5. The impact of information structure on discourse structure

6. Conclusions
Introduction

Basic problems:

- The relation between discourse structure and information structure
  - I argue that discourse structure and information structure stand in a very close relation and constrain each other
  - Insights from the study of both areas can be combined in a fruitful way to:
    - Achieve a wider theoretical coverage
    - Achieve a better understanding of the relevant phenomena
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Central claims

Claims:

- Background elements are anaphoric in a very strict sense
  - In order to resolve IS, no further apparatus is necessary, apart from a theory of anaphoricity.
  - Backgrounds are no monolithic units (as often argued, e.g. in Jackendoff 1972, Schwarzchild, 1999, amongst others). They are built up from smaller units: links and tails (Vallduví, 1992)
  - Links and tails are descriptive anaphors
  - Links and tails must be of a referential type
- Information structure has a direct influence on the way a discourse is structured
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The parsing problem for information structure

The need to model discourse context becomes most evident when we see information structure resolution as a parsing problem.

- Parsing text for information structure has to face a high degree of ambiguity.
- This ambiguity is higher when we have to parse written text.
- Human parsers do not have evident problems when parsing information structure in written text.
- Parsing information structure in written texts is a feasible task.
- The only possible source for information structure disambiguation in such cases is discourse information.
Constraints on information structure

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Discourse information constrains information structure: an example

(1) Diese Situation nutzen andere Fluggäste, this situation used other flight-passengers, um durch den hinteren AUSGANG zu in-order through the rear exit to entkommen.

escape

‘Other passengers used this situation to escape through the rear EXIT.’

(German, tagesschau.de 18.08.2007)
discourse structure constrains information structure: an example

(2) a. At the Antalya airport the two kidnapers wanted to release various passenger through the front exit.

b. Diese Situation nutzen andere Fluggäste, um durch den HINTEREN Ausgang zu entkommen.

‘Other passengers used this situation to escape through the REAR exit.’
(tagesschau.de 18.08.2007)
(German)
There are, however, cases where IS is not highly predictable from context

(3) Men *are* different.  

(4) Sai? [A mio *fratello*]_link_ gli hanno you-know? [to my brother]_link_ to-him they-have stolen la moto.  
‘Did you know? My brother got his motorbike stolen’  
(Italian, Brunetti, 2006)
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Information structure is the linguistic module that relates different linguistic realisations (intonational contours, syntactic dislocations, etc.) of the same truth conditional contents to appropriateness in different contexts.

The tripartite articulation (Vallduví, 1992, Vallduví and Endahl, 1996)

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The link-tail distinction receives empirical support from Romance Languages, especially Catalan.

(5) Q: Que passa amb l’amo? Li agrada el bròquil?
A: [L’amo]_link [L’ODIA]_focus [el bròquil]_tail
[The’boss]_link [it-hates]_focus [the broccoli]_tail

In English and German links receive a special pitch accent; tails are not accented or deaccented.

(6) [The boss]_link HATES [broccoli]_tail
L+H* H*
Links vs. tails

In Catalan links can also be preverbal objects (dislocated with a clitic remnant)

(7) Q: Que passa amb l’amo? Li agrada el bròquil?
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Sentence backgrounds as links and tails

- Sentence backgrounds must represent given information
- Claims:
  - Sentence backgrounds are built of smaller units: links and tails
  - Links and tails are anaphoric separately
Information structure

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Discourse structure

- Discourse is organised in the form of a tree.

(9)  
  a. [Max had a great evening last night.
  b.  [ He had a great meal.
  c.  [ He ate salmon.
  d.  He devoured lots of cheese.]
  e.  Then he won a dancing competition.]]

(Asher and Lascarides, 2004)
Discourse structure

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  c.   [ He ate salmon\textsubscript{i}.  
  d.    He devoured lots of cheese.]  
  e.    Then he won a dancing competition.]]  
  d.    # It\textsubscript{i} was beautifully pink.

The right frontier constraint (Polanyi and Scha, 1986) constraints the accessibility of antecedents for pronouns
The evolution of discourse is driven by discourse topics (van Kuppevelt, 1997) or questions under discussion (QUD, Roberts, 1996, Ginzburg, 1995)
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Givenness and anaphoricity

**Givenness in discourse**

- Sentence backgrounds represent *given* information (Halliday, 1970, Schwarzschild, 1999)
- A model of discourse must also allow access to givenness information
- Question: How do we model givenness of information?
Givenness and anaphoricity

Givenness in discourse

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- A model of discourse must also allow access to givenness information
- Question: How do we model givenness of information?
(10) Q: Who did John’s mother praise?  
A: [She praised]_{bg} [BILL]_{F}.

- Schwarzchild (1999): a background is given if it is entailed by the context.
- I argue that a background is given if (the discourse referents of) all of its parts are anaphorically bound by an antecedent (either under identity or under a part-of relation).
Anaphoricity: a linguistic expression is anaphoric if part of its meaning is derived from its antecedent.

Anaphoricity is to be understood here as a relation between (variables that hold) discourse referents, as in DRT (Kamp and Reyle, 1993).

That requires that background element must correspond to a referential unit.
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Referentiality and semantic typing

- Background elements are restricted to the same semantic types as other anaphors (e.g. entities, events, properties, etc...)

Four arguments in favour of typed backgrounds

- Complex inference patterns: Multiple partial matches
- Links and tails are properly typed units
- Disjoint antecedents for a single background
- Some linguistic elements show an inability of being anaphoric
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Givenness and anaphoricity

Links, tails and partial matches

(11) a. What about the staff members? Do they like broccoli?

b. \([\textit{The boss}]_{\text{link}} \text{ HATES } [\textit{vegetables}]_{\text{tail}}\).

In such cases the background would both have to widen and narrow down the given information:
staff\_members > boss
and
broccoli < vegetables
Links, tails and partial matches

- The link/tail distinction reduces the problem considerably
- Links and tails are anaphoric separately
- The behaviour of links and tails is surprisingly coherent:
  - links may be more specific than their antecedent
  - tails may be more general than their antecedent
- While the background in (11) is not of a referential type, the link and the tail are
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Disjoint antecedents for backgrounds

(12) Jack said the American president drinks. What did Gilles say? He said the [FRENCH]f_focus president drinks. (Schwarzschild, 1999, p.168)

- The background as a whole has a disjoined antecedent
Elements which are never anaphoric

- Higher order types, such as quantifiers and polarity values are never anaphoric (Chierchia, 1984) and cannot serve as sentence topics either.

(13) * All$_i$ men are different and anaph$_i$ animals are the same.

(14) # As for all, [all]$_{\text{link}}$ cats are grey
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Links and tails are descriptive anaphors

- Descriptive anaphors have a stronger ability to identify their antecedents
- Descriptive anaphors have the ability to only partially match their antecedent
- But: links and tails are not lexically specified as anaphors, unlike pronouns
- ⇒ The main difference between links/tails and pronoun-type anaphors is their additional descriptive content.
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- Partial matches
- Kind sensitivity
- Violation of island constraints in donkey sequences
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- Partial matches
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Partial matches

- Partial matches are no problem, since links and tails are descriptive anaphors

(11)  
   a. What about the staff members? Do they like broccoli?  
   b. [**The boss**]_link HATES [vegetables]_tail.
Kind sensitivity

- Links and tails pattern with pronominal one and similar anaphors

(15)  a. Pirates are scum.
     b. Nevertheless Mary MARRIED [a pirate]tail.
     b’. Nevertheless Mary MARRIED one.
Donkey sequences

(16) a. # Every linguist discussed a donkey sentence. Also one computer scientist EXAMINED it.

b. Every linguist discussed a donkey sentence. Also one computer scientist EXAMINED [a donkey sentence]$_{\text{tail}}$.

c. Every linguist discussed a donkey sentence. Also one computer scientist EXAMINED one.

Nominal kinds are introduced via presupposition accommodation. The so introduced kind referent takes scope over the donkey island.
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Since links and tails are descriptive anaphors they have a stronger ability to identify their antecedent

⇒ their antecedent may be more distant than the antecedent of a pronoun

⇒ establishing an anaphoric link has an effect on discourse structure in that a discourse segment is closed off.

As a result intermediate discourse nodes are popped of the discourse stack and are not available for further attachment of new discourse segments.
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As a result intermediate discourse nodes are popped of the discourse stack and are not available for further attachment of new discourse segments.
1. Per fer règim, s'ha de tenir una especial voluntat.
   ‘If you are on a diet you have to have special willpower.’

2. [ No com el Gallardo, que me'l trobo l'altre dia i li dic: "Com estàs?".
   ‘Not like Gallardo, which I saw the other day. I asked him:
   “How are you?” ’

3. I em diu: "Fa tres setmanes que faig règim".
   ‘And he says: “I've been on a diet for three weeks.”’

4. Dic: "Ah, sí? I quan has perdut?".
   ‘And I: “Oh? And how much did you loose?”’

5. Diu: "Tres setmanes".
   ‘He: “Three weeks”:’

6. I té raó. ]
   ‘And he's right.’

   ‘I don't have the willpower either.’

8. Quan faig règim, ho passo fatal.
   ‘When I’m on a diet I’m having a terrible time.’
   (Andreu Buenafuente, 200*, p.103 cited by Mayol, 2002)
‘If you are on a diet you have to have special willpower.’

‘Not like Gallardo …’

‘I don’t have the willpower either.’
There are cases where apparently both a link- and a tail-realisation is possible (Brunetti, 2006, to appear)

(18) Q: Què en saps de l’Enric?
‘Any news about Enric?’

   no cl know nothing, [of art Enric]tail.

b. [De l’Enric]link, no en sé res. Però ...
   [Of art Enric]link no cl know nothing. But ...

(Catalan)
(19) Q: Què en saps de l’Enric?
‘Any news about Enric?’

   no cl know nothing, [of art Enric]tail.

(20) **QUD**: *What do you know about Enric?*

   "d – topic : Enric’

   **QUD**: *What about Enric?*

   *No en sé res, de l’Enric.*
(21) Q: Què en saps de l’Enric?  
‘Any news about Enric?’

b. [De l’Enric]_{link}, no en sé res. Però ... [Of art Enric]_{link} no cl know nothing. But ...

(22) $r' d \rightarrow \text{topic : } x : x > \text{Enric'}$

QUD : What about x?

$r' d \rightarrow \text{topic : Enric'}$

QUD : What about Enric?

Què en saps de l’Enric?  
De l’Enric, no en sé res, però...
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Conclusions

- Links and tails are strictly anaphoric elements
- The only difference between links/tails and pronoun-type anaphors is that the former are descriptive anaphors
- The strict anaphoricity approach can account for both the behaviour of background anaphors and the impact that information structure has on discourse structure
- Links are closely tied to discourse structure because they must be bound by a discourse topic
Conclusions

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Conclusions

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Further research questions

- Which role do discourse relations (e.g. narration, elaboration, ...) play discourse relations (Asher, 2004)?
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- How can we treat higher order anaphoricity, like anaphoricity of properties (Chierchia, 1984)?
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Thank you!