

Computing Definites with Unarticulated Arguments

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Associative anaphora - a common view

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Anaphora is traditionally seen as a relation between two linguistic expressions: An anaphorically used expression and its antecedent.

Correspondingly, also Associative Anaphora is typically seen as a relation between two expressions

- ❖ an anaphorically used definite NP and
- ❖ an NP antecedent

(1) *A car stopped. The driver got out.*

Associative anaphora

- as definite full NP anaphora

(1) A car stopped. The driver got out.

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The engine sounded funny.

The wheels were all painted white.

The noun *car* would denote the concept CAR, which i.a. presumably contains the information that

cars are vehicles, i.e., CAR is subsumed by VEHICLE, & inherit the features and roles (one-place and relational properties) of VEHICLE, such as HAVE_WHEELS, HAVE_ENGINE, HAVE_DRIVER.

The discourse referent of *car* would thus introduce, implicitly, further discourse referents, like wheels, an engine, and a driver, which are available as referents for anaphoric reference by definite NPs.

Associative anaphora

- problems with the common view

What is nice about this story is

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- that it assimilates associative anaphora to regular anaphorically definite reference:

A car stopped. The driver got out.

A car stopped. {The car/ it} had a flat tyre.

What I dislike is

- that it assumes the activation of practically all knowledge that may be connected to the concepts denoted by antecedent expressions.

This is not a plausible processing story: We don't want all features of these concepts, the car with driver, spare parts and all, as discourse referents.

Associative anaphora

- Functional Concepts

An important point in Löbner's approach to definiteness:

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- The head nouns of the definite NPs, *driver*, *engine*, etc. are interpreted as denoting functional concepts, like $[[\text{driver}]] = \lambda y \lambda x. \text{DRIVER}(x, y)$, with an unarticulated argument y .

The discourse referent, introduced by the antecedent expression *a car*, would then fill this argument slot, and the function correctly yields the driver of the car mentioned as the referent of *the driver*.

But how does our function know that it is to pick the discourse referent of *a car* as its argument?

– Well, it doesn't, or does it?

Associative anaphora

- looking for improvement

Discourse referents are plain instances of the lexical denotations of the nominals that introduce them into discourse, like $[[\text{car}]] = \lambda x \in D_e. \text{CAR}(x)$,

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and this does not provide us with driver, engine, or wheels

A possible solution is this:

- Read the lexical concept *CAR* as a pointer to a concept that is more fully represented in the general (non-linguistic) conceptual representation, which has all the information about driver, engine, and wheels

This maintains the semantic-pragmatic or linguistic-conceptual boundary, does not add spurious discourse referents, but still gives access to the information we need.

Associative anaphora - more problems

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- sounds like a good story. But it can't be the full story yet, because of examples like the following...

(2) A Lotus 2-Eleven was sold on ebay.

b. The price was ridiculous.

b'. #The sound was terrific.

(3) A Lotus 2-Eleven was passing.

b. #The price was ridiculous.

b'. The sound was terrific.

Associative anaphora Problem cases

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(4) A Lotus 2-Eleven was offered in the paper.

b. The price was ridiculous.

b'. #The driver was wearing a funny hat.

(5) A Lotus 2-Eleven just stopped.

b. #The price was ridiculous.

b' The driver was wearing a funny hat.

just in case you don't know the Lotus...

but the examples also work with more moderate cars



(6) A car was sold.

The price was ridiculous.

(7) A car was passing.

#The price was ridiculous.

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Where is the problem?

Suppose our functional concept is this:

$[[\text{price}]] = \lambda y \lambda x. \text{PRICE}(x, y)$

and this function is applied to the discourse referent introduced by the antecedent, *a car*

- then, in (7), this discourse referent is apparently not in the domain of our function, while in (6) it is
- so, apparently, the discourse referent must be conceptualized, or represented, differently in (6) and (7), - not simply as a car: $[[\text{car}]] = \lambda x \in D_e. \text{CAR}(x)$.

How does this difference come about?

Domain restrictions for functional concepts

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... there are more things that are not usually in *the domain of the price function*:

? *The price of rain...*

? *The price of the ergative...*

So the domain of the function `[[price]]` is apparently restricted to things that are represented as things that have a price, i.o.w. as *commodities*.

- The feature PRICE is a feature *only of concepts that are subsumed by the concept COMMODITY*.

(8) A car was sold. #The sound was terrific.

(9) A car was passing. The sound was terrific.

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Similarly for the SOUND *concept*.

Also the function $\lambda y \lambda x. \text{SOUND}(x,y)$ is defined only for a specific domain:

? *The sound of the sky...*

? *The sound of an equation...*

So let's suppose that only *physical events* have a sound.

- The function SOUND_OF is a feature only of concepts that are subsumed by the concept PHYS_EVENT.

Differences in representation

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How does the representational difference between discourse referents come about?

In two steps:

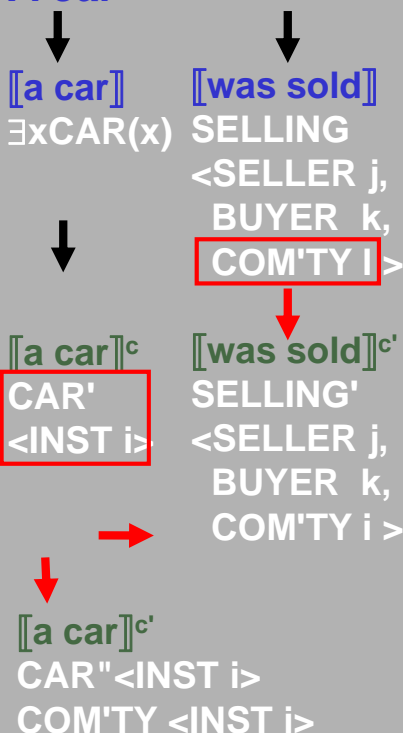
- Our referent is introduced by the NP *a car* as a plain instance of the sort CAR – which does not lead to any difference.
- the VP *was sold* modifies this representation and subsumes this referent, in addition, under COMMODITY, or PHYSICAL EVENT or some other concept.

How does this happen?

Incremental construction of a representation A car was sold. The price...

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A car *was sold.*



unify spec & arg3

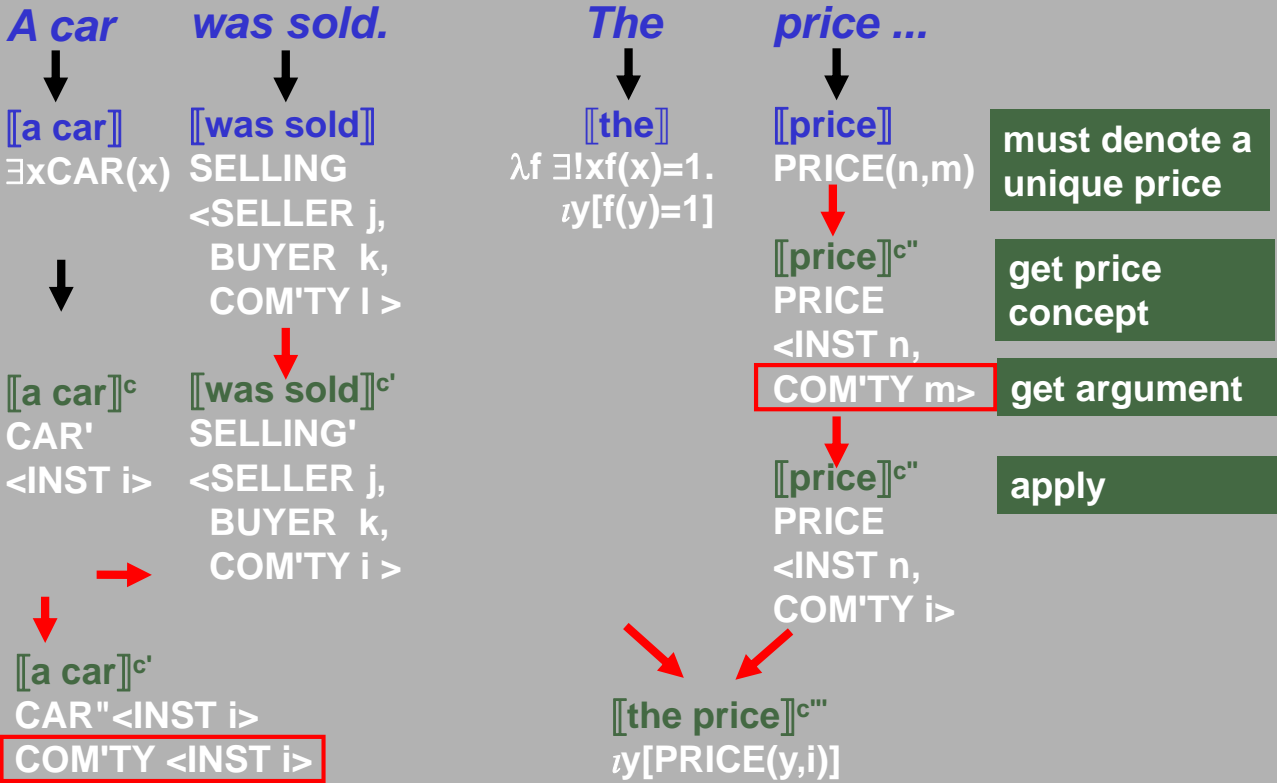
CAR' <INST i>
COM'TY <SELLER x, BUYER y,
PRICE z,...>

CAR'' <SELLER x, BUYER y,
PRICE z, ..., INST i>

Incremental construction of a representation

A car was sold. The price...

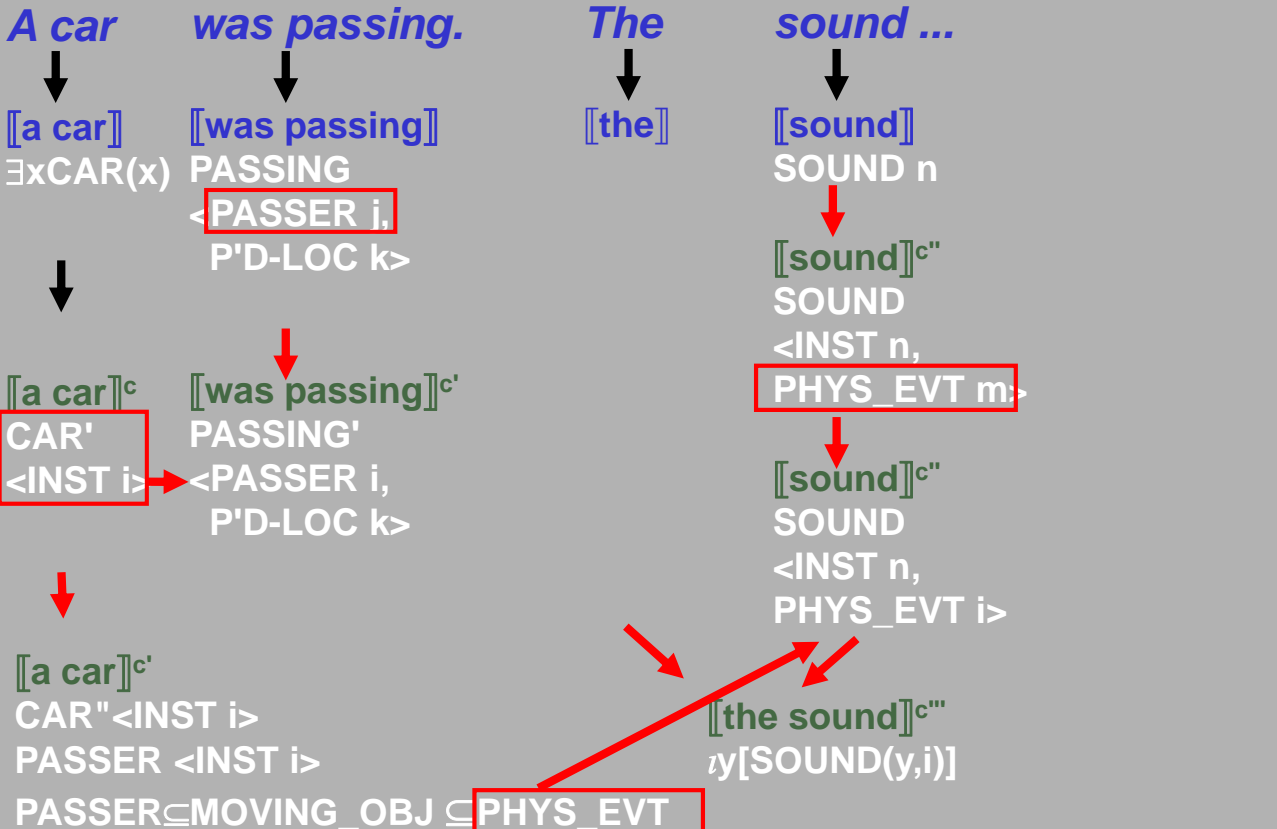
15



Incremental construction of a representation

A car was passing. The sound...

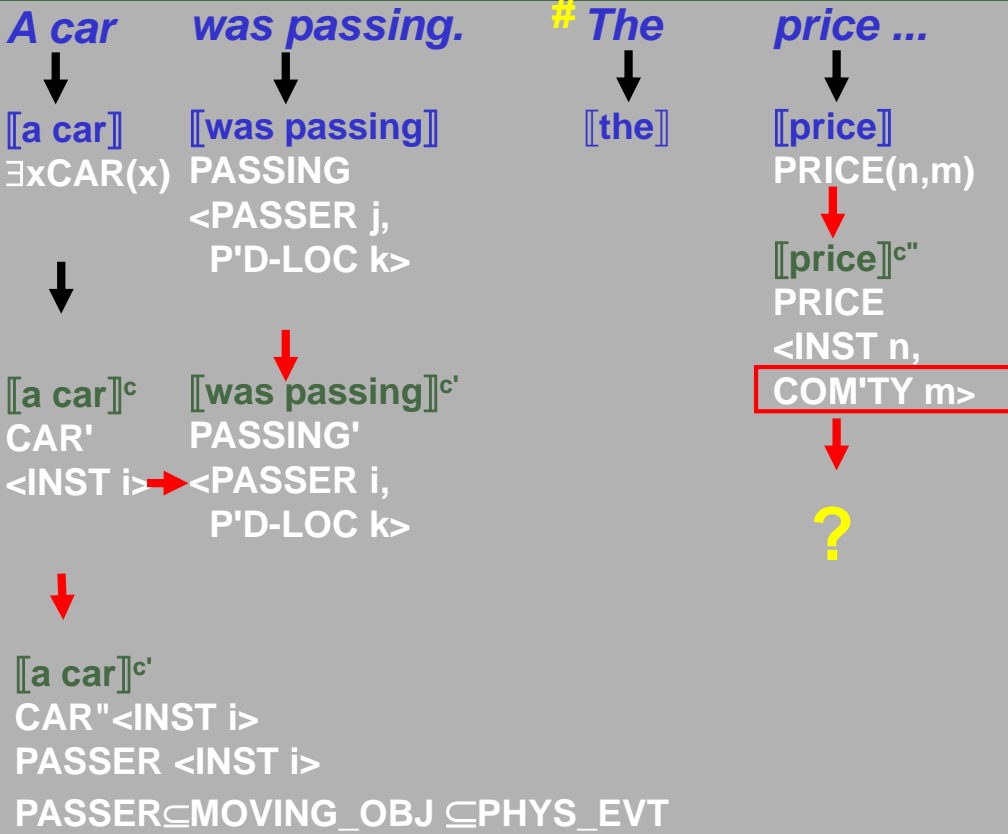
16



Incremental construction of a representation

A car was passing. #The price...

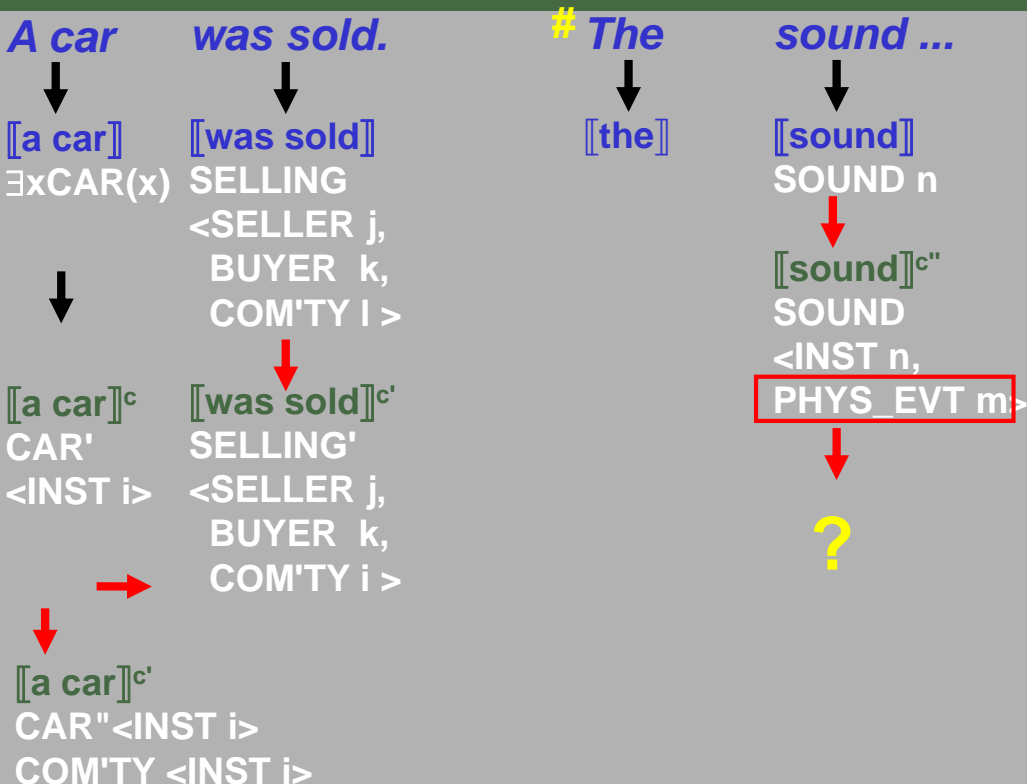
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Incremental construction of a representation

A car was sold. #The sound...

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Changes in subsumption relations

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Our discourse referent is an instance of CAR in any case, but - in the case we just looked at - also of

COMMODITY, or $PASSER \subseteq MOVING_OBJ \subseteq PHYS_EVT$

The `[[price]]` and `[[sound]]` functions are defined for COMMODITIES and PHYS_EVT, which explains that the car as a commodity has a price, and the car as a moving object may produce a sound.

Other cases ("*A car stopped. The driver...*") may be more complicated and perhaps cannot be dealt with by feature information alone. We may need extra world knowledge, such as the fact that a moving car (though not a car for sale) is ordinarily associated with a driver.

Conceptual representation in discourse: CCs

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So the core of the current proposal is quite simple:

The conceptualization of a referent in discourse

- ❖ is constrained by the denotation of the NP by which it is introduced into discourse
- ❖ and by the denotation of further predicates.

I call these contextual conceptualizations Contextual Concepts (CCs).

Discourse referents, constructed as instances of CCs, seem to provide exactly the features that are required as arguments of functional concepts in definite associative anaphora.

Conceptual representation in discourse: CCs

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Discourse referents, constructed as instances of CCs seem to provide exactly the features that are required as arguments of functional concepts in definite associative anaphora

- ❖ while *pure lexical denotations* are too underspecified for this task: They don't provide enough information and leave different types of discourse referents undistinguished
- ❖ and a *full representation of all knowledge available*, such as the introduction of all entities and properties associated with a concept as discourse referents, would be both uneconomical and would, again, obliterate distinctions between different conceptualizations.

Objection: Accommodation to "the situation"?

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Do we need to CCs? How about simply accommodating the unarticulated price or sound arguments to the situation?

- (1) *A car was sold.*
- a. The price was ridiculous.*
 - a'. Its price was ridiculous.*
 - b. The evening was saved.*
 - b'. #Its evening was saved.*
- (2) *A car was passing.*
- a. The sound was terrific.*
 - a'. Its sound was terrific.*
 - b. The stop sign was ignored.*
 - b'. #Its stop sign was ignored.*

Objection: Accommodation to "the situation"?

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The comparison with possessives argues that there is a difference between associative definites and accommodating situational definites:

The former require a CC of an explicitly introduced discourse referent as their argument, and so do the associative definites in the (a) versions, which make this relation explicit by pronominal anaphora.

When definites lead to situational accommodation, no such relation to an explicitly introduced discourse referent is available, as is shown by the possessives in the (b) versions.

Accommodation to the situation

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Eva knew what she wanted: she wanted the whole house transformed, every inch of it, and she wanted energetic, industrious people around her. We got down to it immediately. With relief, I abandoned any pretence at being clever and became a mystic assistant labourer. I did the carrying and loading and smashing, Eva did the thinking, and Ted ensured her instructions were carried out.

(example from Löberner 1998/2003)

Summing up

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Situational accommodation is surely a topic for a theory of definiteness, but it makes sense, I believe, to keep it separate from definite associative anaphora.

I tried to show in this talk that also for definite associative anaphora, i.e. for cases where the definite is interpreted in relation to a discourse referent that was explicitly introduced by an NP, we still have some problems finding the correct picture and a good formal model.

I apologize if I have made what may have looked like a clear picture a little messier with the Lotus 2-Eleven cases.

Summing up

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Note that the sketch of the account just offered attempts to distinguish carefully between lexical meanings and concepts.

The motivation is to isolate properties of linguistic knowledge from conceptual information and general cognition – even though we need both in order to explain language processing.

And note, also, that we have been parsimonious w.r.t. what information we have attributed to our concepts. If we had put everything we know about cars into our initial car concept, there would have been no way of distinguishing between different discourse-based concepts of cars.

Thank you!

