

Lexical & Contextual Concepts

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Immediate use of information in language processing

Empirical observation suggests that **language comprehension** integrates information from linguistic utterances with information that is **antecedently or concurrently available from other sources**, as soon as the information becomes available to the processor.

Visual world (1)

Hartmann & Katz 2005

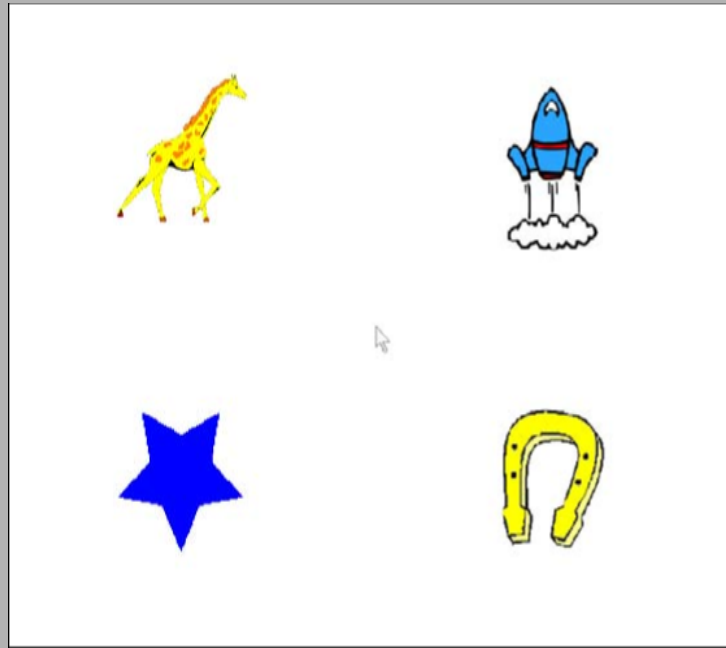
default nouns:

die Giraffe

die Rakete

der Stern

das Hufeisen



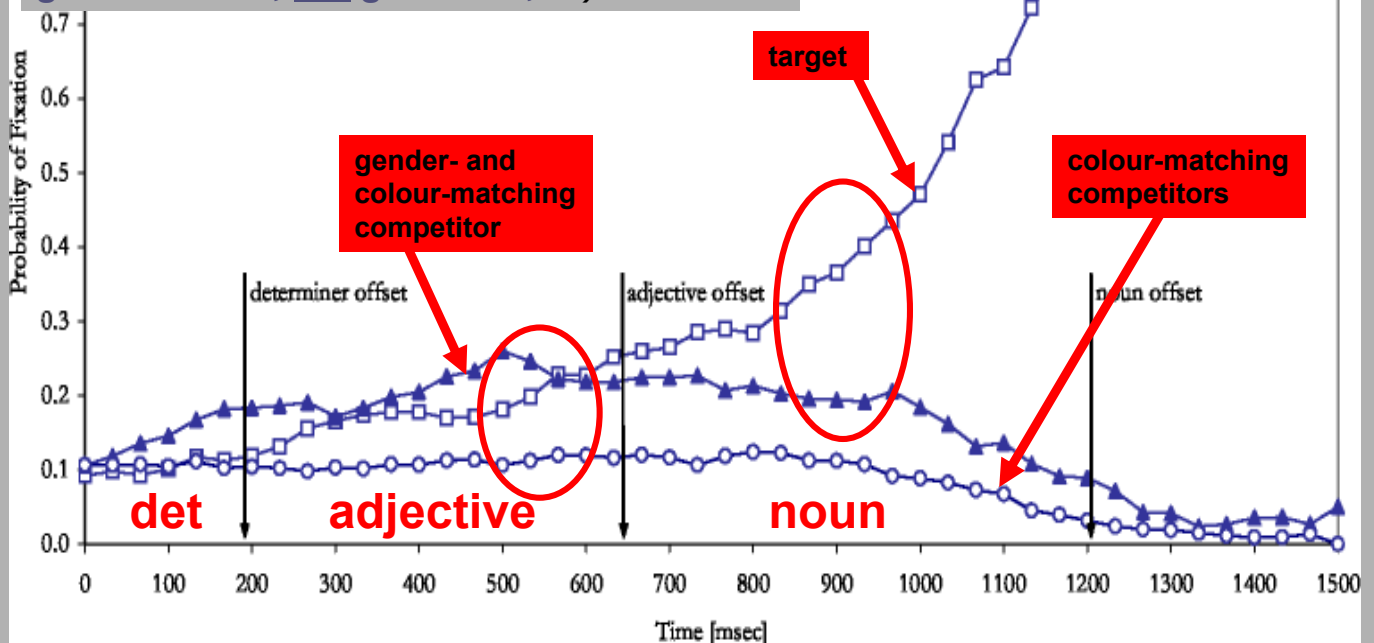
Klicken Sie auf die blaue Rakete.

click on ... [followed by a def. determiner, adjective, and noun]

Visual world (2)

Hartmann & Katz 2005

condition: colour and gender of default noun for target object are shared with one other object, e.g., die gelbe Giraffe (vs. die gelbe Banane, der gelbe Hut, ...)

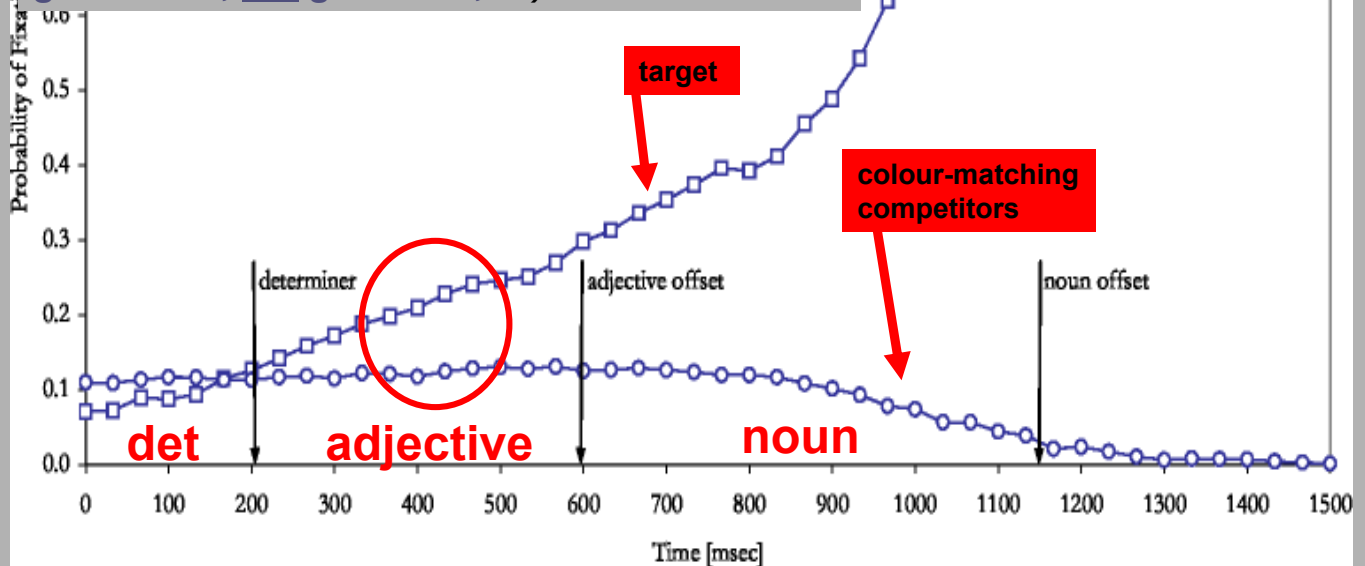


Visual world (3)

Hartmann & Katz 2005

subjects decide about reference as soon as they have enough information

condition: target object singled out by gender of default noun e.g., *die gelbe Giraffe* (vs. *das gelbe Auto*, *der gelbe Hut*, ...)



Eye tracking for reference resolution (1)

Karabanov, Bosch, König, 2007

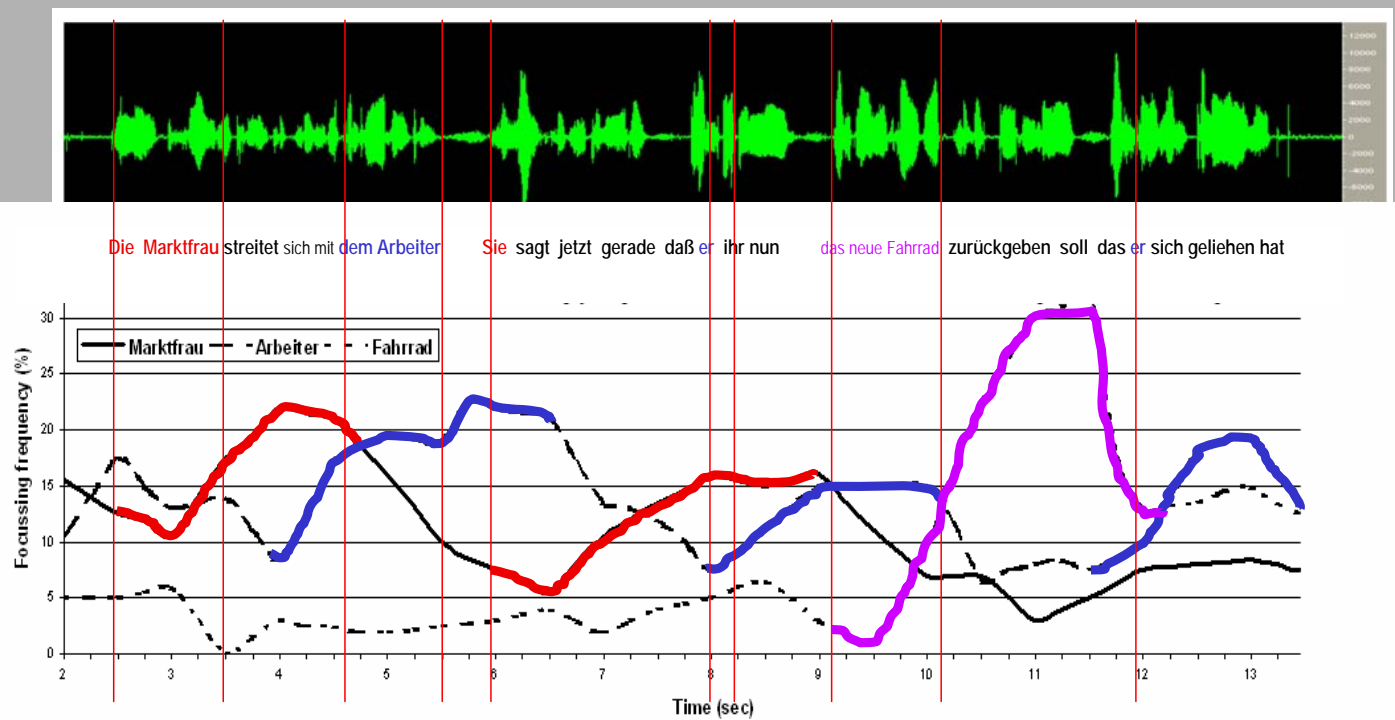


Heute ist Markt im Dorf. Die Marktfrau streitet sich mit dem Arbeiter. Sie sagt jetzt gerade, dass er ihr nun das neue Fahrrad zurückgeben soll, das er sich geliehen hat.

It's market day in the village. The market woman is qibbling with the worker. She's just saying that he should give the new bike back that he das borrowed.

Eye tracking for reference resolution (2)

Karabanov, Bosch, König, 2007



Immediate evaluation

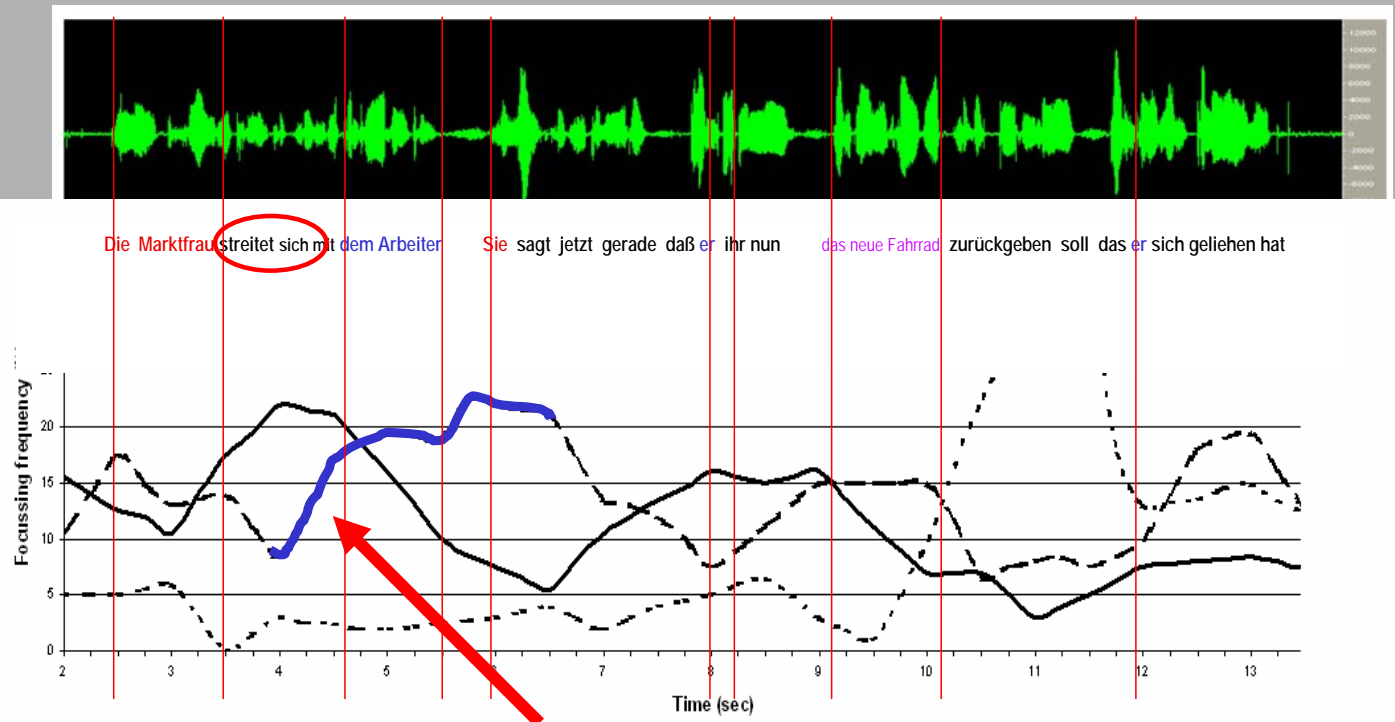
The experimental evidence shows that visual and linguistic input are processed simultaneously: Referential expressions are resolved to the utterance context immediately - **before sentence meanings are computed.**

Should this not also be the case for other than referential expressions (predicates, unsaturated expressions)?

Anticipation effects, as in the Karabanov e.a. experiment, seem to suggest this.

Eye tracking for reference resolution (3)

Karabanov, Bosch, König, 2007



A problem for the semanticist

The philosophical conception of sentence meanings that are

- constructed compositionally in the semantics, and
- are subsequently adjusted to contextual or background information

is hard to fit to empirical observation about the incrementality of language comprehension.

David Kaplan's architecture for indexicality

compositionally
constructed
sentence
meanings

Characters: Contexts → Contents
propositions,
truth
conditions,
what is said

Utterance
meanings

what is meant

Context-dependence of indexicals

This takes the contextual variation into account for the denotations of indexical expression like *I, you, here, now,...*

The computability of contents rests on the assumptions

- that it is a process of **variable saturation**: *The variables are specified in the LF and You know exactly what kind of information to look for in the context.*

Context-dependent predicate expressions

But what about *predicate expressions* :

Also their denotation is not always *lexically given*.

Sometimes it would seem that predicates behave like indexicals:

Point of view

My apartment is nearby

The department is on the left side of the street

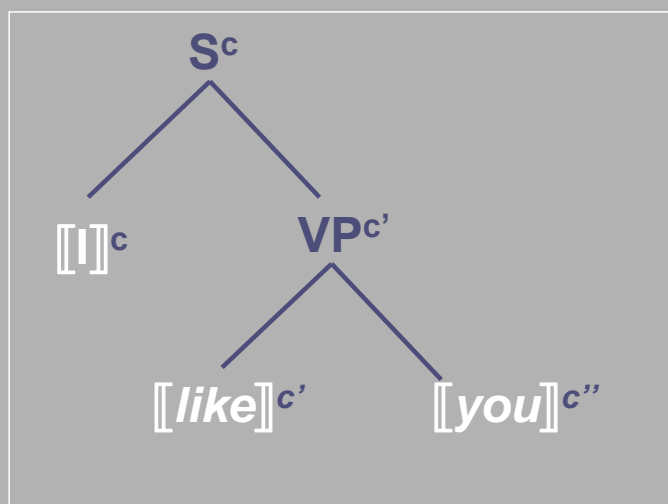
Comparison class

He is a tall basketball player

He is a tall jockey

Immediate context influence

This invites an application of Kaplan's conception to meanings of **constituents** - ultimately lexical items - as they become available consecutively during sentence processing.



Productive modification of predicate denotation

The kind of contextual influence we are interested in

- is a form of modulation that is made and understood automatically and with no effort,
- remains unnoticed by the language user, and
- can yield, in principle, infinitely many variants of arbitrarily fine granularity
- not (at least not today): non-literal uses!

Typical cases:

{My watch / The tap / The lecture...} is running.

{Fred / my computer / my solution} is working

There is a gas station nearby.

Productive modification (i)

where the semantic values of argument expressions contain all information relevant

(1) *to cut*

hair, bread, cake, lawn, ...

(2) *to open*

book, letter, door, bottle, buffet, ...

(3) *to run*

tap, water, clock, show, dog, ...

Open questions:

- What if you only have the argument **expressions** & not their **values**?
- **How many different types** of arguments are there?
What if the list is not finite?

Productive modification (iii)

The variation in the denotation of *work* is inferentially and hence *truth-conditionally relevant*.

Nothing follows about Fred's location when

Fred is working

is an answer to

How can Fred afford these expensive holidays?

The variation is *stable within the utterance context*.

Fred is working and so is Pete.

cannot be interpreted as, e.g.,

Fred is in his office and Pete can afford expensive holidays.

What is this variation a variation of ?

- not of lexical meanings (characters)
(because the variation is productive and correlates with variation in the context)

character: context → content

- but of semantic values (contents, denotations)

Denotations of predicate expressions are

Contextual Concepts (CCs)

(Cf. Frege's idea that the values of "predicates" are concepts.)

What are Contextual Concepts ?

Contextual Concepts are

- truth functions that are defined for all arguments in the intended context
- constructed on the fly in the course of language production and comprehension
- linguistically "real":
They define the required notion of identity in VP anaphora, VP ellipsis, coordination, question-answer coherence; they define units of counting.

Identity of VP denotations

Fred is working, and so is Pete.

Fred is working, and Pete ___ too.

Fred is working, and Pete is working.

Counting (talking of Fred, Pete, and a few others):

I wonder how many of them are working?

Q-A relations:

Is Fred or Pete working? Pete is working.

This is NOT identity of meaning, but identity of denotation:

Fred is working for her, and so is Pete.

the referent of *her* must be the same for Pete and Fred and forms part of the specification of the CC ascribed to both Pete and Fred.

How are Contextual Concepts computed?

The computability of the **content of indexicals** rests on the assumption that it is a process of **variable saturation**: Lexically specified variables are evaluated by the context (*speaker, listener, place, time,...*).

This won't work for **predicate denotations**, because

- there are **arbitrarily many parameters** with respect to which CCs can differ, and
- there is **no finite parameterisation of contexts** (i.e., there is no context-independent identity of contexts).

The computation of CCs differs for different information structure status

Anaphoric expressions are interpreted with reference to objects in the established discourse representation. There is no modification and no lexical semantics involved.

Focal expressions are interpreted via their lexical entries, plus modification.

But modification is a conceptual process and operates on conceptual representations: We are concerned with reasoning, not with linguistic semantics in any narrow sense.

Anaphoric vs. focal occurrence

*Is Fred **working**?*

focal occurrence

anaphoric occurrence

*a. No, he isn't **working**. He's sick.*

a'. No, he isn't. He's sick.

If both (a) and (a') mean the same, then the lexical semantics of "working" in (a) *can't be making a semantic contribution*

Computing values for anaphoric expressions

Anaphoric expressions select their denotations from a small and finite domain: the discourse representation.

The information used in their interpretation is structural information and high level semantic class information. - The interpretation is done by mechanisms of *anaphora resolution*. - The typical case are anaphoric pronouns.

Computing values for focal expressions

Focal expressions are mapped onto their values in two steps:

- i. the expression selects a lexical entry, which contains a pointer to a lexical concept.

----- **the semantics ends here** -----

The concept is part of a conceptual representation and is linked to other concepts via its internal structure, via subsumption, and via various axioms.

It is still largely underspecified with regard to what may be needed in the semantic values.

- ii. Conceptual processes and information from arguments, modifiers, and discourse, as well as non-linguistic sources complete the construction of semantic values.

Sample applications

(i): Transitive-Intransitive alternation

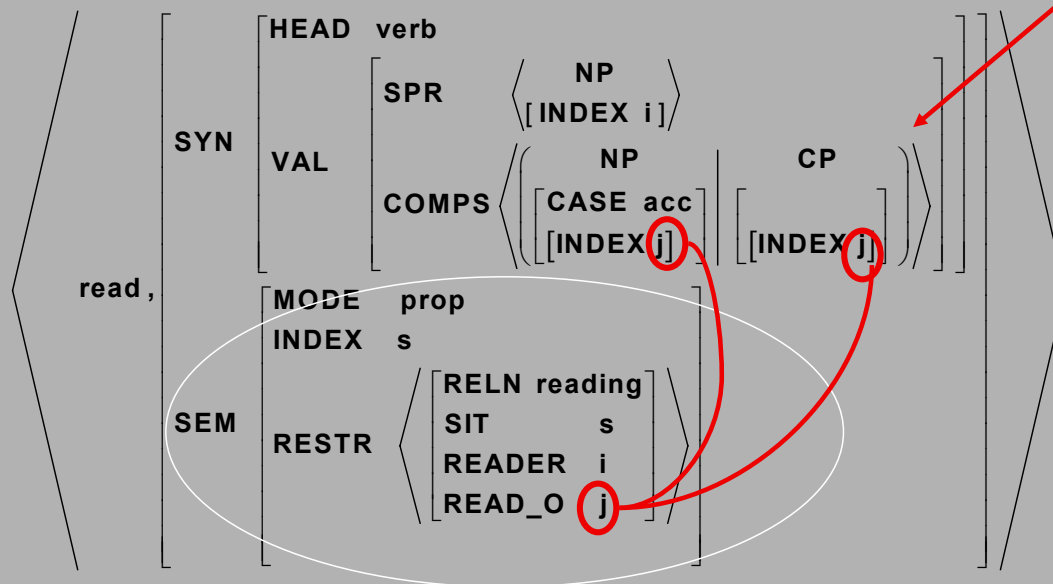
(1a) *Fred is reading a novel.*

(1b) *Fred is reading.*

(1a) *Fred is reading a novel.*

(1b) *Fred is reading.*

a lexical entry:



(1a) *Fred is reading a novel.*

(1b) *Fred is reading.*

The lexical concept $[[\text{read}]] =$

$\text{READ} = \lambda j \lambda i . \exists s (\text{READING}(s) \wedge \text{READER}(i, s) \wedge \text{READ_O}(j, s))$

- is subsumed by a more general concept

$\text{READ} \subset \lambda y \lambda x (\exists e (\text{EVENT}(e) \wedge \text{AGENT}(x, e) \wedge \text{THEME}(y, e)))$

- is inferentially related to other concepts

$\forall s (\text{READING}(s) \vdash \exists x (\text{READER}(x, s) \wedge \exists y \text{READ_O}(y, s)))$

(1a) *Fred is reading a novel.*

(1b) *Fred is reading*

?

What happens if the linguistic utterance doesn't provide an object argument?

- Syntactically it's not required
- Semantically, it's still assumed that there is one, cf. the discourse:

Fred is reading. But he's bored by the book.

#Fred is walking. But he's bored by the book

Definiteness requires identifiability / familiarity - The conceptual representation already contains a READ_O, as a result of understanding "Fred is reading".

The conceptual representation is the integration point for all relevant information, independent of their source

From lexical to contextual concepts

Fred is reading something.

Fred is reading that he won the pools.

Fred is reading an inscription.

Fred is reading a novel.

Fred is reading "Finnegan's Wake"

Fred is reading the daily paper.

Fred is reading "Ratnasiri Wickremanayake".

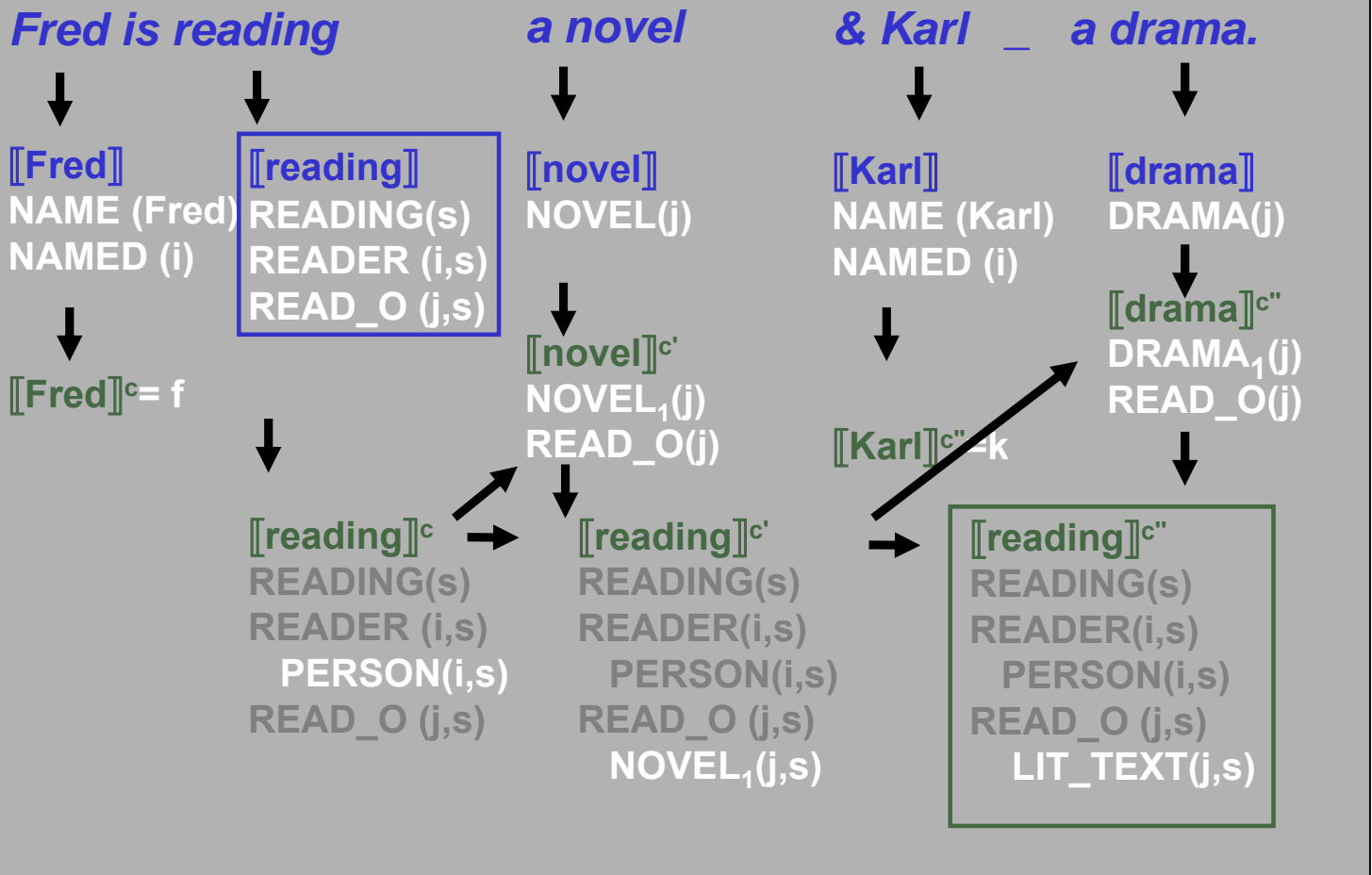
...

One lexical concept, but varying CCs

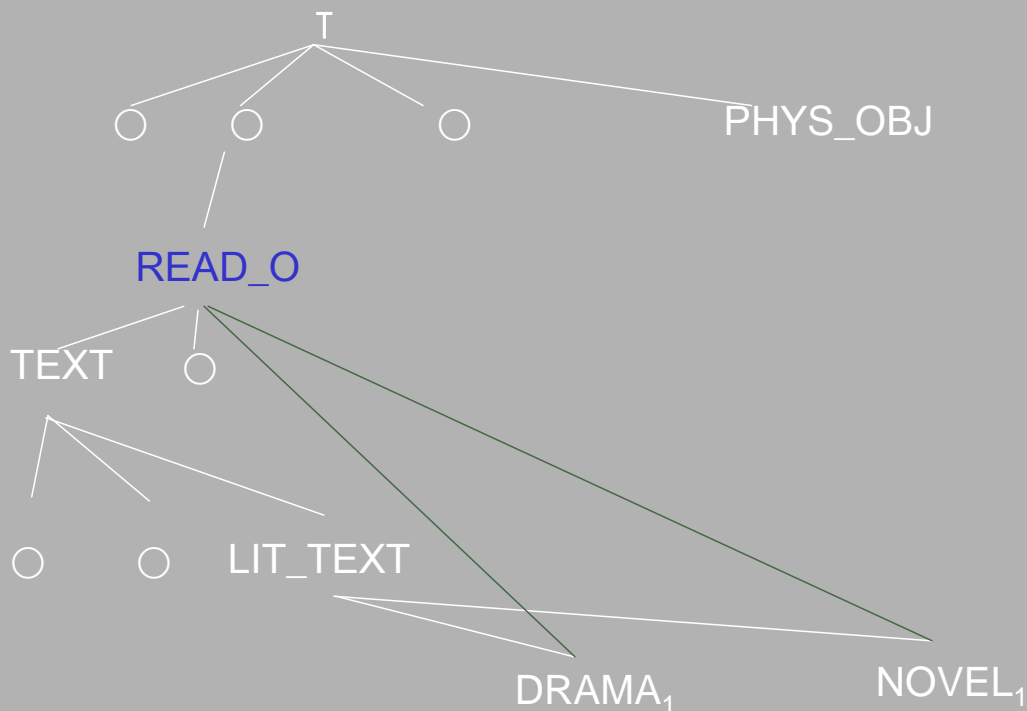
evidence:

1. VP anaphora & ellipsis
2. Inferences
3. Modification

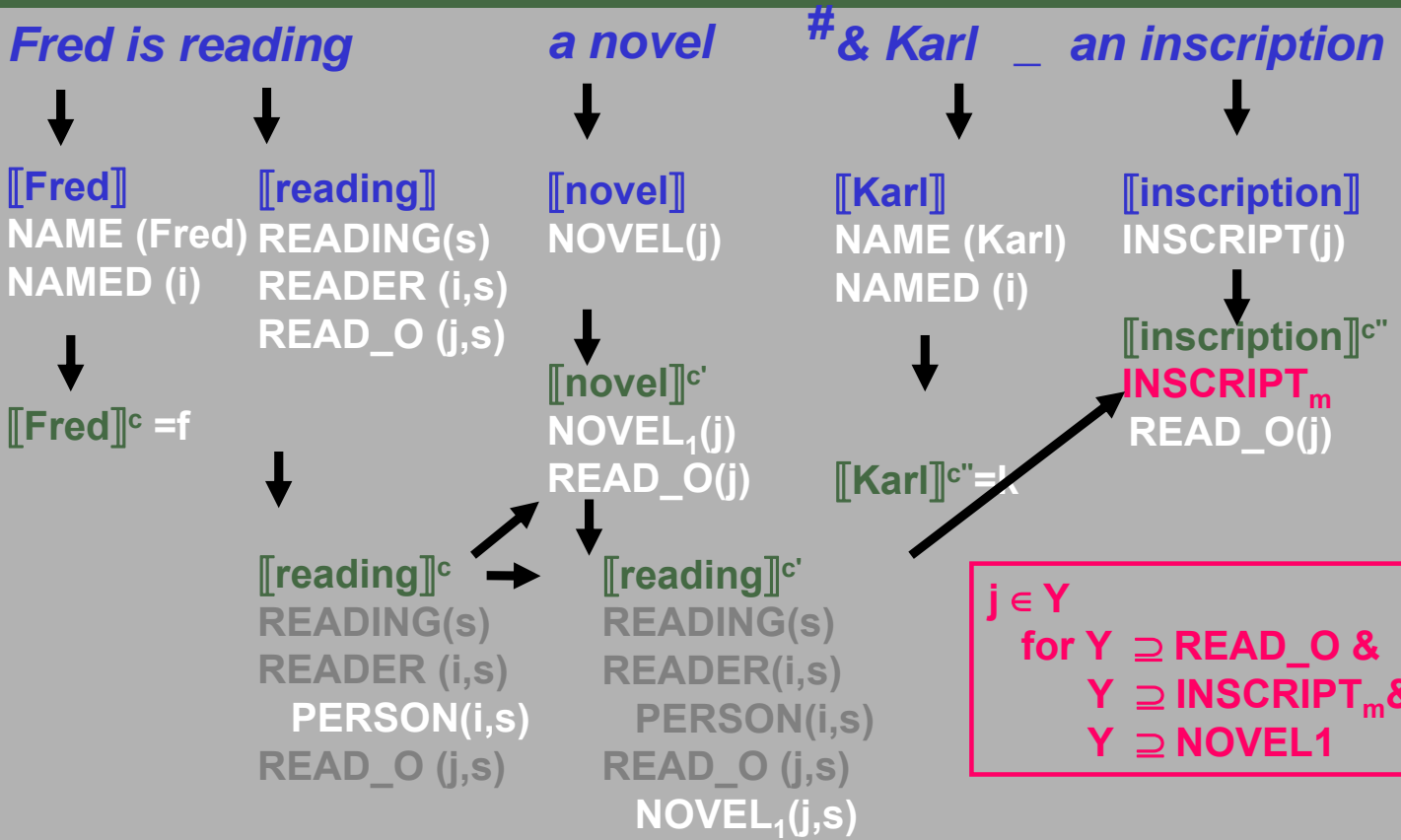
Incremental construction of CCs: An example



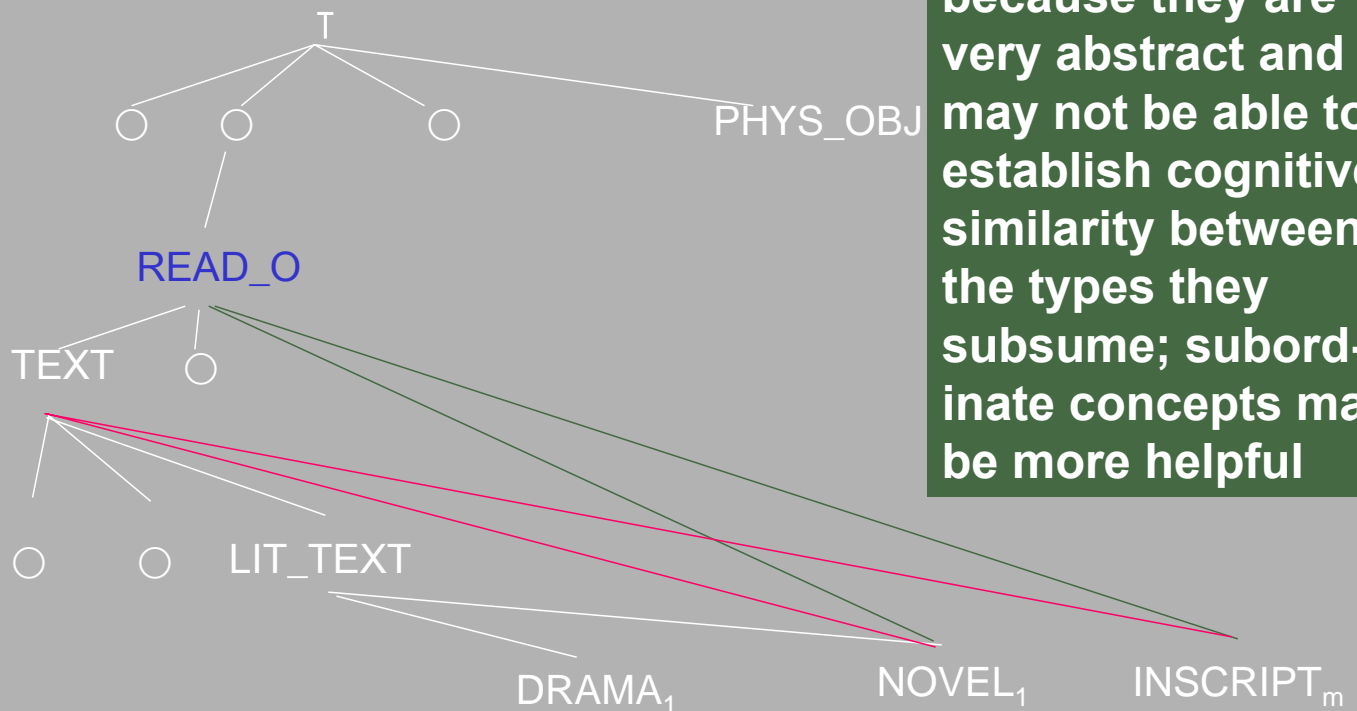
a "novel" concept



Incremental construction of CCs



lexical concepts may be insufficient for coherence



because they are very abstract and may not be able to establish cognitive similarity between the types they subsume; subordinate concepts may be more helpful

Lexical concepts

A **lexical concept** is **part of the lexical entry**, and provides a link to a vastly underspecified concept in the conceptual representation.

Concepts (sorts, types) in the conceptual representation

- inherit information from their super-concepts,
- provide inferential links to other concepts,
- integrate information from the utterance as well as non-linguistic sources to build contextual predicate denotations, i.e., CCs.

Summary (i)

A sketch for an account for contextual variation in predicate denotation

1. The methodology

- incrementality (to keep closer to processing)
- compositionality (to account for productivity and learnability)
- computability (well, in principle)

Summary (ii)

2. Some of the features

- Polysemy disappears from the lexicon and is located in the conceptual representation.
- There is no productivity in the lexicon, the lexicon is not "generative" (leaving aside questions of word formation, possibly lexical rules)
- The observed productivity is a conceptual, not a linguistic phenomenon.
- Semantic information in the lexicon is reduced to a concept link (disquotational lexicon) and subcategorization.
- Conceptual representation integrates constraints collected from argument selection, predication, and discourse and utterance context.

Thank you!