Bader & Meng 1999

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June 5, 2023

Introducing subject-object ambiguities

(1) German

a. *subject-relative clause*
Maria erzählte mir von der Frau$_i$, die.NOM$_i$ die Eltern angerufen **hat**.

b. *object-relative clause*
Maria erzählte mir von der Frau$_i$, die.ACC$_i$ die Eltern angerufen **haben**.

The ambiguity arises from the fact that *die* can have one of four possible sets of features:

die [ϕ:3SG, case:NOM]
die [ϕ:3SG, case:ACC]
**die* [ϕ:3PL, case:NOM/ACC]

Serial parsers and garden path

Most theories at that time assume parsers to be serial, i.e. only one analysis can be explored at a time.

When wrong analysis has been selected, parser needs to revise the structure that has been built up (=reanalysis).

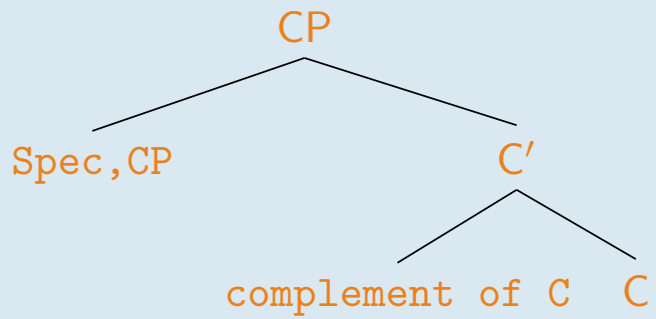
How does a serial parser work?

Let's see how our language system parses relative clauses, e.g.

(2) Maria erzählte mir von der Frau$_i$, die$_i$ einige der Kollegen angerufen { hat / haben }.

Step 1. Relative pronoun triggers generation of CP

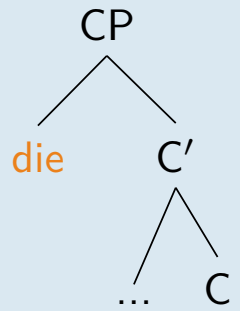
Maria erzählte mir von der Frau,



How does a serial parser work?

Step 2. Insert relative pronoun into Spec,CP

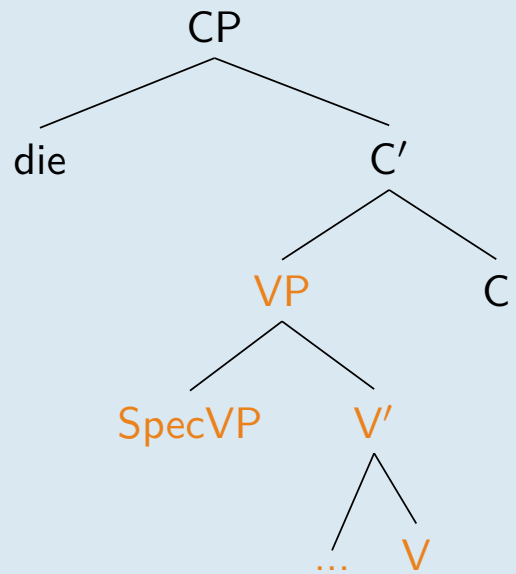
Maria erzählte mir von der Frau,



How does a serial parser work?

Step 3. Embedd a VP into CP. (Authors assume that a sentence only consists of VPs and CPs)

Maria erzählte mir von der Frau,



'First resort' and 'last resort' models

At this point, the parser has a choice:

- Either it integrates the lexical NP into the next available syntactic position (here: Spec,VP),
- or it inserts a trace at the next available syntactic position.

Depending on whether parser prefers positing a gap or not, the parser model is called 'first-resort' or 'last-resort' model respectively.

Which is the preferred choice of the parser?

'First resort' and 'last resort' models

From the syntactic perspective, serial parsers should posit gaps as last resort.

Minimal Chain Principle (MCP, DeVicenzi 1991)

Avoid postulating unnecessary chain members at S-structure, but do not delay required chain members.

Some theoretical background:

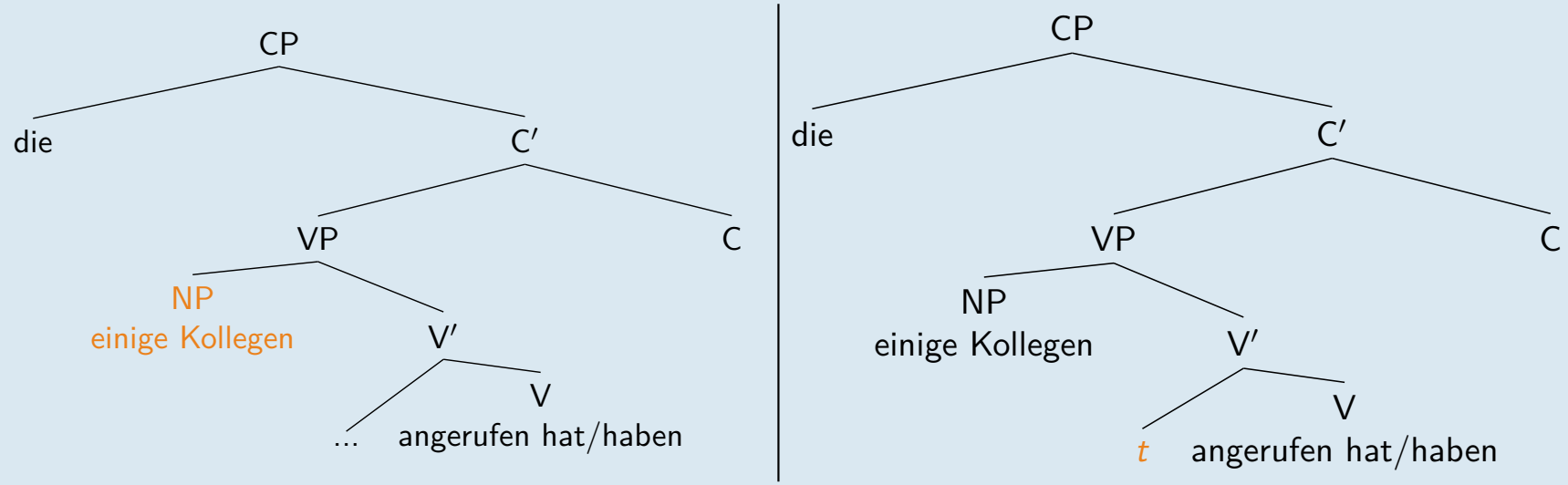
- Whenever we move a syntactic element, we establish a relationship between the moved element and the trace that's left behind
- We say that they form a chain of the form:
  (α, t) where α is the moved element and t the trace

According to the MCP, we should avoid creating any chains.

How does a serial parser work?

Step 4A. Assume 'lexical integration' of NP

Maria erzählte mir von der Frau,

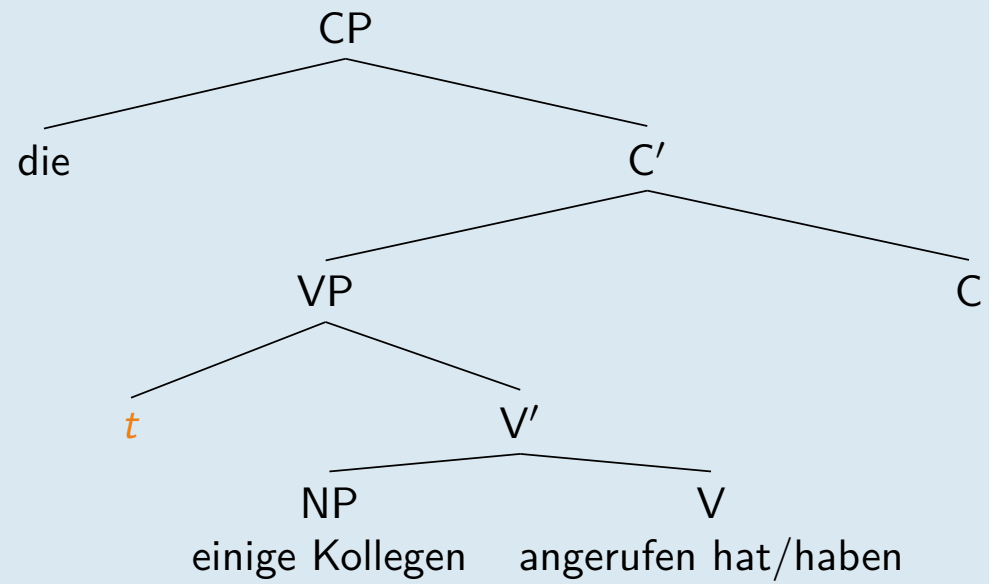


This model would predict that parser has a preference for object $\prec$ subject order. If V turns out to be SG, reanalysis becomes necessary.

How does a serial parser work?

Step 4B. Assume 'positing a gap'

Maria erzählte mir von der Frau,



This model would predict that parser has a preference for subject $\prec$ object order. If V turns out to be PL, reanalysis becomes necessary.

Consequences of MCP

Quick reminder:

Minimal Chain Principle (MCP, DeVicenzi 1991)

Avoid postulating unnecessary chain members at S-structure, but do not delay required chain members.

If MCP holds, our parser would choose option 4A (NP-integration), as we do not need to establish any chain.

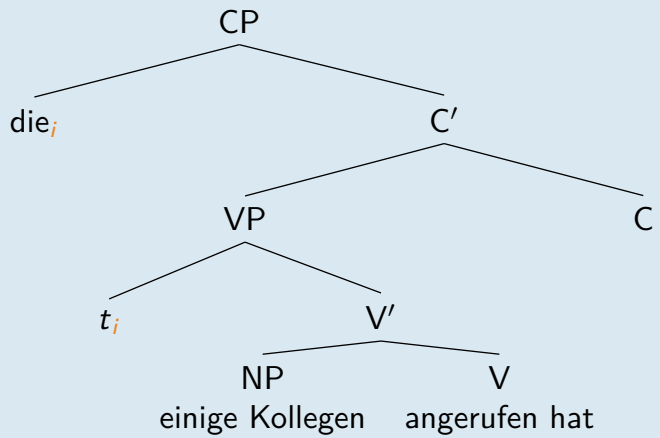
We will see if there is any evidence for MCP.

How does a serial parser work?

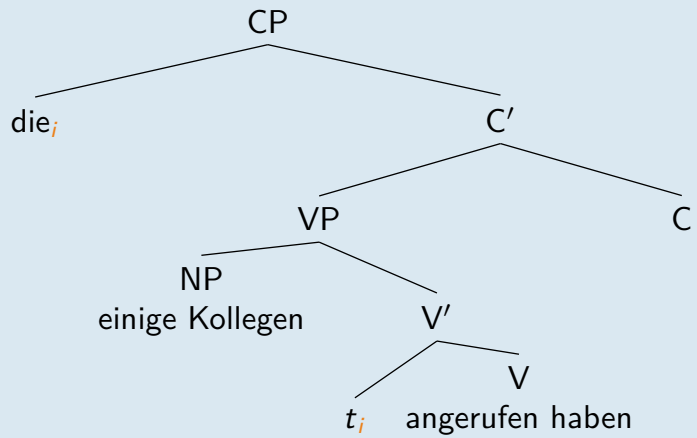
Step 5. Coindex trace with relative pronoun to form a chain.

Maria erzählte mir von der Frau$_i$,

A. subject-relative clause



B. object-relative clause



Ambiguous constructions in German

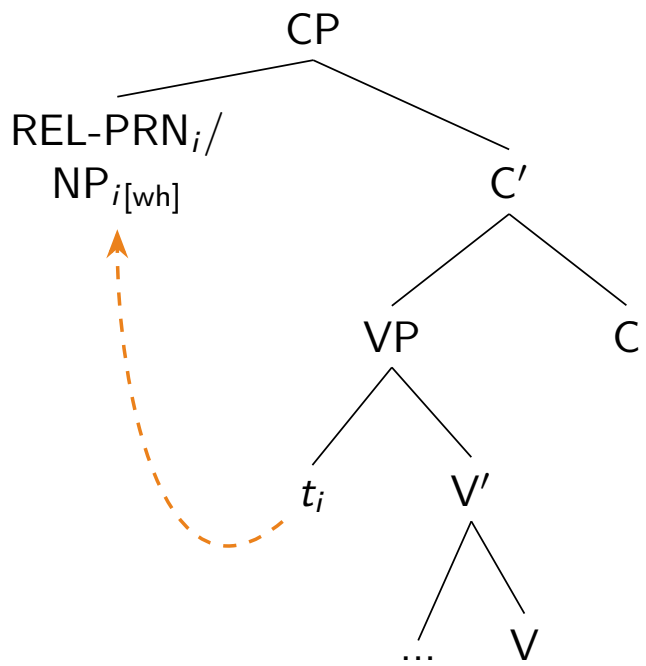
There are 4 types of ambiguities in German embedded clauses:

- scrambling
- pronoun movement
- relative clauses
- embedded wh-questions

Relative clauses, embedded wh-questions

Similar structure, e.g. for subject relative/wh-clauses:

(3)



Both relative clauses and embedded interrogative clauses require the existence of a chain (and a trace).

Relative clauses, wh-questions

Relative clauses

a. Maria erzählte mir von der Frau, [$_{CP}$ die$_i$ t$_i$ die Eltern
M told me about the woman, who the parents
angerufen hat]
phoned has
"Maria told me about the woman, who phoned the parents"

b. Maria erzählte mir von der Frau, [$_{CP}$ die$_i$ die Eltern t$_i$
M. told me about the woman, who the parents
angerufen haben]
phoned have
"Maria told me about the woman, who the parents phoned"

Wh-questions

a. Die Direktorin hat gefragt, welche Lehrerin$_i$ t$_i$ einige der
the director has asked which teacher some the
Kollegen angerufen hat.
colleagues phoned has
"The director asked which teacher phoned some of the colleagues."

b. Die Direktorin hat gefragt, welche Lehrerin$_i$ einige der
the director has asked which teacher some the
Kollegen t$_i$ angerufen haben.
colleagues phoned have
"The director asked which teacher some of the colleagues phoned."

Pronoun movement, scrambling

Pronoun movement

a. Die Direktorin hat erzählt, daß sie einige der Kollegen
The director has said, that she some the colleagues
angerufen hat.
phoned has
"The director said that she phoned some of the colleagues."

b. Die Direktorin hat erzählt, daß sie einige der Kollegen t
The director has said, that she some the colleagues
angerufen haben.
phoned has
"The director said that some of the colleagues invited her."

Scrambling

a. Die Direktorin hat erzählt, daß die neue Lehrerin einige der
The director has said, that the new teacher some the
Kollegen angerufen hat
colleagues phoned has
"The director said that the new teacher phoned some of the colleagues"

b. Die Direktorin hat erzählt, daß die neue Lehrerin einige der
The director has said, that the new teacher some the
Kollegen t angerufen
colleagues phoned
haben
have

Pronoun movement, scrambling

Scrambling is the phenomenon that arguments can be relatively freely 'moved around' in a sentence.

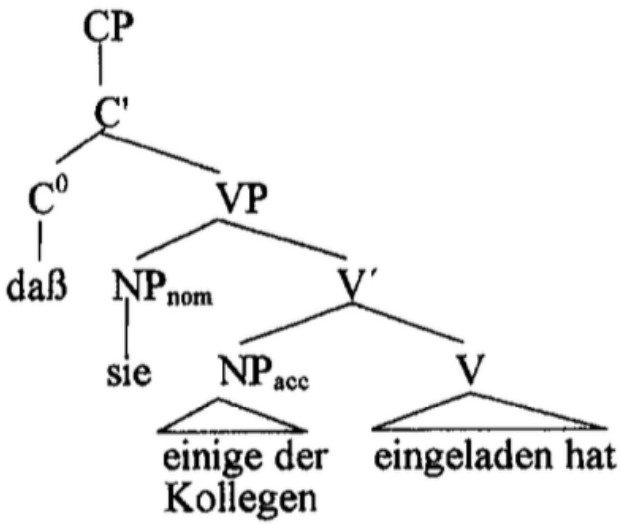
Technically, pronoun movement is a subcategory of scrambling.

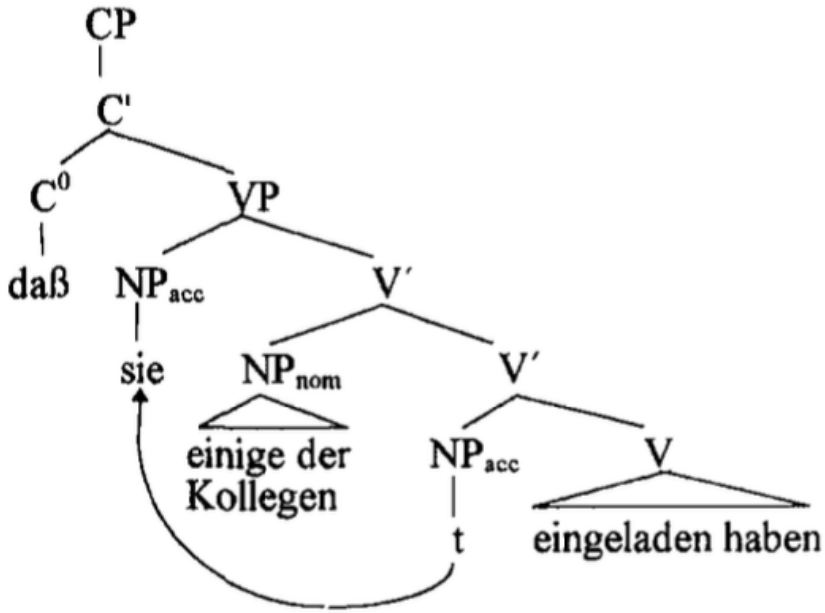
It is assumed, that

- language system base-generates sentences that are in default word order (i.e. only uses Merge, SOV for German)
- only when we want to derive other word orders, we use Move which establishes a chain

So, difference between subject-object and object-subject order can be explained by the presence of trace.

Pronoun movement, scrambling





Focus-related observations

Another way to classify the 4 phenomena concerns information structure.

2 types of focus:

- narrow focus: focus of a NP or DP
- wide focus: focus of a TP or CP

Scrambling is distinct from the other three types in that wide focus is only possible in the subject $\prec$ object order.

B&M's Experiment

Literature stipulates that S-O order is more preferred than O-S order.

1. **Does specific type of syntactic revision influence garden-path strength?**

   Types of reanalysis:

   - changing location of gaps vs. introducing new gaps
   - changing information structure

Experimental setting

- 56 native speakers from the University of Jena
- 40 test items in 8 different versions each:

  word order: { subj-obj / obj-subj }
  construction: { prn movement / scramb / wh-question / rel-clause }

- speeded judgement task (=fixed display times for items), word-by-word fashion
- test items were followed by comprehension questions

Results

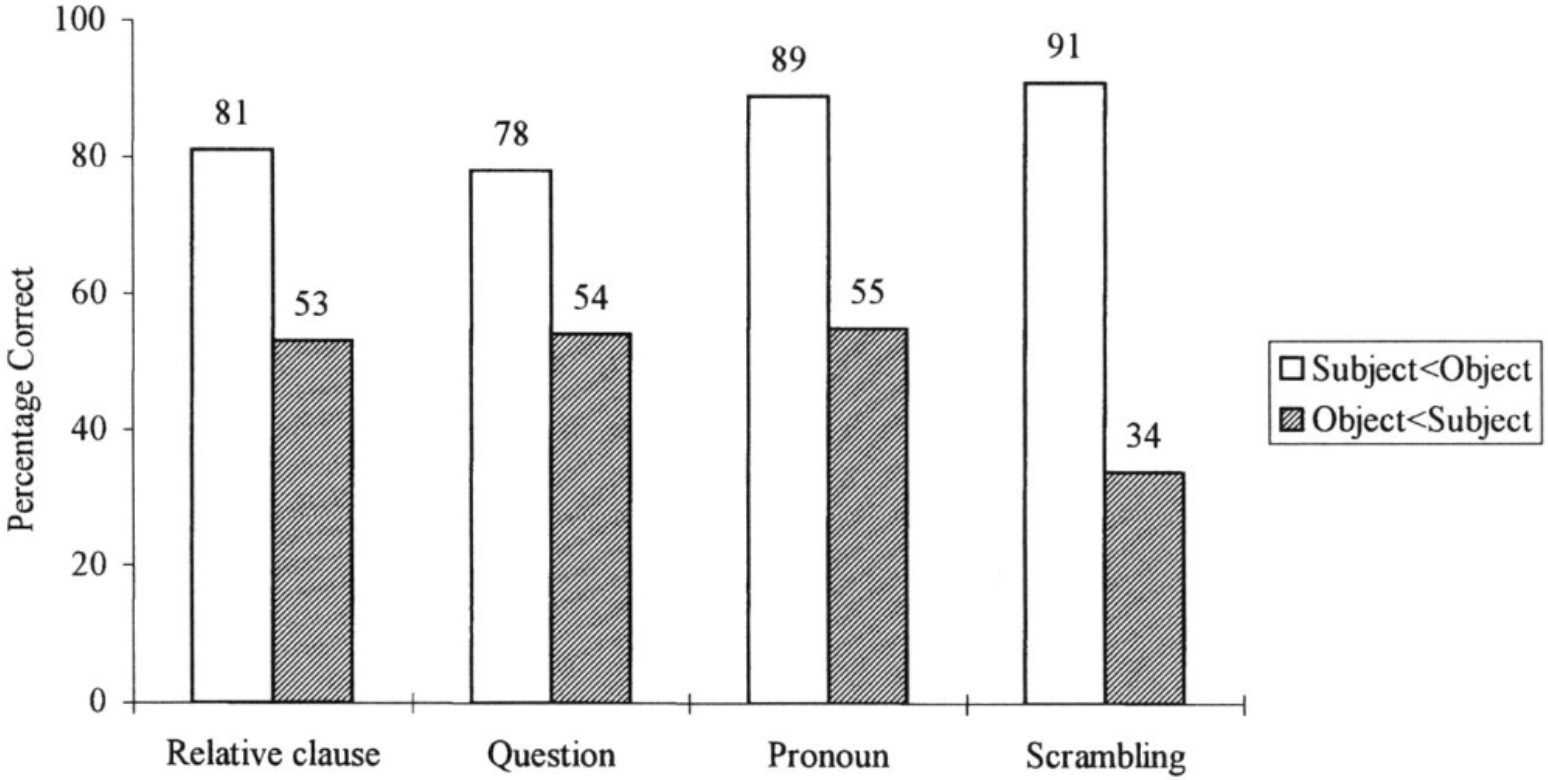


Fig. 3. Percentages of correct responses for four types of subject-object ambiguities.

Results

- Preference for SO could be confirmed.
- Stronger garden-path effect, when trace needed to be introduced (in the scrambling and prn-movement condition).
- So, introducing traces seems to be less preferred than modifying position of trace.
- Also, changing information structure comes at a cost, as can be seen from the scores of the scrambling items.

Conclusion

B&M proposes two different classifications of ambiguous phenomena based on

- the availability of traces (and the need simply to change position of traces or to introduce new ones):

  rel-clause, embedded wh-questions — prn-movement, scrambling

- the need to revise information structure, e.g. from wide to narrow focus:

  scrambling — rel-clause, embedded wh-questions, prn-movement

Introducing new traces and changing information structure induce costs explaining the strength of garden path effects.

Appendix: Why does German have these ambiguities?

German has relatively free word order. Arguments aren't required to appear in a certain order (at least not in the final derivation).

$die \rightarrow \phi : \{3SG, 3PL\} \rightarrow case : \{NOM, ACC\}$
Another reason is that morphemes encoding case and ϕ-properties are in a 1 to many relationship between form and function.

Why do the authors test ambiguity in embedded clauses?
It is widely assumed that German has SOV word order. In choosing embedded clauses instead of matrix clauses, we avoid having to deal with 'V2'-related movements that target the CP.

References

Bader, M. & Meng, M. (1999). Subject-object ambiguities in German embedded clauses: an across-the-bord comparison. Journal of Psycholinguistic Research, 28(2).

DeVicenzi, M. (1991). Syntactic parsing strategies in Italian. Dordrecht: Kluwer.