

# Coherent infinitives in German: An experimental perspective

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## 1 Introduction

Since Bech (1955/57) and Evers (1975), German (and Dutch) infinitival constructions have attracted enormous attention from syntacticians. Two questions have figured prominently over the years and across various changes in linguistic theory: (i) What are infinitival complements? (ii) What governs coherence? Answers given to (i) range from CP to IP to VP. Answers given to (ii) are usually rooted in certain assumptions about the lexical representation of verbs. Certain infinitive-taking verbs undergo a process of restructuring which results in clause union, whose core property is a verbal complex in West-Germanic. Other infinitive-taking verbs reject clause union. Since most of the verbs in question also allow extraposition, and since some even allow finite CP-complements, yet another question appears: (iii) are coherence verbs associated with multiple lexical entries? Most of the work so far rests on a somewhat fragile data base. Corpus studies as well as behavioral data could give important clues to a better understanding of the phenomenon and its place in grammar.

The present study launches an attempt in three steps: (A) A corpus study tries to determine which verbs appear in which frequency in which infinitive constructions. (B) A questionnaire study investigates a number of coherence-sensitive constructions across a wide spectrum of infinitive-taking verbs. (C) As a case in point, a self-paced reading study investigates one aspect of coherent constructions in detail: the scope of negation.

## 2 Corpus study

We conducted a corpus study based on the COSMAS System provided by the Institut für Deutsche Sprache, Mannheim, investigating all the verbs that were used in the

questionnaire study reported below. One result of the corpus study was the strikingly low rate of intraposed constructions. Further results of the corpus study will be reported in connection with the experimental studies.

### 3 Questionnaire study

This study takes a close look at native speakers' intuitions with respect to various coherence-sensitive tests across 56 control verbs which can be grouped in 5 classes according to subcategorisation and control properties. The conditions under which the materials were offered were the following (Sample materials are given in section 5). Conditions 1-4 are usually considered as grammatical only with verbs that can construct coherently and are therefore considered as coherence tests:

1. embedded and matrix verb moved to SpecCP
2. "long" scrambling of a pronoun
3. "long-distance" passive
4. wide scope of negation
5. narrow scope of negation
6. extraposed
7. intraposed (i.e. placement of the infinitive to the immediate left of the matrix verb)

Subjects had to evaluate sentences on a 5-point scale ranging from 1 ("makes perfect sense, easy to understand") to 5 ("does not make sense, very complicated to understand"). The results of this investigation show that

- the coherence tests are valid as they can be shown to correlate (for all pairwise correlations,  $r > 0.34$ ,  $p < .01$ )
- intraposition but not extraposition or narrow scope of negation correlates with the coherence tests
- verb classes differ with respect to the coherence tests
- subject control verbs are most easily constructed coherently, while object control verbs with an accusative controller NP are most difficult in this respect
- a cluster analysis yields a separation of coherent and non-coherent verbs with a substantial but not complete overlap with the predefined verb classes

## 4 Experimental study

Coherence was further investigated in a self-paced reading study of sentences requiring a wide scope construal of a negative quantifier (Sample materials are given in section 6). Subjects had to read sentences in which the infinitive contained a negative quantifier such as *keines von den Büchern* (“none of the books”), and which ended with the tag *und X auch nicht* (“... and neither did X”). This tag is only compatible with the wide scope of negation, which in turn is only possible when the embedded infinitival is constructed coherently (Sample materials appear in the appendix). Of special interest were the regions of the matrix verb, the “spill-over” region (... *und X*), as well as the region of the tag (... *auch (nicht)*).

The most important results of this study are the following:

- Reading times on the matrix verb as well as the immediately following spill-over region significantly correlate with the mean coherence measure derived from the questionnaire study: the better a verb was scored on the coherence tests the faster it was read ( $r = .478, p < .05$ )
- Reading times on the tag requiring wide scope did not correlate significantly with the results of the coherence tests ( $r = .288, p > .1$ )

These results suggest that intraposed infinitives tend to be mandatorily processed as coherent even if the matrix verb does not confirm such an analysis. Therefore reading times on the matrix verb (as well as the spill-over region) correlate with the coherence property of the verb because computing the coherent structure interferes with lexical information of verbs which are not easily constructed coherently. Crucially, however, subjects seem to retain the initial, coherent, analysis. This explains the unexpected finding of no effect on the tag, granted that this tag is exclusively licensed by the coherent analysis.

If this hypothesis can be substantiated by further evidence, this would greatly emphasize the importance of the syntactic positioning of the infinitive in comparison with the lexical factor of the matrix verb. The intraposed order would count as a key trigger of coherence. If true, this result would remove the problem of optionality in extraposition. Extraposed infinitives would be automatically construed as non-coherent. Questions which emerge with respect to the Third Construction will be addressed in this context.

In order to narrow down the possibilities of scope interpretation, we are preparing a new study in which infinitive constructions with coherent and non-coherent verbs will be compared with similar constructions containing complex nominals such as *Max hat [den Versuch [nichts zu trinken]] unternommen, und der Opa {auch / auch nicht}*, in which wide scope is expected to be blocked by the complex-NP constraint.

## 5 Experimental Details: Questionnaire study

**Materials:** 60 verbs with different subcategorization and control properties were tested in the following 7 construction (sample sentence set for the verb *empfehlen*)

### 1. Constructions that are only grammatical with verbs constructing coherently (coherence tests)

- (1) *embedded and matrix verb moved to SpecCP*  
Zu kaufen empfohlen hat Max mir nur das Lexikon  
To buy recommended has M. me only the lexicon
- (2) *“long” scrambling of a pronoun*  
Was das Lexikon betrifft, so ist klar,  
What the lexicon concerns so is clear  
warum es Max mir zu kaufen empfohlen hat  
why it M. me to buy recommended has
- (3) *“long-distance” passive*  
Das Lexikon wurde mir zu kaufen empfohlen  
The lexicon was me to buy recommended
- (4) *wide scope of negation*  
Max hat mir kein Lexikon zu kaufen empfohlen und der Onkel auch nicht.  
M. has me no lexicon to buy recommended and the uncle also not

### 2. Constructions that are only grammatical with verbs that can construct incoherently

- (5) *narrow scope of negation*  
Max hat mir kein Lexikon zu kaufen empfohlen und der Onkel auch.  
M. has me no lexicon to buy recommended and the uncle also
- (6) *extraposed*  
Max hat mir empfohlen, das Lexikon zu kaufen  
Max has me recommended the lexicon to buy

### 3. Constructions that are grammatical with both coherent and incoherent verbs

- (7) *intraposed*  
Max hat mir das Lexikon zu kaufen empfohlen  
Max has me the lexicon to buy recommended

## 6 Experimental Details: Selfpaced-reading study

**Material:** 30 sentences in six conditions corresponding to six different verb classes (cf. condition (4) of the questionnaire study)

In all sentences below, the position marked by  $\Delta$  was filled by the tag *und der Onkel auch nicht* ("and the uncle also not")

- (1) *Modal Verb*  
Der Opa hat keines von den Büchern lesen können  $\Delta$   
the grandpa has none of the books read can
- (2) *Subject Control without further object, infinitival clause replaces direct object*  
Der Opa hat keines von den Büchern zu lesen versucht  $\Delta$   
the grandpa has none of the books to read tried
- (3) *Subject Control without further object, infinitival clause replaces PP object*  
Der Opa hat keines von den Büchern zu lesen begonnen  $\Delta$   
the grandpa has none of the books to read begun
- (4) *Subject Control with dative object, infinitival clause replaces direct object*  
Der Opa hat mir keines von den Büchern zu lesen versprochen  $\Delta$   
the grandpa has me-DAT none of the books to read promised
- (5) *Object Control with dative object, infinitival clause replaces direct object*  
Der Opa hat mir keines von den Büchern zu lesen empfohlen  $\Delta$   
the grandpa has me-DAT none of the books to read recommended
- (6) *Object Control with accusative object, infinitival clause replaces PP object*  
Der Opa hat mich keines von den Büchern zu lesen ermutigt  $\Delta$   
the grandpa has me-ACC none of the books to read encouraged

**Procedure and participants:** word by word non-cumulative presentation, 42 subjects

## References

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