

Argument-specific cues to syntactic structure in verb-final sentences: Corpus and psycholinguistic evidence

Sandra Pappert¹, Johannes Schliesser¹, Dirk P. Janssen², & Thomas Pechmann¹

¹University of Leipzig, ²University of Kent
sandra.pappert@rz.uni-leipzig.de

Introduction

In the last years, the incremental model of the human sentence processor has been supplemented by a predictive component. According to this view, the sentence processor does not only integrate incoming constituents immediately but it also projects syntactic structure in advance. Verb-specific information is assumed to play a crucial role in prediction (cf. Altmann and Kamide, 1999; Jurafsky, 1996). However, during processing of verb-final sentences, verb-specific information is available late. The aim of the study presented here was to investigate the impact of information carried by initially available arguments on the provision of potentially following arguments. Verb-final single and double object structures qualify as critical materials. There is evidence of case effects in such sentences from Japanese (Kamide, Altmann, and Haywood, 2003).

Empirical evidence

In the following, we will report corpus data and experimental data from German showing that case and animacy serve as predictors of upcoming structure.

1.1 Corpus data

A corpus study was designed to investigate the frequency of occurrence of the relevant structures (cf. Kempen and Harbusch, 2004). The sample was extracted from Negra2 and Tiger. It consisted of 4737 verb-final single and double object structures without pronouns that began with a nominative, followed by an auxiliary. There was an overall prevalence of single object structures, irrespective of the case.

The structures were annotated for animacy. When animacy was taken into account, the overall prevalence of single object structures persisted in all conditions but one. After a nominative and a dative, both referring to animate entities, double object structures were more frequent.

1.2 Off-line completion data

In a completion questionnaire, the impact of case and animacy on the availability of syntactic structures was tested. Sentence fragments consisted of a subject, an auxiliary, and an object. Case of the object and animacy of the subject and the object were varied (cf. (1)).

- (1) *Der Doktor/Tupfer wird dem/den Krankenpfleger/Kieferknochen ...*
the_{NOM} doctor/dubber will the_{DAT/ACC} nurse/jaw bone ...

Completions were categorized as to whether they resulted in a single object structure, a double object structure, another structure, or whether they were ungrammatical or missing. In the condition with an animate subject referent, a dissociation by case was found: In the accusative conditions, mostly single object completions were produced whereas in the dative conditions, mostly double object completions were produced.

1.3 On-line completion data

In a cross-modal completion experiment, the impact of case on on-line argument structure availability was investigated. Subjects listened to sentence fragments consisting of a subject, an auxiliary, and an object. Case of the object (dative vs. accusative) was varied (cf. (1)). All nouns referred to animate entities. During the acoustic presentation of a sentence fragment, a noun and a verb (e.g., *Rollstuhlfahrer zeigen*, 'wheel chair user point out to') were presented visually. Subjects were asked to complete the fragment under insertion of the appropriate determiner.

A main effect of case was found. Articulation latencies were longer and error rates were higher in the accusative as compared to the dative condition.

1.4 Reading time data

In a self-paced reading experiment, the influence of case on on-line expectations towards argument structure was investigated. To this extent, subject-first double object sentences were presented as critical items and single object sentences as fillers. In the experimental conditions, case marking of the first object was varied (cf. (2)). All nouns referred to animate entities. Sentences were presented word by word and followed by a case-critical content question.

- (2) *Der Doktor wird dem/den Krankenpfleger den/dem Rollstuhlfahrer zeigen*
 the_{NOM} doctor will the_{DAT/ACC} nurse the_{ACC/DAT} wheel chair user point out to
 'The doctor will point the wheel chair bound person out to the nurse/the nurse
 out to the wheel chair bound person.'

There were significant reading time increases on the determiner of the second object when the first object was marked for accusative as compared to dative. In addition, there were more decision errors in the accusative than in the dative condition.

Conclusions

To summarize, multiple evidence of an interaction of case and animacy with argument structure expectations was found. To account for this, we propose the *Thematic Projection Hypothesis*: Syntactic projections in verb-final sentences are based on the knowledge of typical thematic relations between Proto-Roles (e.g., Primus, 1999).

A nominative referring to an animate entity and a subsequent accusative are interpreted as Agent and Theme, respectively, and Causal Affection is assumed. Consequently, no additional thematic role is projected. In contrast, a nominative and an adjacent dative referring each to animate entities are interpreted as Agent and Recipient, respectively, and Transfer is evoked. Hence, a transferee is projected.

References

- Altmann, G. T. M. and Y. Kamide (1999). Incremental interpretation at verbs: Restricting the domain of subsequent reference. *Cognition*, **73**: 247-264.
- Jurafsky, D. S. (1996). A probabilistic model of lexical and syntactic access and disambiguation. *Cognitive Science*, **20**: 137-194.
- Kamide, Y., G. T. M. Altmann, and S. L. Haywood (2003). The time-course of prediction in incremental sentence processing: Evidence from anticipatory eye movements. *Journal of Memory and Language*, **49**: 133-146.
- Kempen, G. and K. Harbusch (2004). A corpus study into word order variation in German subordinate clauses. In T. Pechmann and C. Habel, eds., *Multidisciplinary approaches to language production*. Mouton De Gruyter, Berlin, pp. 173-181.
- [Negra2] <http://www.coli.uni-sb.de/sfb378/negra-corpus/>
- Primus, B. (1999). *Cases and thematic roles: Ergative, Accusative and Active*. Niemeyer, Tübingen.
- [Tiger] <http://www.ims.uni-stuttgart.de/projekte/TIGER/>