Syntactic templates and linking in sentence comprehension

Introduction

The comprehension of argument order variations has long posed an intriguing challenge for psycholinguistic research. Typically, the processing of varying orders has been described in terms of reconstruction, i.e., a reorganization of a (syntactically or morphologically) unmarked argument into a position which appears to be more easily accounted for under the assumption that phrase structure (templates) and interpretation (linking) are independent of one another. Incremental argument interpretation in German

In the following, we present three findings which challenge the traditional view of position-based interpretation and which appear to be more easily accounted for under the assumption that phrase structure (templates) and interpretation (linking) are independent of one another.

Incremental argument interpretation in German

From the perspective of incremental accounts, association with a particular structural position is a prerequisite for successful interpretation. Thus, it should never be the case that non-positional information should lead to a higher degree of incremental interpretation than positional information. However, a number of experimental findings suggest that incremental argument interpretation in German crucially depends on morphological case marking. Consider the following two examples:

(1) ... dass der Junge dem Mädchen gefällt.

... that the boy is appealing to the girl.

(2) ... dass Amanda Sängerinnen gefällt.

... that Amanda is appealing to singers.

In both (1) and (2), the verb gefällt (‘to please’) is followed by an Experiencer and a Stimulus argument. However, the lower-ranking Stammübersetzung: a canonically ordered, nominative-initial (panel A) and a permuted, accusative-initial sentence (panel B). The ... nominative-marked argument onto the Actor role and the accusative-marked argument onto the Undergoer role in each case.

Two examples from German showing the independence of templates and linking mechanisms: (3a) is a canonical German sentence with the ordering nominative-dative-accusative; in (3b) the dative has been moved to an indirect object. Both manipulations gave rise to distinct activation patterns using the fMRI method as shown in Figure 3.

The role of Broca’s area in syntactic processing

While Broca’s area (the pars opercularis/triangularis of the inferior frontal gyrus, BA 44, 45) has often been associated with syntactic processes specifically linked to the processing of movement operations (Grodzinsky, 2000; Ben-Shachar et al., 2003) – cross-linguistic findings on the activation of this region during the processing of object-initial sentences remain difficult to explain. Increased activation in Broca’s region occurs in English object relatives (e.g., Caplan et al., 2001). In German, however, it is only measurable in clause-medial argument order variations (Köder et al., 2002) but not in wh-questions or relative clauses (Fiebich et al., 2001). From a reconstructive perspective, this finding only explains increased activity because the successful interpretation of all of these permutation types crucially hinges on some sort of reconstruction.

In terms of linking properties that are independent of phrase structure, by contrast, the cross-linguistic differences are naturally accounted for. English consistently links on the basis of linear order. Therefore, all object-initial structures require an ‘inverse linking’ and thus engender additional processing (linking) costs. In German, by contrast, linking is accomplished via morphological case marking and construction-specific properties. While the clause-medial region in unmarked German sentences directly reflects the argument hierarchy in the semantic representation of the verb, the clause-initial region can host any single constituent (argument or adjunct). On-line linking processes are sensitive to this distinction and inverse linking is, therefore, only costly in clause-medial contexts.

Syntactic complexity vs. grammaticality

Using functional magnetic resonance imaging (fMRI) to examine sentence types such as (3), Fiebach et al. (in press) observed a double dissociation between syntactic complexity and grammaticality.

The three grammatical sentences: (3a)-(3c) encode a continuous increase in complexity: (3a) is a canonical German sentence with the ordering nominative-dative-accusative; in (3b) the dative has been moved to the left of the subject; (3c) involves two scrambling operations as both object and indirect object have been moved. Interestingly, Broca’s area remained ungrammatical because the particle is infelicitously positioned between the subject and the indirect object. Both manipulations gave rise to distinct activation patterns using the fMRI method as shown in Figure 3.

Conclusion

The three sets of empirical findings discussed here indicate that the RRG perspective on phrase structure vs. interpretation – i.e., syntactic templates vs. linking mechanisms – constitutes a viable account of the RRG perspective. Further research is required to test this promising theoretical basis for language comprehension. Further research is required to test this promising theoretical basis for language comprehension.