Subanalysis of complex inflectional markers: An ERP study on the processing of morphological information

Stefanie Regel1, Andreas Opitz2, Gereon Müller2, and Angela D. Friederici1
1Max Planck Institute for Human Cognitive and Brain Sciences, 2University of Leipzig
contact: regel@cbs.mpg.de

In languages with a relatively free word order, such as German, inflectional morphological markers are crucial for phrase structure as well as sentence structure building. Thereby the occurrence of particular inflectional markers is grammatically constrained by agreement rules with respect to gender, case and number of a noun. While German noun inflection is formed regularly by affixation of a particular grammatical morpheme to the word stem, in some cases complex morphological marker occur representing several grammatical categories. For example, nouns in dative plural context, e.g. ‘Kindern’ (children), are marked by the affix ‘-/rn/’ that conveys both plural and case marking. In current models of morphology such complex inflectional markers are often subanalyzed in terms of their surface form into independent markers like that for plural, e.g. ‘-/r/’, and for case, e.g. ‘-/n/’ (Alexiadou & Müller (2008), Wiese (1999), Müller (2007)). However, it is still unclear whether the processing of complex inflectional markers is indeed rule-based by analyzing independent markers, or whether complex markers are processed rather holistically. In the present study we examined this question exemplarily for the German dative plural marking by using event-related brain potentials (ERPs). ERPs are highly time sensitive measures that allow an on-line investigation of neurocognitive processes involved in language comprehension. An ERP component related to (morpho)syntactic analysis is the left anterior negativity (LAN) (Friederici et al. (1996), Penke et al. (1997)), which we would expect to emerge in case the processing of complex inflectional markers is indeed rule-based. In order to investigate subprocesses underlying the processing of inflectional markers, we compared ERPs during reading of German nouns inflected for accusative and dative plural. For all nouns chosen as stimuli plural is formed regularly by affixation of ‘-/s/’ in all cases (thus lacking any additional case marking in dative). Nouns were embedded in prepositional phrases requiring either accusative or dative, e.g. ‘...ohne die ACC mit den DAT Kartons...’ (with/without cartons). They were manipulated by affixation of the ‘-/n/’ plural form, e.g. ‘*...ohne die ACC mit den DAT Kartonen...’.’ All phrases were presented in a sentential context. Native German participants read sentences containing either a correctly or incorrectly inflected noun, and were ask to perform a grammaticality judgment. For dative plural contexts, ERPs on the critical noun showed a LAN component followed by a late positivity (P600) for incorrectly inflected nouns (i.e. dative plural ‘-/n/’ marking) compared to the respective correct plural marking (i.e. ‘-/s/’). In contrast, we obtained no such LAN effect when comparing nouns with the incorrect marking (i.e. ‘-/n/’) in accusative plural contexts. Still, the incorrect accusative plural marking evoked a P600 component (see Figure). This pattern of ERP results is in accordance with the notion of a rule-based processing of complex inflectional markers. While affixation of ‘-/n/’ seems to be analyzed as a regular, independent inflectional marker in dative plural contexts (indicated by an enhanced LAN), no such morphological analysis processes were observed when this marker occurred in the accusative case. Thus, the findings support a fine-grained morphological subanalysis of complex inflectional markers and ask for an extension of current rule-based processing models.
Figure. Grand average ERPs elicited by correctly (blue line) and incorrectly (red line) inflected nouns in dative plural context (left side) and accusative plural context (right side). The topographic maps on the right column of each side show the scalp distribution of the ERP effects related to the inflectional violation in the respective plural context.

References: