ELSEVIER

Journal of Neurolinguistics 19 (2006) 466–482

Journal of NEUROLINGUISTICS

www.elsevier.com/locate/jneuroling

Electrophysiological responses to violations of morphosyntactic and prosodic features in derived German nouns

Ulrike Janssen*, Richard Wiese, Matthias Schlesewsky

Department of Germanic Linguistics, University of Marburg, Wilhelm-Roepke Strasse 6a, 35032 Marburg, Germany

Received 7 November 2005; received in revised form 6 April 2006; accepted 18 April 2006

Abstract

In the present study, we used event-related potentials (ERPs) to examine the neurophysiological correlates of violations of word formation rules in German derivational morphology. To this end, we compared violations of the German noun forming morphemes -ung (violation of morphosyntactic category) and -heit/-keit (violation of prosodic constraints). Our main objective was to ascertain whether morphosyntactic category violations would differ from violations of prosodic constraints.

For each type of incorrect suffixation, the data yielded an N400-like effect, but the processing of incorrectly derived words varies according to the type of violation: Effects for -ung- and -heit violations appeared approximately 200 ms earlier than for -keit-violations. Furthermore, the negativity effect for -ung was stronger and distributed over the whole scalp, whereas the effect for -heit and -keit is restricted to parietal electrodes. We interpret the differences as suggesting that different word formation restrictions play different roles in the processing of derived words, such that morphosyntactic restrictions are more salient than prosodic ones.

Keywords: Word processing; Event-related brain potentials; German derivational morphology; Morphosyntax; Prosody

*Corresponding author. Tel.: +49 6421 2824536; fax: +49 6421 2824558.
E-mail address: janssenu@staff.uni-marburg.de (U. Janssen).

0911-6044/$ - see front matter © 2006 Elsevier Ltd. All rights reserved.
doi:10.1016/j.jneuroling.2006.04.002

1. Introduction

One of the most investigated topics in psycholinguistic research is concerned with the processing of complex words with either inflectional endings (like English third person singular suffix *-s*) or derivational endings (like the noun building suffix *-ness*). Inflectional and derivational endings include information about their grammatical or lexical meaning and about the type of base form they are restricted to. For instance the suffix *-ness* attaches to adjectives and creates nouns like *happy-ness*. Some affixes bear a specific meaning or gender — like German noun forming suffixes — and others are restricted to words with a particular prosodic structure like *-ize* in *woman-ize*. In general, suffixes vary with respect to the subcategorization properties which are part of their lexical representation.

Our concern in the present paper is to investigate the role of such selectional constraints of affixes. In particular, we will examine whether different kinds of affix information have an equal status, i.e. whether there is more or less prominent information. Is the violation of high-order subcategorization properties "worse" than that of lower ordered? In an ERP study, it will be examined whether violations of different types of suffix information produce distinct components or different effect sizes as a response to violation detection. Different effects might indicate that subcategorization properties are ranked hierarchically in affix representations.

In psycho- and neurolinguistic research, complex words have mainly been studied in order to shed more light on the question how such words are processed (e.g. dual route models see Clahsen, 1999; Pinker, 1999) or associative models (see Elman et al., 1996): Are they accessed as full forms only or can the lexicon be divided into entries that are decomposed into stem and affix and entries that are stored as full forms?

Most of the evidence for the assumption that some derived complex words are decomposed into base and affix comes from priming studies (e.g. Clahsen, Sonnenstuhl, & Blevins, 2003; Drews & Zwitserlood, 1995; Feldman, 2000; Feldman & Prostko, 2002; Marslen-Wilson, Tyler, Waksler, & Older, 1994). Priming effects were found between morphological complex words and their stems (e.g. *happiness–happy*; Marslen-Wilson et al., 1994) if they are semantically transparent, but not between semantically opaque forms (e.g. *casualty–casual*). The occurrence of a priming effect for transparent derived words indicates that the processing of forms like *punishment* requires decomposition into the stem (*punish*) and the affix (*-ment*) in order to facilitate the access to the target form *punish*. However, in the debate whether derived forms are decomposed into morphemes or stored as full forms, evidence has been found for both options. Whether derived forms are decomposed or fully listed seems to depend on the productivity and the transparency of the derivational processes and on the requirement of the task. For instance, in a priming experiment with German derived words Clahsen et al. (2003) found facilitation in the access to a stem form (e.g. *gründen* 'to found') after presentation of a prime word that consisted of a stem and a productive and transparent suffix (e.g. *Gründung* 'foundation') indicating decomposed lexical representation. However, in a lexical decision task, identical derived forms showed a frequency effect which is indicative of a full form representation. Clahsen et al. interpret their findings as evidence that productive derivation is the result of combinatorial operations which additionally associate productive derivation with stored full forms.

With regard to ERPs, most studies have investigated the processing of inflected words rather than the processing of derived forms. For instance, Penke et al. (1997) and Gross,