

Psycho- and Neurolinguistic Studies on German Plural Morphology

Martina Penke & Marion Krause, Heinrich-Heine-Universität, Düsseldorf

In this paper, we consider the predictions the Dual-Mechanism Model makes concerning the representation of German noun plurals in the mental lexicon. In German, plural nouns are either marked by the endings *-e*, *-er*, *-(e)n*, *-s*, or they remain unmarked. In addition to these five different endings, unmarked plurals and plurals on *-er*, and *-e* can show umlauting of the stem vowel. Even though the plural marking of nouns is affected by gender and by phonological constraints (cf. Bittner 1994, Golston & Wiese 1995), the system shows a number of idiosyncracies which have led to debates focussing on the question which of these plural forms are regular and which are stored as irregular idiosyncratic forms (cf. Köpcke 1993, Marcus et al. 1995, Wiese 1996). Recently, the Dual-Mechanism Model of inflection (Pinker & Prince 1994) which distinguishes rule-based regular inflection and stored irregular inflection has been applied to the German plural system (cf. Marcus et al. 1995, Clahsen et al. 1997). According to the Dual-Mechanism approach to German plural formation, *-s* is the only plural affix whose application is rule-based. In contrast to *-s*, all other noun plurals (*-e*, *-er*, *-n* and unmarked) are said to be irregular and stored as full forms in the mental lexicon. A test-case for this proposal are *-n*-plurals. The plural marker *-n* is completely predictable for feminine nouns which end in *-∕* in the singular (here $-n^{fem}$). Contrary to the Dual-Mechanism Model, it has therefore been suggested that the *-n*-marking on these nouns is due to regular affixation (cf. Köpcke 1993, Wiese 1996). The *-n*-marking is not predictable for masculine or neuter nouns that do not end in *-∕* in the singular (here $-n^{masc}$). Hence, these forms are generally assumed to be stored (cf. Marcus et al. 1995, Wiese 1996).

In this paper, we will present data from an elicitation task conducted with 9 German Broca's aphasics and from a lexical-decision experiment with unimpaired subjects. The aim is to test the assumption of the Dual-Mechanism Model that both types of *-n*-plurals are stored irregular forms.

- Previous research has shown that agrammatism can lead to selective deficits of regular and irregular inflectional morphology (Cholewa & DeBleser 1995, Marslen-Wilson & Tyler 1997, Penke 1998, Penke et al. 1999). If the two types of *-n*-plurals were both stored irregular forms, as predicted by the Dual-Mechanism Model, no different error-rates between the 2 types of *-n*-plurals should occur. However, our data show that the 2 types of *-n*-marked forms were affected differently by the agrammatic deficit. Plurals on $-n^{masc}$ were significantly more impaired than plurals on $-n^{fem}$ (χ^2 , $p < .05$). Moreover, for 2 subjects, $-n^{masc}$ -plurals were impaired, whereas $-n^{fem}$ -plurals were not affected at all. Further evidence against a unitary approach to *-n*-plurals comes from an analysis of the frequency distribution of errors. If both plurals on $-n^{masc}$ and $-n^{fem}$ were stored, frequency-effects caused by the access of stored lexical items should be observable for both markings. However, the data revealed a frequency effect for $-n^{masc}$ -plurals only (Wilcoxon, $p = .068$), i.e. errors occurred more often with infrequent forms than with frequent ones. A similar effect did not occur for $-n^{fem}$ -plurals ($p = .58$).

- Clahsen et al. (1997) have shown that lexical decision times for nouns with the irregular German *-er*-plural are shorter for frequent nouns than for infrequent ones. A similar frequency effect, however, could not be observed for nouns with the regular default plural *-s*. We used this effect as a test-case to explore the nature of *-n*-plurals. 16 unimpaired adult German subjects participated in an auditory lexical decision experiment. The analysis of the reaction time data demonstrated a strong frequency effect for *-n^{masc}*-plurals: lexical decision times for high frequency *-n^{masc}*-plurals were significantly shorter than those for low frequency ones (T-test, $p=.00$). In contrast, *-n^{fem}*-plurals produced similar lexical decision times irrespective of whether they were high or low frequency words.

To summarise, the findings on *-n*-plurals argue for a modification of the Dual-Mechanism account of German plural formation. Plurals on *-n^{masc}* and *-n^{fem}* can be selectively affected by the agrammatic deficit. In addition, the data revealed a frequency effect for *-n^{masc}*-plurals only. These findings suggest that plural markers other than *-s* cannot uniformly be treated as irregular stored forms. We have to assume at least one additional mechanism besides stored irregular forms and affix-based default-forms, namely regular but input-restricted inflection. Specifically, we want to suggest that plurals on *-n^{fem}* are built by regular affixation of a suffix which is subcategorised for the input [+fem].

References

- Bittner, D. (1994): Die Bedeutung der Genusklassifikation für die Organisation der deutschen Substantivflexion. In: Köpcke, K.-M. (Hrsg.): *Funktionale Untersuchungen zur deutschen Nominal- und Verbalmorphologie*. Niemeyer: Tübingen, S.65-80.
- Clahsen, H.; Eisenbeiß, S.; Sonnenstuhl, I. (1997): Morphological Structure and the Processing of Inflected Words. *Theoretical Linguistics*, **23(3)**, 201-249.
- Cholewa, J.; de Bleser, R. (1995): Neurolinguistische Evidenz für die Unterscheidung morphologischer Wortbildungsprozesse. *Linguistische Berichte*, 158, 259-297.
- Golston, C.; Wiese, R. (1995): Zero Morphology and Constraint Interaction. *Yearbook of Morphology 1995*.
- Köpcke, K.-M. (1993): *Schemata bei der Pluralbildung im Deutschen*. Narr: Tübingen.
- Marcus, G.F.; Brinkmann, U.; Clahsen, H.; Wiese, R.; Pinker, S. (1995): German Inflection: The Exception that Proves the Rule. *Cognitive Psychology*, 29, 189-256.
- Marslen-Wilson, W.D.; Tyler, L.K. (1997): Dissociating types of mental computation. *Nature*, **387**, 592-594.
- Penke, M. (1998). *Die Grammatik des Agrammatismus. Eine linguistische Untersuchung zu Wortstellung und Flexion bei Broca-Aphasie*. Niemeyer: Tübingen.
- Penke, M.; Krause, M.; Janssen, U. (1999). The Representation of inflectional morphology: Evidence from Broca's aphasia. *Brain and Language* 68, 225-232.
- Pinker, S.; Prince, A. (1994): Regular and Irregular Morphology and the Psychological Status of Rules of Grammar. In: Lima, S.D.; Corrigan, R.L.; Iverson, G.K. (Hrsg.): *The Reality of Linguistic Rules*. Amsterdam: Benjamins, 321-351.
- Wiese, R. (1996): *The Phonology of German*. Oxford: Oxford University Press.