

Independent access to the meaning and the syntax of morphologically complex words: Evidence from a case of acquired dyslexia

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Introduction

We report the case of a patient with acquired dyslexia, who produced many morphological errors in reading aloud morphologically complex words, especially, derived words. We assessed the patient's ability to access semantic and grammatical class information from visually and auditorily presented simple and complex words. The pattern of the patient's performance in these tasks provides insights into the structure of morphological representations in the visual word recognition system (e.g., Caramazza, Laudanna, & Romani, 1988).

Case report

SM, a right-handed 35-year-old woman with 15 years of formal education, suffered a CVA 4 years prior to this study. She was impaired in picture naming (26/45) but scored within the normal range in a word/picture matching task, both with spoken and written words. SM could not read isolated letters (5/26) or nonwords aloud (1/40) while her performance was good at reading exceptional words (31/40). She read simple nouns (41/55) better than suffixed nouns (14/55), for which she produced mostly morphological errors (71%).

Experimental study

Given the patient's impairment in reading aloud morphologically complex words, she was presented with the tasks below in order to determine whether she could access lexical (semantic and syntactic) information from visually presented words.

Morphological comprehension task

The material was composed of 108 suffixed and 108 monomorphemic words referring to a person (targets), and 108 suffixed and 108 monomorphemic words not referring to a person (foils). Targets and foils, matched for frequency, were arranged in pairs: 54 pairs in which both the target and the foil were monomorphemic words; 54 pairs in which both the target and the foil were suffixed words; 54 pairs with a suffixed target and a monomorphemic foil; and 54 pairs with a

monomorphemic target and a suffixed foil. The foils were either morphologically, semantically, or visually related to the targets, except that, in the pairs of monomorphemic words, a foil both semantically and visually related to the target was selected instead of a morphological foil. The pairs were presented one at a time and in random order to the patient and, on different occasions, in the written and the spoken modality. The patient was asked to indicate which of the word referred to a person.

SM performed better in the spoken (91%) than the written (82%) modality ($\chi^2_{(1)} = 7.96$; $p < .005$). However, there was no significant effect of the type of pair in the spoken ($\chi^2_{(3)} = 2.5$; $p = .48$) or the written modality ($\chi^2_{(3)} = 1.1$; $p = .78$), and no significant effect of the type of foil, again, in the spoken ($\chi^2_{(2)} = 1.5$; $p = .47$) or written modality ($\chi^2_{(2)} = 2.4$; $p = .295$). Thus, SM's performance appeared to be slightly impaired in the written in comparison with the spoken modality. Nevertheless, she was able to access the meaning of the suffixed words as well as of the monomorphemic words when presented visually.

Grammaticality judgment task

We assessed the patient's ability to access grammatical class information for visually presented complex words in a task requiring implicit access to that information. We selected 76 simple words and 67 complex words, matched for average frequency. Complex words were nouns derived from a verbal root by suffixation (e.g., *présentation*; $n = 31$) or syntactic conversion (e.g., *abandon*; $n = 36$); in the latter case, the noun was not, however, homographic with any inflected form of the corresponding verb. In addition, 143 verbs in infinitive form, matched for frequency with the nouns, were selected as filler words. Each noun and verb was embedded within two minimal syntactic contexts, one requiring a noun (*c'est un... ; it is a...*), one requiring a verb in infinitive form (*il faut... ; you must...*). These utterances were presented to the patient in the spoken and the written modality (on different occasions). She was required to indicate whether the utterances could be a correct start for a sentence. An item was scored as correct when the patient both accepted the grammatical utterance and rejected the ungrammatical one in which that item was embedded.

SM performed significantly better in the spoken (86%) than the written modality (58%); $\chi^2_{(1)} = 26.7$; $p < .0001$. In the spoken modality, SM's performance did not significantly differ between simple (91%) and complex (81%) nouns ($\chi^2_{(1)} = 3.1$; $p = .08$). However, in the written modality, SM performed better for simple nouns (71%) than for complex nouns (43%); $\chi^2_{(1)} = 11.2$; $p = .0008$. Her performance did not significantly differ between the suffixed nouns (35%) and the nouns

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derived by syntactic conversion (50%); $\chi^2_{(1)} = 1.4$; $p = .23$. This suggests that SM's difficulties in accessing grammatical class information for visually presented complex words were probably not caused by a difficulty in processing the suffix per se, but rather by impaired access to the syntactic class information specified by morphological structure representations.

Conclusion

SM's ability to gain access to the meaning of visually presented complex words is relatively spared in comparison with her ability to access syntactic class information for these words, which is impaired. In contrast, access to grammatical class information for visually presented simple words, and to both simple and complex words presented auditorily, is relatively spared. This pattern indicates that SM has a specific deficit in accessing syntactic aspects of morphological structure representations in the visual word recognition system. It also suggests that morphological structure representations are articulated in such a

way in the visual word recognition system that access to the semantic and the syntactic consequences of derivational processes can be selectively disrupted by brain damage.

We propose that SM's deficit in accessing grammatical class information could be at the origin of the morphological errors she produces in reading aloud complex words. In the case of derived words, grammatical class information might be important to further discriminate between the various morphologically related units that could be activated in the phonological output lexicon on the basis of semantic information alone. Thus, in the absence of grammatical class information about the target word, a morphologically related candidate could be erroneously selected, which would give rise to a morphological paralexia.

Reference

- Caramazza, A., Laudanna, A., & Romani, C. (1988). Lexical access and inflectional morphology. *Cognition*, 28, 297–332.