



## Types of Amorphia: Different Morphological Disorders in Reading and Their Different Sources

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# Types of amorphia: Different morphological disorders in reading and their different sources

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## Introduction

Many individuals with aphasia or dyslexia make morphological errors in reading (e.g., Marshall & Newcombe, 1973; Job & Sartori, 1984; Castles et al., 1996; Rastle et al., 2006; Dotan & Friedmann, 2015; Reznick & Friedmann, 2016). In this study we propose a model for reading morphologically complex words, and describe case studies of individuals with aphasia who show selective deficits in different components of this model. The study was done in Hebrew, a morphologically-rich language.

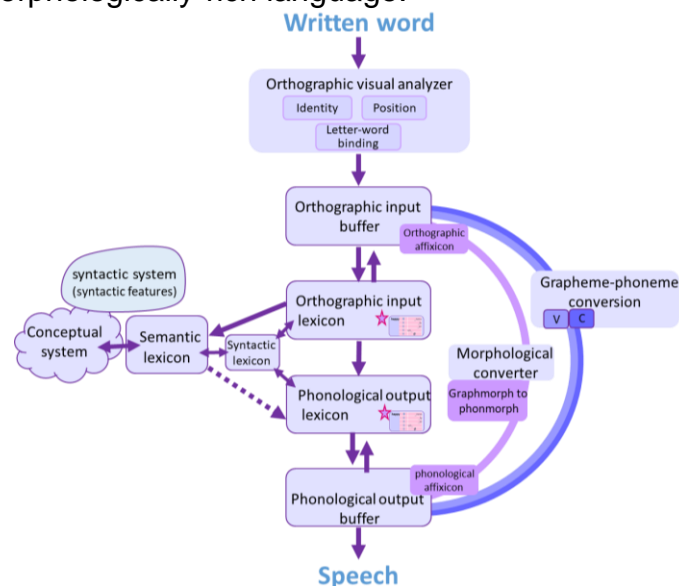


Figure 1. A model for reading morphologically-complex words and nonwords

The model (Figure 1) proposes that the orthographic input lexicon (OIL) and the phonological output lexicon (POL) store the words' base/stem and the Stem-Affix-Registry (STARs) for each stem, which includes the idiosyncratic information about the derivational affixes that can attach to the stem (e.g., happy: *un-*, *-ness*). The orthographic input buffer (OIB) performs a structure-based analysis of morphologically-complex words and nonwords on the basis of the list of existing affixes in the orthographic affixicon, and the phonological output buffer (POB) assembles the morphologically-complex words/nonwords back from their stem and affixes. A morphological route, which is separate both from the lexical route and from the grapheme-to-phoneme route, converts whole written affixes (-ing, -ity) to their pre-assembled phonological representation. So in morphologically-complex words, the stems are read

through the lexical route (and the grapheme-to-phoneme conversion), and the inflectional and derivational affixes are converted in the morphological conversion route.

## Methods

The study is a multiple-case-study of ten people (9 men and a woman, average age=49;2) who demonstrated different kinds of amorphia, morphological errors in reading aloud and/or in word retrieval. Each participant underwent tests of reading aloud, lexical decision, written-word comprehension, retrieval, and word and nonword-repetition. The tests included derivational and inflectional morphologically-complex words and nonwords.

## Results

We identified several types of amorphia, attributable to different loci in the proposed model: Three patients had a **deficit in the OIB**, resulting in substitutions of whole morphological affixes with other affixes, as well as additions, and omissions of morphological affixes, in both words and nonwords, in reading aloud, lexical decision, and comprehension tasks. Naming and repetition of morphologically-complex words and nonwords were intact.

One participant had a **deficit in the access from the semantic lexicon to the POL**. His reading was intact, his lexical retrieval was impaired. Importantly, in lexical retrieval he made morphological errors in irregular plurals, indicating that irregular plural inflection is stored in the POL (whereas rule-based plural inflection is probably stored in the affixicons).

Five participants had a **deficit in the POL**, some of them had a deficit only in the **stems**, so once they could access the stem (following cueing or their own access success), they could reach the STARs and produce the matching affixes. Other POL-impaired patients, however, had a **deficit in the STARs** as well, and produced stems with non-matching affixes. Their lexical-decision and comprehension of morphologically-complex words was intact.

Two patients had a **deficit in the POB**, resulting in morphological errors in reading-aloud and speech production but not in input tasks.

Moreover, a double-dissociation was found between **impairments in the grapheme-to-phoneme conversion route** and **in the morphological conversion route**, whereby three patients had a deficit in reading stems of nonwords (nonexisting stems) but read affixes correctly, and two other patients showed the opposite pattern, with regularization errors within affixes (indicating they were read via grapheme-to-phoneme conversion) or affix errors, and correct reading of stems of nonwords.

## Conclusions

The results indicate that morphological errors in reading may result from deficits in different loci in the reading process. The selective impairments indicate that morphological parsing takes place pre-lexically, at the OIB level, for both inflectional and derivational morphology; the grapheme-to-phoneme conversion route is separate from the morphological affix conversion route; the lexicons include specifications for the derivational affixes that can appear with each stem; the POB assembles stems with whole, pre-assembled, affixes.

## References

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