Morphological decomposition in the early stages of visual-orthographic analysis: Evidence from neglexia

Julia Reznick and Naama Friedmann
Tel Aviv University

Research questions

• Is the earliest reading stage of orthographic-visual analysis sensitive to the morphological structure of written words?
• What is “morphological representation” at this stage?
• Are there morphological processes that already take place at this earliest reading stage of orthographic-visual analysis?

Why are these questions interesting?

Researchers agree that the processing of polymorphic written words recognition involves morphological decomposition, but there is no agreement regarding the stage of word recognition at which this decomposition takes place, and it is still unclear what the characteristics of morphological decomposition are.

Is the earliest reading stage of orthographic-visual analysis sensitive to morphological structure? What are “morphological representations” at this stage?

Findings

The morphological category of the neglected side of the word affected the performance of each of the participants with neglexia: the side of the word was more frequently neglected when it belonged to the pattern/suffix, than when it was a part of the root ($T = 0, p = .02; \chi^2 = 36.45, p < .00001$).

The target word ends in a suffix letter: שופעך → שופעך ≠ שוףך
The target word ends in a root letter: שופעך → שוףך ≠ שופעך

There is a limited number of letters that can be part of an affix; Is there really a morphological category effect, or is it a morphological letter effect?

Does the visual analyzer identify a letter that can be part of an affix or does it really decompose the word morphologically and detect a morpheme? In order to neutralize the possible letter effect, we analyzed only words that ended in the same letters, (א and י), and compared the cases in which they were part of the affix to word in which they were part of the root.

The side of the word was more frequently neglected when the letters א and י belonged to the affix than when they were a part of the root ($T = 0, p = .02; p < .001$).

-belongs to the word suffix: שופעך ≠ שוףך
-belongs to the word root: שופעך ≠ שוףך

Conclusions

• Morphological representations are accessible during the visual analysis stage.
• The morphological effect is defined in terms of the morphological category: the side of the word was more frequently neglected when it belonged to the affix than when it was a part of the root.
• The visual analyzer not only identifies a letter that can be an affix but actually decomposes the word and identifies the role of the letter in each word – an affix or a root.

Participants

Seven Hebrew speakers with acquired neglexia (aged 43-79, $M=61$) participated in this study: six with left-sided neglexia and one with right-sided neglexia.

Task

The performance of the participants was evaluated using word reading tasks.

Morphological decomposition occurs early in the word reading process. It takes place already during early orthographic-visual analysis.

Information concerning affix letters is available already when the visual analysis takes place.

The search for a 3-consonantal root triggers attention shift in neglexia: the visual analyzer keeps orienting attention to the neglected side of the word until it finds all root letters.

How can neglexia contribute to these research questions?

Neglexia is a peripheral dyslexia that stems from a deficit at the visual analysis stage. Neglexia causes omissions, substitutions, and additions in one side of the word, usually its left side, which in Hebrew is the end of the words.

What is “morphological representation” at this stage?

Morphological representations are accessible during the visual analysis stage.

If these errors occur to a different degree in morphologically complex and simple words, this would suggest that morphology already plays a role at the visual analysis stage.

Are there morphological processes that already take place at the orthographic-visual analysis stage?

At least 3 possible sources for orthographic-visual analysis sensitivity to the morphological structure of written words:

1. The orthographic-visual analysis
2. The post-perceptual and pre-lexical stage
3. The lexical (and/or post-lexical stage)

Findings

There was no effect of semantic or morpho-lexical features of the words on the performances of the participants.

Conclusion

During morphological decomposition the semantic and morpho-lexical features of the words are not accessible yet. Therefore, the source of the morphological presentations is pre-lexical.

Findings

Length effect and final-form letter effect: longer words were more susceptible to neglect errors; words ending with final-form letters were less susceptible to errors, were found only for words ending with a suffix, but not for words ending in a root letter.

Conclusion

The perceptual effects are already sensitive to morphological properties, indicating that the morphological decomposition occurs already at the first visual analysis stage.

Morphological decomposition occurs already during orthographic visual analysis.

Orthographic-Visual Analysis

The orthographic input lexicon, which is an input lexicon of the words, is then converted to phonetic output. After the phonetic buffer and the phonological output lexicon, the letter is identified as a morpheme.