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Subtypes of Developmental Surface Dysgraphia

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Introduction

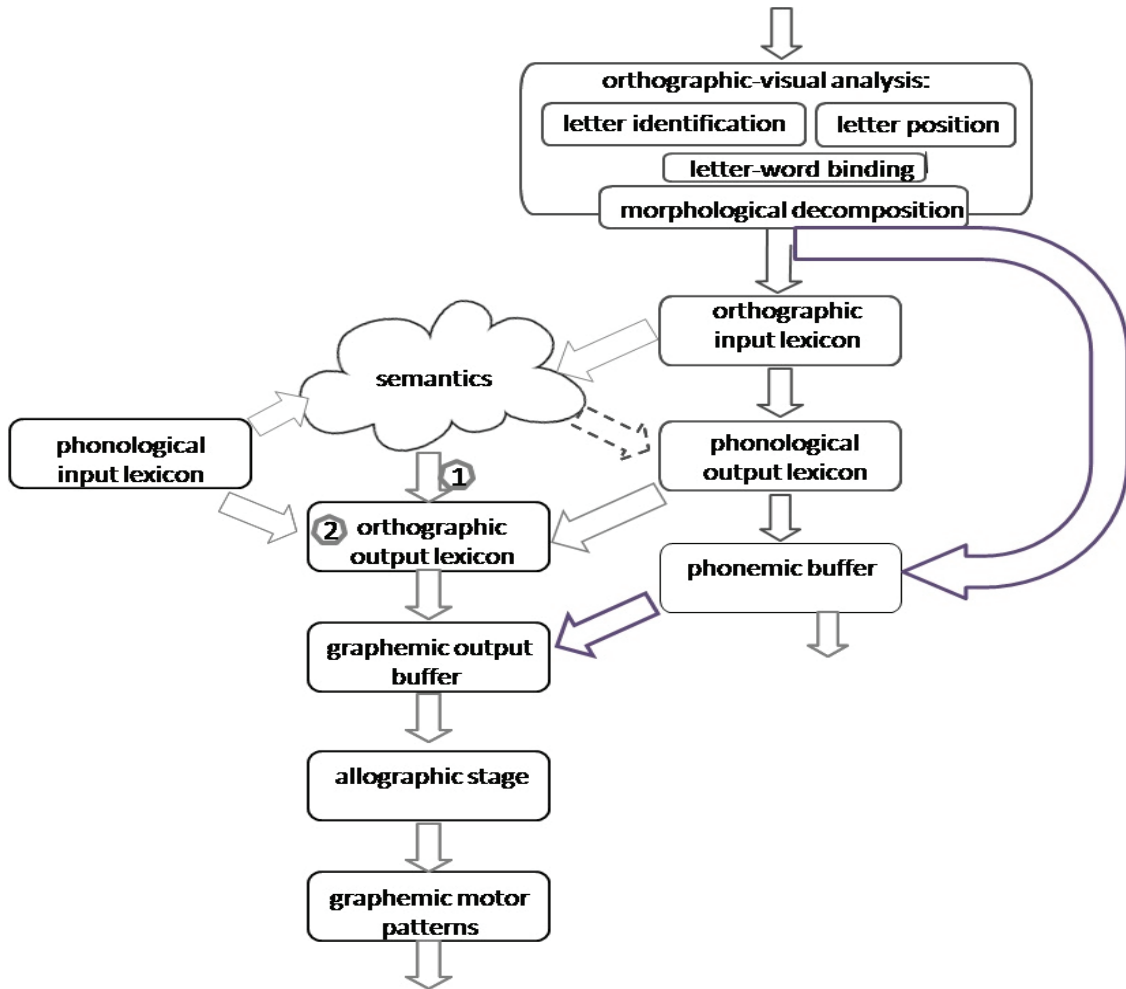
Individuals with surface dysgraphia write via phoneme-to-grapheme conversion, due to a deficit in the lexical route (Weekes & Coltheart, 1996). The modularity of the writing process suggests that such a deficit can be caused by impairments at different loci. One possible locus is the orthographic output lexicon (marked 2 in the model below), which does not include the necessary lexical items; this may lead to writing via the sublexical route, and yield both lexical and non-lexical non-target spellings (writing *were* or *wer* instead of *where*). Crucially, another locus is theoretically possible, which would also lead to surface dysgraphia: the connection between the semantic-conceptual system and the orthographic-lexicon (1 in the model). In this case, the orthographic-lexicon is intact, and writing can be done via the phonological-lexicon, and from there to the intact orthographic-lexicon. Such route is expected to result in writing predominantly existing words (writing *were* instead of *where*). In the current study we set to explore whether these two subtypes of surface dysgraphia, non-lexical and lexical-surface dysgraphia, indeed exist. We also explored the relation between subtypes of surface dyslexia and surface dysgraphia, specifically whether reading and writing are dissociable with respect to intact or impaired orthographic lexicon.

Method

The participants were 9 Hebrew-speaking individuals with developmental surface dysgraphia with at least 8 years of education. Writing to dictation and written naming tasks that included at least 270 words were used to test their writing. To assess the type of errors (lexical or not) we used homophones and potentiophones whose erroneous writing could lead with equal probability to lexical and non-lexical substitution errors (where → were/wer). In addition, we tested reading using oral reading of irregular words and potentiophones (like *now* and *know*), lexical decision, and written word comprehension.

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Results

Seven of the participants produced similar rates of lexical and non-lexical surface dysgraphia errors. These participants also showed better writing of frequent words. Two other participants showed a completely different pattern. They made predominantly lexical errors, making a phonologically-plausible error that creates another existing word. Another interesting difference between the subgroups was evident in infrequent target words with frequent potentiophonic counterparts. Whereas the 7 participants with the non-lexical surface dysgraphia produced randomly either the frequent or the infrequent possibilities (indicating they do not write via the lexicon), the two lexical surface dysgraphics substituted the target words with their frequent counterparts.

As to reading, of the 7 participants with the non-lexical surface dysgraphia, 3 did not manifest surface dyslexia at all, one patient had lexicon-output surface dysgraphia (preserved lexical decision for pseudohomophones but impaired homophone comprehension), and 3 had inter-lexical surface dysgraphia (surface dyslexia errors only in reading aloud as a result of a deficit in the connection between lexicons, Friedmann & Lukov, 2008), implying that it is possible to read via orthographic lexicon even when writing is processed without it.

Conclusions

The results suggest that surface dysgraphia is not a single entity and that there may be further selective deficits to the written lexical route. Our findings also suggest that reading and writing do not necessarily share an orthographic lexicon or at least that there may be selective deficits to the output or input of the orthographic lexicon.

References

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Weekes, B., & Coltheart, M. (1996). Surface dyslexia and surface dysgraphia: Treatment studies and their theoretical implications. *Cognitive Neuropsychology*, *13*, 277-315.