The relationships between oral language and reading instruction: Evidence from a computational model of English word reading

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Introduction

How should reading be trained?

<table>
<thead>
<tr>
<th>Phonics</th>
<th>Whole Word</th>
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<tr>
<td>Orthography-to-phonology (OP) mappings</td>
<td>Orthography-to-semantics (OS) mappings</td>
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Artificial word learning:

<table>
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<th>OP focus</th>
<th>OS focus</th>
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<td>/kes/</td>
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Research Questions: OP focused training transferred to meaning, but not vice versa. Why? Do oral language skills matter?

Simulation 1

Whether the advantage of the OP focused training demonstrated in Taylor et al.’s (2017) study depends on oral language skills?

- Learn artificial words without any prior orthographic training
- Simulating Children’s learning
- Generalised linear mixed-effects model (GLMM) analyses on the model’s word naming and word comprehension
- Division of Labour analyses

Simulation 2

Whether the results from Simulation 1 are reproduced when the model acquires a second orthography (more close to Taylor et al.’s (2017) experimental design)?

- Learn artificial words with prior knowledge of English
- Simulating literate adults’ learning to read a second orthography
- Two stages: English word reading first and then artificial word reading with OP focused or OS focused training

Simulation 3

Whether the training effects could scale up to a larger, representative vocabulary of English?

- Learn a fuller vocabulary of English
- Test of different training regimes on learning both consistent (e.g., leg) and inconsistent OP mappings (e.g., print) as well as some polymorphic words (e.g., asked, asks, asking)
- Simulating Children’s literacy learning

Discussion

- A series of computational models of reading incorporating orthographic, phonological and semantic processing was developed to simulate both artificial and natural orthographic learning conditions in adults and children.
- The pattern of performance from the OP training focused model was similar to the behavioural data reported in Taylor et al. (2017) only for the model that was pre-trained to a high level of oral language skills, suggesting that OP focused training is most advantageous for written word comprehension when the learner has good oral language knowledge.
- Our findings are in line with the Simple View of Reading and the triangle model of reading - the critical role of pre-literate oral language skills to support the development of reading.

Acknowledgements

This research was supported by ESRC grants ES/L006936/1 and ES/P001874/1.

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