Morphological intervention for children with reading and spelling difficulties

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Team Morph

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The context

• In the UK, initial reading instruction consists of:
  - systematic phonics instruction
  - practice reading books
  - listening to and discussing written texts beyond their reading ability
• Some children struggle to learn to read and spell despite this
• What can we do for these children?
sign
sign
signature
signal
Latin root: *signare*

“To mark with a stamp or sign”
Existing studies of morphological instruction

• Evidence for improvements in reading, spelling and vocabulary (e.g. Bowers & Kirby, 2010; Devonshire, Morris & Fluck, 2013; Nunes, Bryant & Olsson, 2009; Goodwin & Anh, 2010, 2013)

• Frequency, length and method of morphological instruction varies widely

• Some evidence morphological instruction is more beneficial for poor readers, but confounded with group size (e.g. Bowers, Kirby, & Deacon, 2010)
The MORPH Project

• A randomised controlled trial registered on the Open Science Framework: https://osf.io/zfc2n/

• Comparison of two training programmes:
  - Structured Word Inquiry (Bowers & Kirby, 2010)
  - Motivated Reading
Intervention sessions

• 24 weeks of instruction
• Three 20-min sessions per week
• Delivered by teaching assistants
  - Four day training workshop
  - Scripted lessons
  - Fortnightly school visits by research team
Structured Word Inquiry

Word matrices and word sums

<table>
<thead>
<tr>
<th>dis</th>
<th>un</th>
<th>please</th>
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<tbody>
<tr>
<td></td>
<td></td>
<td>es</td>
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<td>able</td>
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</table>

please + ant -> pleasant

dis + please + ure -> displeasure
Flowcharts

*please + ed -> pleaseed

**Diagram:**
- **START**
  - Does the suffix begin with a vowel letter?
    - **YES**
      - Does the base or stem have a final, single, silent <e>?
        - **NO**
          - Replacing the single, silent <e>
            - Just add the suffix.
        - **YES**
          - Remove the single, silent <e> before you add the suffix.
Motivated Reading

- Based on successful intervention for children with reading comprehension difficulties (Clarke, Snowling, Truelove & Hulme, 2010)
- Developed in conjunction with Paula Clarke
- Books donated by Oxford University Press
Motivated Reading Lessons

Two lesson per week of Reciprocal Teaching (Palincsar & Brown, 1984)

- Children select a text to read
- TA reads aloud
- Group re-reads text slowly, applying strategies
  - clarification
  - summarisation
  - prediction
  - question generation
Motivated Reading Lessons

One vocabulary lesson per week

• Robust Vocabulary Instruction (Beck, McKeown & Kucan, 2002)
• 2-3 words per lesson
  - multiple exposures to words in rich contexts
  - Tier 2 words (gradual, enthusiasm, glimpse)
  - children had opportunity to choose words
SWI vs MR

• Same amount of time and attention
• Same TAs teaching both programmes
• Same set of words trained across programmes
• MR provides reading experience and exposure to new words at the lexical level, without instruction in word structure
• Comparison tests effectiveness of teaching sub-lexical morphological knowledge
Research Questions

• Is Structured Word Inquiry more effective than Motivated Reading for children with poor reading and spelling skills?
• Does the effectiveness of each programme vary depending on
  - age?
  - severity of reading and spelling difficulties?
  - whether or not children are native speakers of English?
Study design

Screening
April/May 2016
1283 participants

Pre-testing
June/July 2016
270 participants

SWI
September 2016-May 2017
120 participants

Post-Test 1
June/July 2017
237 participants

MR
September 2016-May 2017
117 participants

Post-Test 2
June/July 2018
172 participants

SWI = Structured Word Inquiry
MR = Motivated Reading
Training participant characteristics

- Children were in Year 3 and 5 (ages 8-10)
- Schools from a mix of inner city, suburban and semi-rural locations

<table>
<thead>
<tr>
<th>YEAR 2</th>
<th>SWI</th>
<th>MR</th>
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<tbody>
<tr>
<td>Mean age*</td>
<td>8;3</td>
<td>8;4</td>
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<tr>
<td>%EAL</td>
<td>40</td>
<td>40</td>
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<tr>
<td>%FSM</td>
<td>31</td>
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<table>
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<tr>
<th>YEAR 4</th>
<th>SWI</th>
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<tr>
<td>Mean age*</td>
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*September 2016
## Outcome measures

<table>
<thead>
<tr>
<th>Skill</th>
<th>Measures</th>
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<tbody>
<tr>
<td>Reading</td>
<td>• Trained and untrained words</td>
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<tr>
<td></td>
<td>• TOWRE&lt;sup&gt;1&lt;/sup&gt;</td>
</tr>
<tr>
<td>Spelling</td>
<td>• Trained and untrained words</td>
</tr>
<tr>
<td></td>
<td>• Nonword morphological spelling (MoSTn)&lt;sup&gt;2&lt;/sup&gt;</td>
</tr>
<tr>
<td>Reading comprehension</td>
<td>• NGRT&lt;sup&gt;3&lt;/sup&gt;</td>
</tr>
<tr>
<td>Vocabulary</td>
<td>• Trained and untrained words</td>
</tr>
<tr>
<td></td>
<td>• Group-administered BPVS&lt;sup&gt;4&lt;/sup&gt;</td>
</tr>
<tr>
<td>Morphological awareness</td>
<td>• Analogy task&lt;sup&gt;5&lt;/sup&gt;</td>
</tr>
<tr>
<td>Motivation to read</td>
<td>• Questionnaire&lt;sup&gt;6&lt;/sup&gt;</td>
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Analysis

• Regression models comparing groups with random intercepts to allow for baseline differences between schools
• Pre-test scores used as a covariate
• Interaction terms for
  - age
  - initial reading/spelling ability
  - whether or not children are native speakers of English
Morphological reading task

- Children asked to read aloud
  - real words, taught during training lessons e.g. *assistance*
  - words of similar length and frequency that had not been trained
  - nonwords made up of trained bases and suffixes e.g. *helpability*
Morphological reading task

- Main effect of group ($t = 2.13, p = 0.03$)
- No main effects of age or EAL
Morphological reading task

Interaction of pre-test score and group ($t=-2.41, p = 0.02$)
Trained vs. untrained items

Evidence of improvement on trained but not untrained items
Evidence of improvement on novel combinations of trained bases and suffixes
Generalisation items

Same interaction as on trained items ($t = -2.08$, $p = 0.04$)
TOWRE Pseudoword Decoding

Main effect of pre-test ($t=-15.40$, $p < 0.001$) but no other significant main effects or interactions.

Error bars = 95% CI
Reading - Overview

• For children with lower pre-test scores, Motivated Reading resulted in greater gains than Structured Word Inquiry, and vice versa
• Reading improved on trained items and nonwords made up of trained morphemes for both groups
• Reading did not improve on untrained words or nonwords
Morphological spelling task

- Children asked to spell to dictation
  - real words, taught during training lessons e.g. *unpleasant*
  - words of similar length and frequency that have not been trained
  - nonwords made up of trained bases and suffixes e.g. *preplease*
Morphological spelling task

Main effect of pre-test ($t=12.22, p < 0.001$) but no other significant main effects or interactions
Trained vs. untrained items

- Untrained items: interaction between group and year was significant ($t = 2.2$, $p = 0.03$)
- Trained items: interaction between group and year approached significance ($t = 1.83$, $p = 0.07$)
Year 5 Spelling

Scores on Trained Items (Max = 14)

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Scores on Untrained Items (Max = 11)

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Error bars = 95% CI
Year 3 Spelling

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Error bars = 95% CI
MoSTn spelling task

- Children asked to spell nonwords ending in common suffixes e.g.
  
  *Gary will snive. He will be the sniver. Spell sniver.*

- Two scores:
  1) **base score** - whether children spelled the base correctly (e.g. *sniver*)
  2) **suffix score** - whether children spelled the suffix correctly (e.g. *sniver*)

Kohnen, Colenbrander, Caruana and Barisic (unpublished)
No significant main effects of group but significant interaction of year and training group

(t = 2.10, p = 0.04)
MoSTn – Suffix Score
Year 5

Same pattern as that observed on reading measure
Difference between SWI and MR approached significance ($t = -1.69$, $p = 0.09$)
Spelling - overview

- Scores increased on both trained and untrained real words and nonwords in both year groups
- Not clear whether this was a result of training, or of normal classroom instruction/maturation
- Hint of greater improvements in SWI than MR in Year 3 – but not significant
- Probably because some of the trained morphemes were taught in class as part of the Year 3-4 spelling and grammar curriculum
Other outcome measures

• No significant differences between the groups on
  - Reading comprehension
  - Group-administered multiple choice vocabulary
  - Oral morphological awareness
  - Motivation to Read questionnaire
Research Questions

• Is Structured Word Inquiry more effective than Motivated Reading for children with poor reading and spelling skills?  
  No

• Does the effectiveness of each programme vary depending on
  - age? No – except for spelling?
  - severity of reading and spelling difficulties? Yes
  - whether or not children are native speakers of English? No
• Fidelity ratings from school visits
  - SWI: Mean 3.28, SD 0.53
  - MR: Mean 3.43, SD 0.47
  - Difference not significant (p = 0.07)
• 19 of 28 TAs completed a fidelity rating scale
• 9 TAs completed qualitative interviews
  - SWI more challenging to deliver
  - TAs felt less confident delivering SWI
  - Felt that SWI was more challenging for children to learn, particularly for youngest and weakest readers
Conclusions

• No evidence that SWI is more effective than MR for improving reading, spelling, vocabulary or reading comprehension

• MR instruction led to greater reading gains than SWI for the weakest readers (also true for Year 5 spelling)

• Possible that SWI instruction was too high-level

• Lower levels of TA knowledge and confidence in SWI may have reduced effectiveness

• Future studies could explore effects of increasing TA training and tailoring to ability levels
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