Presenter:  Dr Lillian Fawcett  
Ph.D., B.Ed., B.A. (Psych) Honours
Frith’s Literacy Acquisition Model

- Phonological Awareness
- Alphabetic Phase
- Logographic Phase


Participants: 382 kindergarten students


- 125 five year olds
- 34 children – 10 weeks of phonological awareness (PA) instructions.
- 95 children – usual reading program (phonics but did not PA).

Intervention

- Superior literacy outcomes
- 6% (versus 26%) experiencing word decoding difficulties at the end of the program.

- 119 typically developing 4th and 6th graders
- Assessed on
  - phonological awareness (phonemes, syllables, rime)
  - phonological memory
  - word reading & comprehension
  - spelling

Phonological skills explained significant variance in
- reading (pronunciation and comprehension)
- written language
Logographic Phase

Alphabetic Phase

Alphabet Code

Phonological Awareness

Alphabet Code

Logographic Phase


Alphabet Code

Phonemic Knowledge


• 6 & 7 year olds with reading difficulties
• Intervention – 24 weeks
• 56 – sequenced, semi-scripted lessons in phonemic awareness and alphabetic coding

Alphabet Code

Phonemic Knowledge

Table 1: Pre and post test means and standard deviations for the control and intervention groups on all measures

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Alphabet Code:
Phonemic Knowledge


<table>
<thead>
<tr>
<th>Measure</th>
<th>Intervention group (n = 10)</th>
<th>Control group (n = 10)</th>
<th>Z (10)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Word recognition score</td>
<td>15.00</td>
<td>12.50</td>
<td>1.37†</td>
</tr>
<tr>
<td>Multiple accuracy score</td>
<td>12.00</td>
<td>11.25</td>
<td>1.37†</td>
</tr>
</tbody>
</table>

* p < .05

Alphabet Code:
Phonemic Knowledge


- 49 comparisons of experimental and control groups
- Phonics Instruction
  - most frequently investigated treatment approach
  - only approach whose efficacy on reading and spelling performance in children and adolescents with reading disabilities is statistically confirmed.

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- Dyslexics – successful phonetic based intervention
- Dyslexics – unsuccessful phonetic based intervention
- No reading impairment
ow – cow
ou - house
ow – cow
ow - bow


Brain activation:
• Reading real and pseudo words of different lengths
• Lexical decision making task
Alphabet Code: Phonemic Knowledge

- Yellow = area activated during task
- Red = length effect
- A = Real words – no time difference irrespective of length
- B = Pseudo words – longer words took longer to read

Alphabet Code: Phonemic Knowledge

- Yellow = length effect for pseudo words
- Orange = length effect for lexical decision making task
- No significant effect for auditory lexical decision making

Alphabet Code: Phonemic Knowledge

- Red = areas activated reading pseudo words but not real words
Key Points:
1. Absence of length effect for real words – competent readers able to easily and automatically match letter strings against stored orthographic knowledge.
2. Greater brain activation generally and specifically in the left hemisphere when reading pseudo words and particularly longer pseudo words suggests that where words are not instantly recognised the decoding process is completely different.
3. Suggests reading is a two part process.

Ben is rich. “I will get a chop and chips at lunch,” said Ben. I can not chat much at lunch.


- Participants: 32 Grade 1 students
- Phonic instruction & decodable texts
- Authentic literature read aloud
- Phonics instruction & authentic literature
Alphabet Code: Phonemic Knowledge

- Below average readers improved most from phonic instruction and decodable texts.
- Average readers improved most from authentic literature read aloud.


Frith’s Literacy Acquisition Model

Orthographic Phase

Alphabetic Phase

Logographic Phase

calligraphist

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- Orthographic to meaning (no phonology)
- Orthographic to phonology (no meaning)
- Phonology to meaning (no orthography)

- Orthography and word meaning = best performance on word association test

- Vocabulary development depends on
  - recognising past encounters with a word
  - past encounters most likely to be remembered when students understand the meaning of the word and its key orthographic features.
Orthographic Knowledge:
Root Words & Affixes


* Participants: 83 middle-school students

Treatment Group Program
- Syllabification patterns
- Syllabification steps and rules
- Accenting patterns
- Practiced skills by decoding and encoding pseudowords and low frequency words

Orthographic Knowledge:
Syllabification

<table>
<thead>
<tr>
<th>Variable</th>
<th>Control (n = 31) Pre-test</th>
<th>Control (n = 31) Post-test</th>
<th>Treatment (n = 30) Pre-test</th>
<th>Treatment (n = 30) Post-test</th>
</tr>
</thead>
<tbody>
<tr>
<td>Errors</td>
<td>Mean: 1.91 (SD: 2.16)</td>
<td>Mean: 1.46 (SD: 2.04)</td>
<td>Mean: 1.31 (SD: 1.85)</td>
<td>Mean: 1.31 (SD: 1.85)</td>
</tr>
<tr>
<td>Syllabication</td>
<td>Mean: 22.57 (SD: 1.32)</td>
<td>Mean: 22.57 (SD: 1.32)</td>
<td>Mean: 22.57 (SD: 1.32)</td>
<td>Mean: 22.57 (SD: 1.32)</td>
</tr>
<tr>
<td>Comprehension</td>
<td>Mean: 53.2 (SD: 1.2)</td>
<td>Mean: 53.2 (SD: 1.2)</td>
<td>Mean: 53.2 (SD: 1.2)</td>
<td>Mean: 53.2 (SD: 1.2)</td>
</tr>
<tr>
<td>Fluency</td>
<td>Mean: 75 (SD: 2)</td>
<td>Mean: 75 (SD: 2)</td>
<td>Mean: 75 (SD: 2)</td>
<td>Mean: 75 (SD: 2)</td>
</tr>
</tbody>
</table>

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Syllabification as a decoding strategy

Link new knowledge to existing knowledge


Information processing research using time-sequencing of the activation of the different brain regions

- Brain’s potential for learning is associated with recognition of existing pattern.
- Relate existing pattern to incoming information

Integration


- Transference from spelling into reading particularly strong
- Focus on orthographic understanding
- Generalisations made to new words with similar orthographic patterns

Pictorial

Shmidman, A., & Ehri, L. (2010). Embedded picture mnemonics to learn letters Scientific Studies of Reading, 14 (2), 159

- Learned the letters quicker
- Remembered them better a week later
- Were less likely to confuse the letters
- Were better at using this knowledge in reading and spelling tasks

8 week multisensory intervention involving:
- mental imagery
- articulation
- tracing of letters, groups of letters and words

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- Brain more efficient at encoding and retrieving motor movements.
- Links between cerebellum and memory, attention and spatial perception.
- Exercise generally increases the number of connections between neurons.


- 20 letters of unknown alphabet
- Group 1 – wrote letters by hand
- Group 2 – used keyboard
- Tested after 3 weeks & 6 weeks
  - Recollection of letters
  - Correct formation or reversals
- Group 1 superior
- Greater activation of Broca’s area

- Greater mental effort required
- Visual attention is concentrated on the letter formation
- Actually form the visual shape of the letter
- Different parts of the brain are simultaneously stimulated
- Writing process take longer stimulating the temporal aspects of the brain longer


Practice builds permanence


Rehearsal and Repetition

Struggling readers who participated in repeated reading intervention programs outperformed control group in:

- Fluency
- Vocabulary recognition
- Word & passage comprehension

The rhythmic gymnast performed a dynamic routine at the Sydney Olympics. The cyclist had a terrible accident when the tyre on her bicycle exploded. It was the first time that Kylie had performed at the Sydney gymnasium and she thought that the synthetic surface was fabulous.

Direct Instruction


- Participants: 1,400 Year 3 students
- Regular observation and testing of all students
- Diagnostic testing
- Investigating appropriate strategies
- Planning and implementing appropriate remediation strategies
- Re-evaluation

- Participants: 4,572 students
- Mastery learning
- High levels of feedback
- Structured, incremental steps of instruction

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