Literacy development in children with speech and language difficulties

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Outline

- Background regarding children with speech difficulties
  - Risk and protective factors for literacy development
  - Case study examples of individual intervention
- Response to classroom-based PA teaching
- Preliminary analysis
  - Children with speech difficulty in the Better Start Cohort
- Future Directions

The literacy development of children with speech difficulty

Young children with speech difficulty

The literacy development of children with speech difficulty

- Increased risk for reading and spelling difficulties
- Poor phonological awareness (e.g., Dodd's work; Preston et al., 2013)
- Additional language impairment (e.g., Sices et al., 2007)
- Atypical speech error patterns (e.g., Dodd's work; Preston et al., 2013)
Not all speech errors are created equally!

Broomfield & Dodd, 2004 (n = 320)

Articulation (62)
Deletion (57)
Elision (29)
Enunciation (0)

Male, aged 7;6
McNeill, Wolter & Gillon, 2017

/gʌk/
/dʌ/
/gak/

Male, aged 7;6
McNeill, Wolter & Gillon, 2017

Phonological Awareness: Standard Scores

Holm et al., 2009
**Literacy: Inconsistent Speech Errors**

- **Holm et al., 2009**

**Speech Over Time**

(n=39, children with inconsistent speech)

- McNeill, Macrae, McIlraith & Gillon, in preparation

**Literacy over time**

(% within expected range)

**Arthur; 8 years 8 months**

<table>
<thead>
<tr>
<th>Item</th>
<th>Spoken attempt</th>
<th>Written attempt</th>
</tr>
</thead>
<tbody>
<tr>
<td>Kangaroo</td>
<td>/dæɳəru/</td>
<td>(wel'mn)</td>
</tr>
<tr>
<td>Girl</td>
<td>/dɪl/</td>
<td>(lmaʃ)</td>
</tr>
<tr>
<td>Shark</td>
<td>/zək/</td>
<td>(amkʃ)</td>
</tr>
<tr>
<td>Bridge</td>
<td>/wɛʤ/</td>
<td>(wɛtno)</td>
</tr>
<tr>
<td>Cake</td>
<td>/dɛk/</td>
<td>(Kmko)</td>
</tr>
</tbody>
</table>

* Spelling items from the inconsistency subtest of the DEAP (Dodd et al., 2002)
Young children with speech difficulty

- Atypical speech error patterns (e.g., Dodd's work; Preston et al., 2013)
- Poor phonological awareness (e.g., Gillon, 2000)
- Additional language impairment (e.g., Sices et al., 2007)

Increased risk for reading and spelling difficulties

Case Study Intervention Examples

Children with multiple risk factors for literacy difficulty

**Intervention for Childhood Apraxia of Speech (n=12)**

- Multiple single-subject and comparative group design

**Intervention Block 1:** 6 weeks

**Intervention Break:** 6 weeks

**Intervention Block 2:** 6 weeks

**Post-test repeated measures**

**Pre-test**

- Baseline repeated measures 2 weeks

**Pre-test**

**Post-test**

**Integrated Phonological Awareness Intervention**

- Phoneme Awareness
- Speech Production
- Letter-sound knowledge
Case Study 1: Logan

<table>
<thead>
<tr>
<th></th>
<th>Age</th>
<th>Burt Age Equivalence Band</th>
<th>Non-word Reading (PPC)</th>
<th>Spelling (PGC)</th>
<th>TOPA-2 (standard score)</th>
<th>Letter knowledge (1/32)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>6;6</td>
<td>&lt;5;10-6;4</td>
<td>0%</td>
<td>15%</td>
<td>78</td>
<td>8</td>
</tr>
</tbody>
</table>

Note: PPC = percent phonemes correct; PGC = percent graphemes correct, TOPA-2 = Test of Phonological Awareness – second edition (Torgesen and Bryant, 2004).

Spoken

<table>
<thead>
<tr>
<th>Item</th>
<th>Spelled (Pres)</th>
<th>Spell Pre (6:6)</th>
<th>Spell Post (6:11)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Rain</td>
<td>/wen/</td>
<td>/kæn/</td>
<td>/kæn/</td>
</tr>
<tr>
<td>Kangaroo</td>
<td>/ næwu/</td>
<td>/gæwu/</td>
<td>/gæwu/</td>
</tr>
<tr>
<td>Girl</td>
<td>/gæl/</td>
<td>/gæl/</td>
<td>/gæl/</td>
</tr>
<tr>
<td>Shark</td>
<td>/ʃæk/</td>
<td>/ʃæk/</td>
<td>/ʃæk/</td>
</tr>
<tr>
<td>Dinosaur</td>
<td>/ˈdaɪnaʊsər/</td>
<td>/ˈdaɪnaʊsər/</td>
<td>/ˈdaɪnaʊsər/</td>
</tr>
<tr>
<td>Teeth</td>
<td>/tiːθz/</td>
<td>/tʃiːθz/</td>
<td>/tʃiːθz/</td>
</tr>
<tr>
<td>Fish</td>
<td>/fiʃ/</td>
<td>/fiʃ/</td>
<td>/fiʃ/</td>
</tr>
<tr>
<td>Chips</td>
<td>/tʃiːps/</td>
<td>/tʃiːps/</td>
<td>/tʃiːps/</td>
</tr>
<tr>
<td>Bridge</td>
<td>/bɹɪdʒ/</td>
<td>/bɹɪdʒ/</td>
<td>/bɹɪdʒ/</td>
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<td>Cake</td>
<td>/keɪk/</td>
<td>/keɪk/</td>
<td>/keɪk/</td>
</tr>
</tbody>
</table>

*Note: Items not directly trained in specialist teaching.

Case Study 2: Liam and Theo

- Aged 4;6
- Significant speech difficulty
- Mild receptive language difficulty
- Rhyme awareness and initial phoneme identity knowledge yet to emerge
- Integrated PA therapy from 4;7–4;11
- Significant growth in speech, phonological awareness and letter-sound knowledge
- Followed for a year following the completion of therapy
- School entry assessment
- Teacher interview
Liam: First term at school (5;2)

Theo: First term at school (5;2)

Response of children with speech difficulty to classwide PA teaching

Gain Scores for Children with Typical Development and Speech Language Delay (n=7)

Responsiveness to Classroom Based PA Teaching
(Carson, Gillon & Bousted, 2013)
A Better Start

E Tipu E Rea
Literacy and Learning Theme

Early literacy intervention: Focus on children with speech production difficulties

Participants
Year 1 students (Aged 5;0 – 5;11)

268 Initial Assessment across 7 schools
170 eligible for comprehensive assessment
56 children with speech difficulty

Children with speech difficulty (n=56/143)

<table>
<thead>
<tr>
<th></th>
<th>% consonant to correct</th>
<th>Inconsistent errors</th>
<th>Inconsistent errors %</th>
<th>Unusual errors</th>
<th>CELF Total Language Score*</th>
<th>Initial Phoneme Identity</th>
</tr>
</thead>
<tbody>
<tr>
<td>Strand A</td>
<td>82.7% (12.5)</td>
<td>N = 6</td>
<td>29.4% (15.8)</td>
<td>N = 4</td>
<td>80.6 (13.3)</td>
<td>5.1 (2.0)</td>
</tr>
<tr>
<td>Strand B</td>
<td>82.2% (12.8)</td>
<td>N = 5</td>
<td>27.2% (17.2)</td>
<td>N = 5</td>
<td>82.5 (14.6)</td>
<td>4.7 (2.4)</td>
</tr>
</tbody>
</table>

Inconsistent errors = 40% or greater inconsistency

No difference across strands in speech accuracy, inconsistency, phoneme awareness, oral language ability

Reminder - Study Design (E Tipu e Rea)

<table>
<thead>
<tr>
<th>Term 1</th>
<th>Term 2</th>
<th>Term 3</th>
<th>Term 4</th>
</tr>
</thead>
<tbody>
<tr>
<td>Usual</td>
<td>Usual</td>
<td>Usual</td>
<td>Term 1: PA + vocab</td>
</tr>
<tr>
<td>Usual</td>
<td>Usual</td>
<td>Usual</td>
<td>Term 2: PA + vocab</td>
</tr>
<tr>
<td>Usual</td>
<td>Usual</td>
<td>Term 2: PA + vocab</td>
<td>Term 3: PA + vocab</td>
</tr>
<tr>
<td>Term 2: PA + vocab</td>
<td>Term 3: PA + vocab</td>
<td>Term 4: PA + vocab</td>
<td>Usual</td>
</tr>
</tbody>
</table>

Strand A (n=71, 27 with SD) across 3 schools
Strand B (n=73, 29 with SD) across 4 schools
Phoneme segmentation

Non-Word Reading (graphemes correct)

Expressive Vocabulary (Elaborated)

Conclusions, Implications and Next Steps

• Preliminary data (phase 1) show positive impact of the intervention for children with speech difficulty
• Important to examine the impact for Strand B and for the tier 2 support
  • Literacy and speech outcomes
• Opportunities for tier 3 support?
Acknowledgements

This research forms part of the National Science Challenge: A Better Start, funded by the Ministry of Business, Innovation and Employment (MBIE) [Grant number 15-02688].