LITERACY FOR DEAF CHILDREN: THE ESSENTIALS

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The Simple View of reading (Gough & Tunmer, 1986)

Decoding + Comprehension = Reading
The problem

- Many deaf children have poor phonological skills (as well as poor language)

Harris & Beech (1998)
Can deaf children can learn to read in two different ways?

- An oral route using links between sounds and letters (similar to hearing children)
- An alternative route using links between signs and words
The puzzle

- How does this non-phonological route actually work?
- How can knowledge of sign be used in learning to read?
- Links between signs and words would mainly have to be at the whole word level
- How can children read unfamiliar words?
What about deaf children who are good readers?

Harris & Moreno (2006)
Comparison of deaf children with good and poor reading ability

<table>
<thead>
<tr>
<th></th>
<th>Good Readers</th>
<th>Poor Readers</th>
</tr>
</thead>
<tbody>
<tr>
<td>Phonetic errors in spelling (%)</td>
<td>16.22 (14.94)</td>
<td>0.93 (2.78)</td>
</tr>
<tr>
<td>e.g. BISKIT</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Correct representation of syllables (%)</td>
<td>53.23 (20.42)</td>
<td>23.91 (19.85)</td>
</tr>
<tr>
<td>Orthographic awareness score</td>
<td>6.33 (4.00)</td>
<td>2.03 (2.98)</td>
</tr>
<tr>
<td>Speech intelligibility rating</td>
<td>2.33 (1.58)</td>
<td>2.33 (1.41)</td>
</tr>
<tr>
<td>Speechreading score (total)</td>
<td>38.89 (2.57)</td>
<td>28.56 (7.68)</td>
</tr>
</tbody>
</table>
Comparison of good and poor readers

- All good readers were good at speechreading
- No other measure distinguished all good readers
- Children who were good signers were only good at reading if they were also good at speechreading (since some good signers were poor readers)
- AND some of the poor readers were also good speechreaders so speechreading alone was not sufficient to support reading
English vocabulary also predicted reading progress

1 year

T1

0.52**

T2

0.02

Controlling for Nonverbal intelligence, Hearing loss and reading at T1

Kyle & Harris (2010)
CURRENT RESEARCH
What has changed in 10 years?

Age of diagnosis has reduced with the national rollout of Newborn Hearing Screening.
What has changed in 10 years?

Many more children now have cochlear implants and many have bilateral implants.

Implants are being carried out earlier.

Technology of implants continues to improve.

Hearing aid technology has also improved with the development of digital hearing aids.
Impact of hearing aid technology and earlier identification?

- Better and earlier hearing aid technology gives children better access to spoken language.
- This should enable the development of better decoding skills and better vocabulary.
- This should improve literacy.
- How do children currently in primary school compare with similar children assessed 10 years ago?
**Design**

**Year 1**
- Recruitment of participants and 1st assessment
  - Classroom observations and teacher interviews

**Year 2**
- 2nd assessment
  - Classroom observations and teacher interviews

**Year 3**
- 3rd assessment
Participants

- 42 deaf children in Year 1 and Year 2
  - Aged 5:06 -7:06 years
  - Recruited from 25 settings (schools for the deaf, hearing impaired units and mainstream) in same geographical area as previous study
  - Severely- profoundly deaf
  - Non verbal intelligence within normal range (> 85)

- 40 hearing children of similar age and reading ability
  - Aged 5:06- 6:06 years
  - Recruited from 5 schools (all mainstream)
  - Matched on single word reading
Assessments

- BAS III – pattern construction
- Single Word Reading Test
- York Assessment of Reading Comprehension
- Expressive One Word Picture Vocabulary Test
Two cohorts

<table>
<thead>
<tr>
<th>Study</th>
<th>N</th>
<th>CA years: months (SD)</th>
<th>Unaided Hearing Loss dB (SD)</th>
<th>Aided Hearing Loss dB (SD)</th>
<th>NVIQ</th>
</tr>
</thead>
<tbody>
<tr>
<td>Kyle &amp; Harris 2003</td>
<td>32</td>
<td>6:04 (9.2m)</td>
<td>99 (15)</td>
<td>53 (17.4)</td>
<td>92 (11.8)</td>
</tr>
<tr>
<td>ESRC 2013</td>
<td>42</td>
<td>6:07 (6.9m)</td>
<td>97 (14.1)</td>
<td>39 (14.8)</td>
<td>121 (30.7)</td>
</tr>
<tr>
<td>p= .135</td>
<td></td>
<td>p= .495</td>
<td>p= .002</td>
<td>p &lt; .001</td>
<td></td>
</tr>
</tbody>
</table>
Assessments

- Letter sound knowledge
- Phonological Awareness test
- ToCS – Speechreading test
Phonological awareness task (24 trials)

ONSET

RIME – SAME SPELLING

RIME – DIFFERENT SPELLING
Test of Child Speechreading (ToCS)
Kyle, Macsweeney, Mohammed & Campbell (2009)

Apple

The baby is in the bath
# Cohort comparison: Aiding

<table>
<thead>
<tr>
<th>Study</th>
<th>Hearing Aids</th>
<th>Cochlear Implants</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Kyle &amp; Harris</td>
<td>24</td>
<td>8</td>
<td>32</td>
</tr>
<tr>
<td>ESRC 2013</td>
<td>20</td>
<td>22</td>
<td>42</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>44</strong></td>
<td><strong>30</strong></td>
<td><strong>74</strong></td>
</tr>
</tbody>
</table>
## Cohort comparison: Assessments

<table>
<thead>
<tr>
<th>Study</th>
<th>N</th>
<th>Single word reading</th>
<th>Reading comprehension</th>
<th>Spoken English vocabulary</th>
<th>Phonological awareness Total score</th>
</tr>
</thead>
<tbody>
<tr>
<td>Kyle &amp; Harris 2003</td>
<td>32</td>
<td>5:09 (12.3 m)</td>
<td></td>
<td>3:02 (9.9 m)</td>
<td>16/24 (3.7)</td>
</tr>
<tr>
<td>ESRC 2013</td>
<td>42</td>
<td>6:01 (14.4 m)</td>
<td>6:0 (19.4 m)</td>
<td>5:05 (22.6 m)</td>
<td>18/24 (4.2)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>ns</td>
<td></td>
<td></td>
<td>p &lt; .001</td>
</tr>
</tbody>
</table>
## Cohort comparison: Educational setting

<table>
<thead>
<tr>
<th>Study</th>
<th>Educational setting</th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>School for the Deaf</td>
<td>Hearing Impaired Unit</td>
<td>Mainstream</td>
<td>Total</td>
<td></td>
</tr>
<tr>
<td>Kyle &amp; Harris</td>
<td>7</td>
<td>25</td>
<td>0</td>
<td>32</td>
<td></td>
</tr>
<tr>
<td>ESRC 2013</td>
<td>14</td>
<td>18</td>
<td>10</td>
<td>42</td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td>21</td>
<td>43</td>
<td>10</td>
<td>74</td>
<td></td>
</tr>
</tbody>
</table>

\[ p = 0.002 \]
## Comparison of deaf and hearing children

<table>
<thead>
<tr>
<th>Group</th>
<th>N</th>
<th>Phonological awareness (SD)</th>
<th>ToCS total score (SD)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Deaf children</td>
<td>42</td>
<td>18 (4.2)</td>
<td>14 (3.7)</td>
</tr>
<tr>
<td>Hearing children</td>
<td>40</td>
<td>21 (2.6)</td>
<td>11 (3.9)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>p &lt; .001</td>
<td>p = .014</td>
</tr>
</tbody>
</table>
Comparison of deaf and hearing children: Net reading & vocabulary levels at T1

<table>
<thead>
<tr>
<th></th>
<th>Single word Comprehension</th>
<th>English vocabulary</th>
</tr>
</thead>
<tbody>
<tr>
<td>Deaf children</td>
<td>-10</td>
<td>-15</td>
</tr>
<tr>
<td>Hearing children</td>
<td>-5</td>
<td>-10</td>
</tr>
</tbody>
</table>

Graph showing the comparison between deaf and hearing children on single word comprehension and English vocabulary.
Summary of findings at first assessment

- More children are in mainstream settings
- Spoken English vocabulary is higher in the 2013 cohort but lower than hearing peers
- BUT phonological awareness scores and reading are not higher than in the 2013 cohort
- This suggests that children will require support to develop phonological coding skills
Thanks to

- Teachers and pupils who took part in the studies