Key research findings on reading comprehension and language in deaf children

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Reading comprehension in deaf children: relationship with word reading

- In our research, oral and signing deaf children with below average reading all had poor decoding skills (including poor word reading) and poor reading comprehension\(^1,2\)
- In the research literature, reading comprehension difficulties in deaf children are often attributed to poor word reading
- Why? Because slow, inaccurate, or inefficient word reading leaves fewer cognitive resources for processing text for meaning\(^3\)
- This is unlike hearing children with poor reading comprehension, who generally have age appropriate word reading\(^4\)

\(^1\)Herman et al 2014, \(^2\)Herman et al 2015, \(^3\)Perfetti, 1985, \(^4\)Cain & Oakhill 1999
Reading comprehension and vocabulary in deaf children

• Vocabulary knowledge is correlated with word recognition, speech comprehension, and reading in hearing\textsuperscript{11,12} and deaf children\textsuperscript{13,14,15,16,17}
• Deaf children’s vocabulary is typically smaller than hearing children
• Rate of vocabulary acquisition is slower
  – On vocabulary tests, the expected rate of change for hearing children is 1.0 per year, i.e. a one-year increase in age-equivalent score per year
  – For deaf children with cochlear implants, the mean rate is typically 0.46 to 0.72 per year (better for children implanted younger)\textsuperscript{10}

\textsuperscript{10}Fagan & Pisoni 2010, \textsuperscript{11}Ouellette 2006, \textsuperscript{12}Wise et al 2007, \textsuperscript{13}Blamey et al 2001;\textsuperscript{14}Connor & Zwolan 2004, \textsuperscript{15}Geers 2003, \textsuperscript{16}Paatsch et al 2006, \textsuperscript{17}Spencer et al 2003
Reading comprehension and broader language skills

- As well as vocabulary, sentence level language skills (e.g. grammar) are important, and both are explicit in a text.
- In addition, readers must make sense of information stated *implicitly*, i.e. make inferences.
- What are inferences? Inferences involve drawing conclusions from the text.
  - Making links between information provided, e.g. Tom loved his new pet. The puppy was very playful. *Inference: the new pet was the puppy,* or
  - Making use of external information, e.g. The children paddled and built sandcastles. *Inference: the setting is the beach*.
- Deaf children have problems with vocabulary and syntax and also struggle with inferencing skills.

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Reading comprehension and Theory of Mind

- What is Theory of Mind?
  - ‘The ability to impute mental states to oneself and others’
- Develops from early infant imitation and joint reference, pretend play and later conversations about personal experiences and the experiences/perceptions of others
- Involves the use of mental state verbs to talk about thoughts, feelings, hopes, etc.
- Linked to language development
- Deaf children have delayed TOM development - although not children in native signing families
- Interventions developed for children with ASD

18 Westby & Robinson 2014, 19 Woolfe et al 2002
Testing Theory of Mind (Baron-Cohen, 1985)

This is Sally.

This is Anne.

Sally has a basket.

Anne has a box.

Sally has a marble. She puts the marble into her basket.

Anne takes the marble out of the basket and puts it into the box.

Sally goes out for a walk.

Now Sally comes back. She wants to play with her marble.

Where will Sally look for her marble?
Research findings on spelling

• Spelling and reading are highly correlated in hearing and deaf children
• Far less research on spelling
• More reliable method for deaf children with poor intelligibility as it is not dependent on speech
• Analysis of spelling errors is informative because it provides a window into the kind of strategies children use

see Roy et al 2015
Spelling strategies

• 2 main types of strategies:
  – Visual, whole-word/whole syllable non-phonetic
  – Auditory-sequential phonetic

• Children use both types of strategies

• Poor readers and poor spellers may have problems with one or both types of strategy
Analysing spelling errors

• Visual orthographic, non-phonetic errors
  – e.g. more letters than necessary
  – Grapheme (letter) implausible
  – Non-phonetic order /anagrams

• Semi-phonetic/ phonetic errors
  – Vowels missing
  – Non-homophones
  – Homophones
Changes in strategy use with age

- Spelling errors from typically developing children start undifferentiated, but become increasingly phonetically plausible across time.
- By 11-12 years, more than 75% of misspellings in hearing children are phonetically plausible\(^{10}\).
- This compare with less than half (44%) of 6-12 year-old-deaf children with CI\(^{11}\).

\(^{10}\)Angelelli et al 2010, \(^{11}\)Hayes et al 2011
Summary and implications of research on spelling in deaf children

• Spelling is a relative strength for deaf children
• In deaf children, use of a phonetic strategy is related to better spelling & reading and associated with expressive vocabulary, speech intelligibility but not speech reading
• Visual orthographic strategies also play a part
  – Best suited to irregular words
  – Least well suited to unfamiliar, low frequency words
• Over-dependency on visual orthographic strategies may underpin plateau effect in older children
• Teaching potential of spelling and analysis of errors as an integral part of supporting literacy acquisition in deaf children