Young Deaf Readers' Word Processing Efficiency

Nathalie N. Bélanger, Elizabeth Schotter & Keith Rayner*

National Institute on Deafness and Other Communication Disorders (NIDCD)

Department of Psychology, University of California, San Diego

*nbelanger@ucsd.edu

Introduction

Adult skilled deaf readers have a wider perceptual span than hearing readers matched on reading level (RL).

(Bélanger, Slattery, Mayberry & Rayner, 2012)

Adult skilled deaf readers also skip words more often, regress in the text less often, refixate words less often and make longer forward saccade than hearing RL-matched readers do.

(Bélanger et al., 2012; Bélanger, Mayberry & Rayner, 2013)

Adult deaf readers (skilled and less-skilled) appear to bypass phonological codes in early word processing.

(Bélanger, Baum & Mayberry, 2012; Bélanger et al., 2013).

Based on these combined findings, we proposed the notion of "word processing efficiency" for adult deaf readers. In other words, they process more information within one fixation (larger span, longer forward saccades) and do so more efficiently (no need to regress back as often, no need to refixate as often, more skipping).

(Bélanger & Rayner, under revision)

QUESTIONS:

What are the general characteristics of eye movement behavior in young deaf readers (relative to that of young hearing readers)?

Do young deaf readers also show signs of word processing efficiency?

Methods

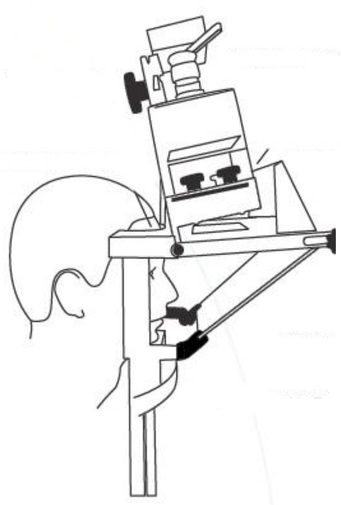
PARTICIPANTS	n =	Mean Age (range)	Reading Age	Reading Level (RAW - PIAT)	Comprehension Questions - Accuracy (%)
Young hearing readers	13	10 years (8-13)	8.11 to 14	65	95
Young deaf readers	13	11 years (8-12)	8.8 to 12	63	94

STIMULI & CONDITIONS:

60 sentences – 9 to 17 words with simple syntactic structures and frequent words

Task: Moving Window Technique (McConkie & Rayner, 1975)

6 Window Sizes (all with 4 visible character spaces to the left of the fixation) :

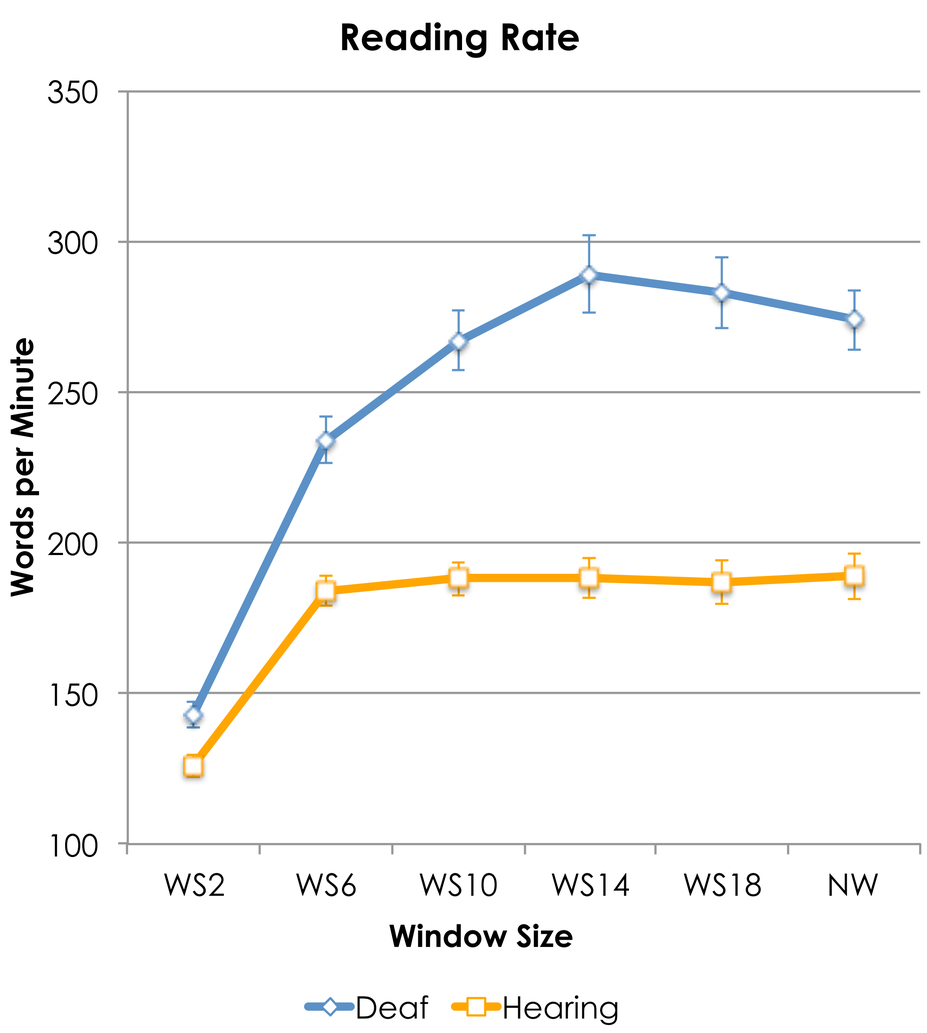


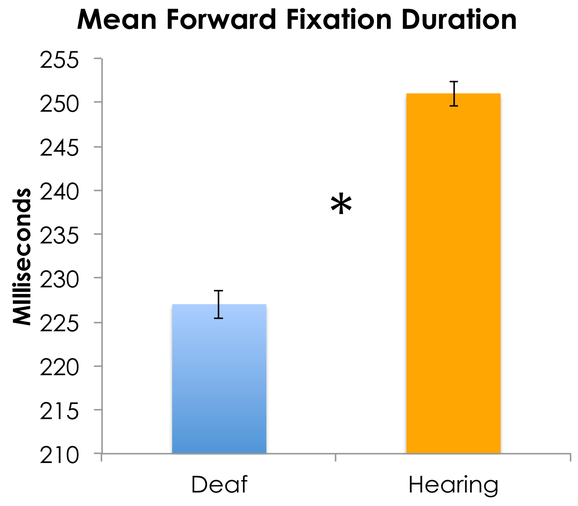
WS 2	WS 6	WS 10	WS 14	WS 18	NW
characters to right of fixation	characters to right of fixation	characters to right of fixation	characters to right of fixation	characters to right of fixation	Control – unmasked sentence

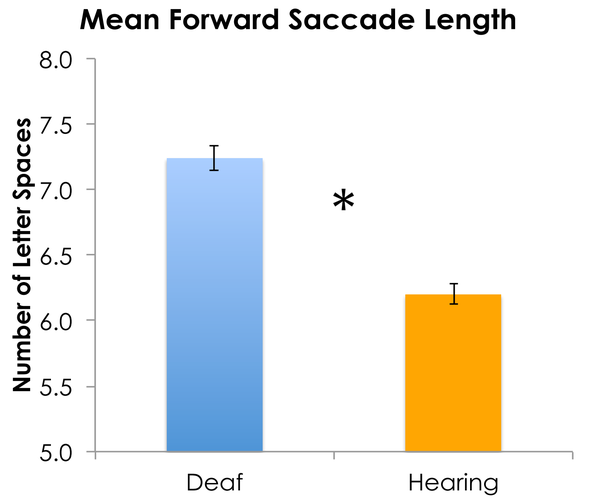
```
The little girl was happy to win the race last weekend.
                  *                                                    Normal text
```

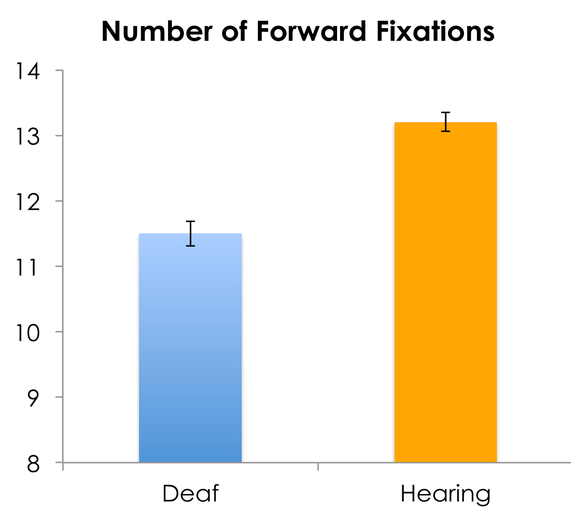
```
xxe little girl wxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxx
      *                                                    Moving window
                                                           on three
xxxxxxxxle girl was hapxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxx     consecutive
          *                                                fixations

xxxxxxxxxxxxxxxxxxs happy to win xxxxxxxxxxxxxxxxxxxx
                    *
```

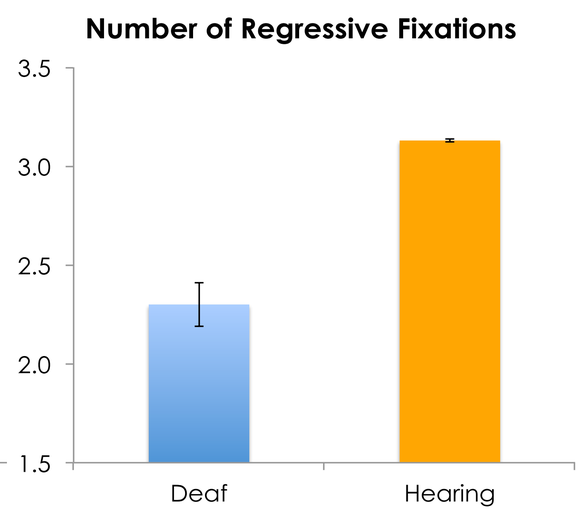
Results











Discussion

- ✓ Young deaf readers have a wider perceptual span than young hearing readers.
- ✓ Young deaf readers also have significantly shorter forward fixation durations and make significantly longer forward saccades than young hearing readers.
  - Though this only approached significance, young deaf readers also made fewer forward fixations and made fewer regressions back in the text relative to young hearing readers.
- ✓ Despite these differences in eye movements, comprehension in young deaf readers was equal to that of hearing readers.

Our results suggest an early onset of "word processing efficiency" in young deaf readers

References - **Bélanger, N.N. & Rayner, K. (under revision).** What Eye Movements Reveal about Deaf Readers. *Current Directions in Psychological Science*. **Bélanger, N.N., Mayberry, R.I., & Baum, S.R. (2012).** Reading difficulties in adult deaf readers of French: Phonological codes, not guilty! *Scientific Studies of Reading, 16*(3), 263-285. **Bélanger, N.N., Mayberry, R. I. & Rayner, K. (2013).** Orthographic and phonological preview benefits: Parafoveal processing in skilled and less-skilled deaf readers. *Quarterly Journal of Experimental Psychology, 66*(11), 2237-2252. **Bélanger, N.N., Slattery, T.J., Mayberry, R.I. & Rayner K. (2012).** Skilled deaf readers have an enhanced perceptual span in reading. *Psychological Science, 23*(7), 816-823. . **McConkie & Rayner (1975)** The span of the effective stimulus during fixation in reading, *Perception & Psychophysics*, 7, 578. **Acknowledgements** – Supported by a NIH-NIDCD R03DC011352 Grant to N. N. Bélanger, and NSF Center Funding SBE 1041725 to Keith Rayner. The authors wish to thank all the deaf and hearing participants in this study: Michele Lee and Blair Rasmus for participant recruitment and data collection.