Eye-movement Comparison in Reading in Deaf and Hard-of-hearing Russian Sign Language Speakers

Anastasia Kromina[1], Anna Laurinavichyute[1,2]

[1]HSE University, Center for Language and Brain
[2]University of Potsdam, Linguistic department

aakromina@edu.hse.ru, alaurinavichute@hse.ru

Deaf individuals are usually considered poorer readers than hearing people (Berent & Kelly, 2007; Bélanger, Baum & Mayberry, 2012; Bélanger & Rayner, 2015). Less-skilled reading in the deaf population is currently explained by the fact that for deaf adults spoken language is often their second language, learned after sign language (Goldin-Meadow & Mayberry, 2001). However, deaf children born to hearing parents do not have a common language with their parents and may be deprived of sign language input too. This deprivation may hinder overall language development, and, consequently, reading (Knoors & Marschark, 2014). Probably, deaf people born to deaf parents have more developed language ability and may further acquire oral language and reading better than deaf people born to hearing parents.

Level of hearing loss is another factor that may influence oral language proficiency and, consequently, reading skills. Hard-of-hearing people have partial access to sounds and may acquire spoken language as the first one and later learn to read in it as their native one. It is likely that hard-of-hearing people might read better than deaf signers because they typically read in their first language, while deaf individuals read in their second language.

To examine to what degree the early language deprivation and access to the speech sounds affect later reading skills, we investigated the patterns of eye movements during reading in hearing-impaired speakers of Russian Sign Language (RSL) with different degrees of hearing loss (N=35, N of hard-of-hearing participants = 13, N of deaf participants = 22). Participants read 144 sentences from the Russian Sentence Corpus (Laurinavichyute et al., 2019) and answered comprehension questions.

First, we investigated local quantitative characteristics of reading. We found that deaf and hard-of-hearing RSL signers mostly have comparable reading skills: similar fixation durations, skipping rates, numbers of fixations per word, saccade landing positions, and word and sentence reading speeds. However, comprehension question responses demonstrated that deaf participants had a pronounced decrease in correct answers as the sentence length increases. Besides, deaf individuals were not sensitive to word frequencies, which may indicate a smaller vocabulary size.

Second, we identified reading strategies with the analysis of scanpaths (i.e., sequences of eye movements) that focuses on the whole trajectories of eye movements in reading the entire sentence (von der Malsburg & Vasishth, 2011). Further, we used cluster analysis that allows to automatically group participants by the similarity of their reading strategies. The results demonstrated that participants do not fall into groups determined by their hearing loss status and early access to language.

To sum up, deaf and hard-of-hearing signers have comparable reading patterns with minor differences. Hearing loss status and early access to language do not define successful reading acquisition in hearing-impaired RSL speakers.

References

Bélanger, N. N., & Rayner, K. (2015). What eye movements reveal about deaf readers. *Current directions in psychological science*, 24(3), 220-226.

Bélanger, N. N., Baum, S. R., & Mayberry, R. I. (2012). Reading difficulties in adult deaf readers of French: Phonological codes, not guilty!. *Scientific Studies of Reading*, 16(3), 263-285.

Berent, G. P., & Kelly, R. R. (2007). 5. The Efficacy of Visual Input Enhancement in Teaching Deaf Learners of L2 English. *In Understanding second language process (pp. 80-105). Multilingual Matters*.

Goldin-Meadow, S., & Mayberry, R. I. (2001). How do profoundly deaf children learn to read?. *Learning disabilities research & practice*, 16(4), 222-229.

Knoors, H., & Marschark, M. (2014). Teaching deaf learners: Psychological and developmental foundations. *Oxford University Press*.

Laurinavichyute, A. K., Sekerina, I. A., Alexeeva, S., Bagdasaryan, K., & Kliegl, R. (2019). Russian Sentence Corpus: Benchmark measures of eye movements in reading in Russian. *Behavior research methods*, 51(3), 1161-1178.

Von der Malsburg, T., & Vasishth, S. (2011). What is the scanpath signature of syntactic reanalysis?. *Journal of Memory and Language*, 65(2), 109-127.