Frequency, orthographic neighborhood, and concreteness effects in deaf readers of English: an ERP study
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Introduction
• N170 patterns, reflecting early orthographic processing, differ between hearing and deaf participants [1].

- The present experiment, a megastudy design that was similar to that of Dufau et al. [2], focused on ERPs to words in three post N170 time windows thought to reflect lexical and post-lexical processes: 200-300 ms, 300-500ms and 500-700ms
- Here we report ERP differences resulting from the manipulation of three well known word properties: concreteness, orthographic neighborhood density and word frequency.

Concreteness- Ratings from Brysbaert et al., (2014).
Orthographic Levenshtein Distance – Orthographic Levenshtein Distance
Word Frequency - Zip frequencies based on SUBTLEX-US

Participants:
• 23 deaf individuals, mean age = 34
• 75 hearing individuals from Dufau et al., mean age = 20

Stimuli:
• 480 words varying in frequency, orthographic neighborhood density and concreteness.
• 70 nonword probes
• Critical comparisons were between the low and high quartiles [120 items per condition] for our three properties E.G. 120 of the highest frequency items compared to 120 of the lowest frequency items

Task
Go/No-Go Lexical Decision Task: Decide whether words presented on a computer monitor were real English words [e.g. table] or nonwords [e.g flark]
• Go: Press a button to nonwords [e.g flark 15% of trials]
• No-Go: Do not press button if legal English word [e.g book 85% of trials].

Results

Concreteness
Hearing
Deaf

200-300 300-500 500-700

Results

Frequency
Hearing
Deaf

200-300 300-500 500-700

High frequency words elicit more negative N400s than low frequency words. Very similar size, timing and distribution of effects in deaf and hearing.

Task

Method

Conclusions
• Our preliminary results indicate that deaf readers show similar ERP effects to manipulations of neighborhood size, frequency and concreteness as compared to previously collected data from 75 hearing readers.
• However, scalp distribution varies between hearing and deaf readers for both concreteness and neighborhood.
• Concreteness: Deaf readers show an earlier, more widespread and prolonged effect.
• Neighborhood: Deaf readers show a somewhat different scalp distribution effect that is more prolonged in time.
• Our results suggest that later mechanisms (post N170) involved in recognizing visual words are more similar for hearing and deaf readers but that there are subtle differences in timing, scalp distribution and size of effects.
• Future directions: Run more subjects! Observe correlations of these effects with reading profiles in deaf participants in order to better understand these findings.

References

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