How do we recognize pseudowords in an audio signal?

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Introduction

- Pseudoword: combination of segments that could be a word in a language but isn't
- Spoken word recognition experiments often use pseudowords as distractors
  - Give insight into the lexicon (organization, activation, etc.)
- Pseudoword responses often discarded (usually 50% of data)
  - We haven't described what's going on during half of the experiment time

Research questions:

- Do predictors for real word responses also predict pseudoword responses? (E.g., phonotactic probability [5], phonological neighborhood density [1][2], and uniqueness point [3])
- What do pseudoword responses say about the lexicon?

Methodology

Materials

- Response data from Massive Auditory Lexical Decision data set [4]
  - 9,600 pseudowords with mean of 11.88 responses each (n=113,504); differing lengths and syllable structures, some morphologically complex

Analysis

- Linear mixed-effects regression
  - Predicting log reaction time from stimulus offset
  - Predictors of interest: **phonotactic probability**, **phonological nbhd density**, and **uniqueness point**
  - Items w/ RT from onset < 500, RT from offset <= 0, or phonotactic probability of 0 dropped (n=93,601, or 81.99% remaining)

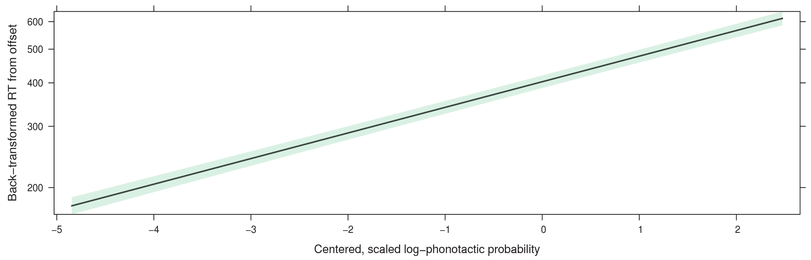

Figure 1. Effect plot for phonotactic probability

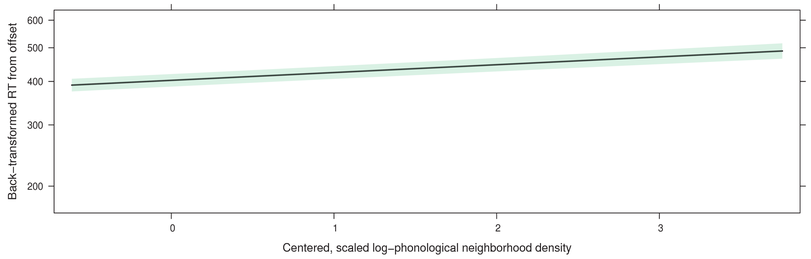

Figure 2. Effect plot for phonological neighborhood density

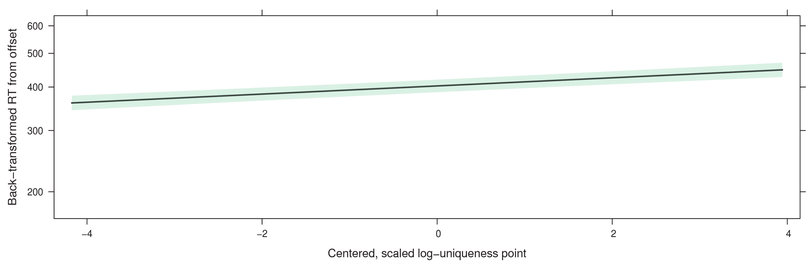

Figure 3. Effect plot for uniqueness point

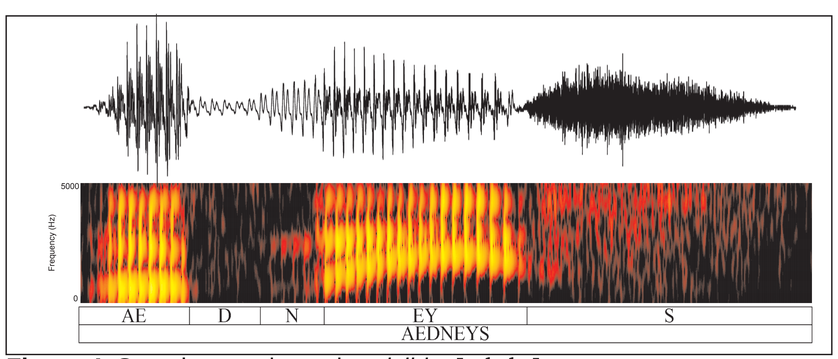

Figure 4. Sample pseudoword *aadsihks* [ɑdsɪks]

Results

- **Phonotactic probability**: common sequences harder to identify, & vice-versa
  - Conflicts with [5]; however, their data set is CVC and not necessarily a representative sample of possible pseudowords
- **Phonological neighborhood density**: more candidates to decide between, so takes longer
  - Matches [1][2]
  - Effect size smaller than for phonotactic probability, but larger than for uniqueness point
- **Uniqueness point**: further into the signal implies a need to wait longer to identify the signal
  - Aligns with [3]
  - Effect size smaller than for phonotactic probability and phonological neighborhood density

Conclusion

- No "magic bullet" predictor
  - Pseudoword recognition is instead a combination of cognitive processes carried out on the signal
- Lexical characteristics predict both real word and pseudoword responses
- Audio signals with pseudowords seem to be processed in similar ways as signals with real words

References

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[4] Tucker, B. V., Brenner, D., Danielson, D. K., Kelley, M. C., Nenadić, F., & Sims, M. Massive auditory lexical decision: Toward reliable, generalizable speech research. Manuscript in preparation.
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