

# Morphological Status and Acoustic Realization: Findings from NZE

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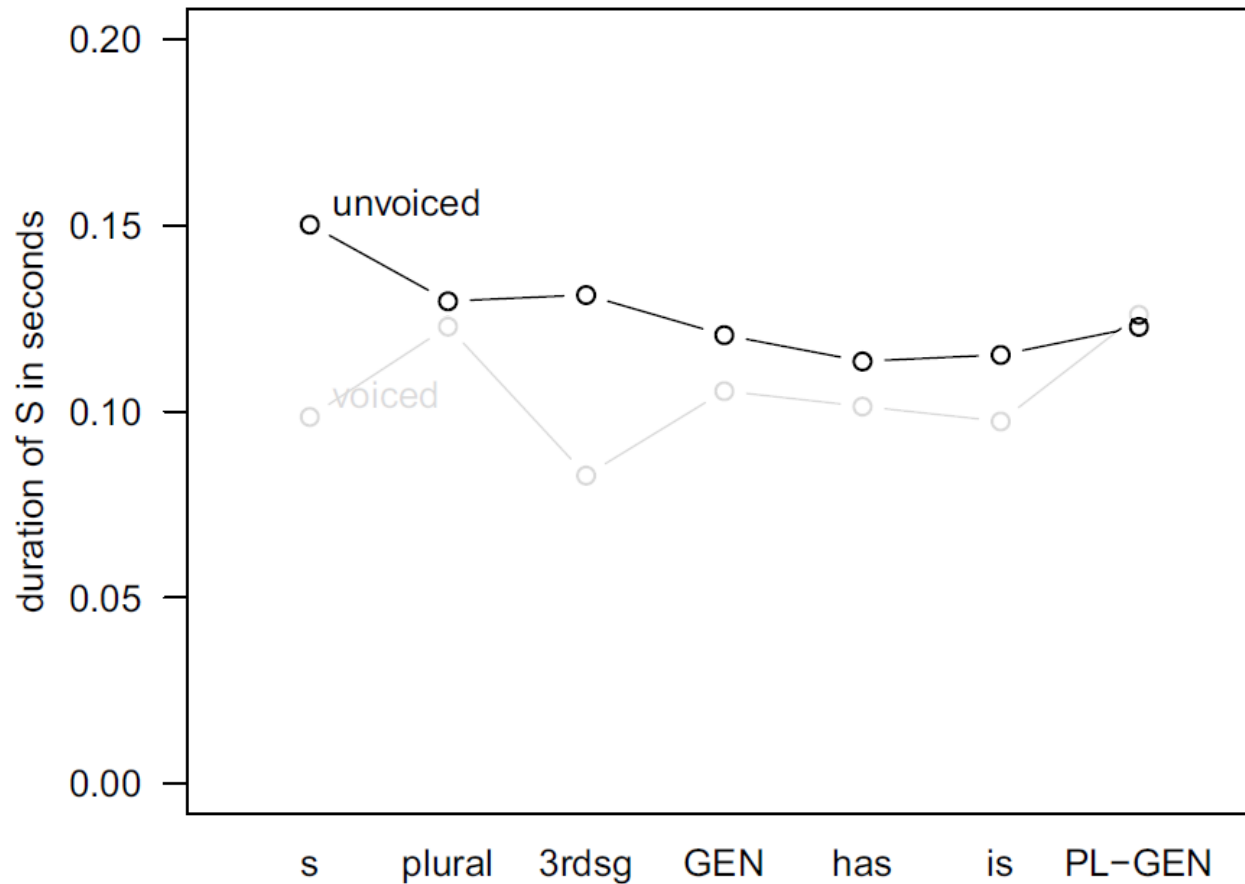
# Traditional assumptions

- morphemes are represented at the phonological level
- no phonetic difference between different English /s/
- homophony of plural, genitive, genitive plural, 3rd sg, clitics of *has, is, us*
- morphemic and non-morphemic sounds are the same in speech production

# Traditional assumptions: early challenges

- morphemic /t/ and /d/ differ acoustically from non-morphemic /t/ and /d/ (Losiewicz 1992)
- morphemic /s/ differs acoustically from non-morphemic /s/ (Walsh & Parker 1983)
- Can these results be replicated with conversational speech?

# Plag et al. 2015 (AE)

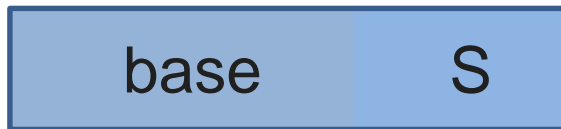


*Figure 4*

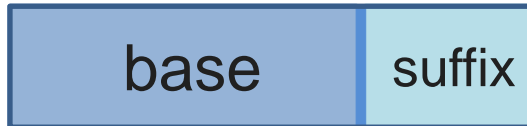
Interaction of type of S and voicing, Model 1 (Abbreviations: s = non-morphemic S, 3rdsg = 3rd person singular, GEN = genitive, PL-GEN = genitive-plural).

# Plag et al. 2015 (AE)

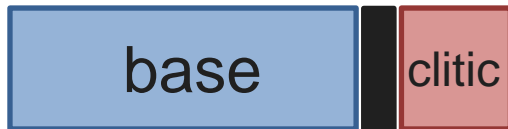
- Does the type of morphological boundary preceding the S have an effect on its duration?



no boundary



morphological boundary



word/clitic boundary

# Phonetics of English Affixes: NZE

## Can these results be replicated for a different variety?

- New Zealand English
  - morpheme homophony has not been researched in NZE
  - effects of plural expectability on plural S duration (Rose et al. 2015)
  - availability of large amounts of corpus data
    - QUAKEBOX corpus
    - 324 native speakers of NZE
    - same topic: experience in CHC earthquakes

# Phonetics of English Affixes: NZE

- Quakebox corpus
- all [s] or [z]-final words not followed by [s] or [z]-initial words
  - excluding items ending in [ɪz] or [əz], irregular forms, brand + place names, all function words (except indefinite pronouns)
  - selection of ~ 7600 items with max. 25 tokens per type
  - manual checking of a random sample; exclusion based on distribution of COG

# Phonetics of English Affixes: NZE

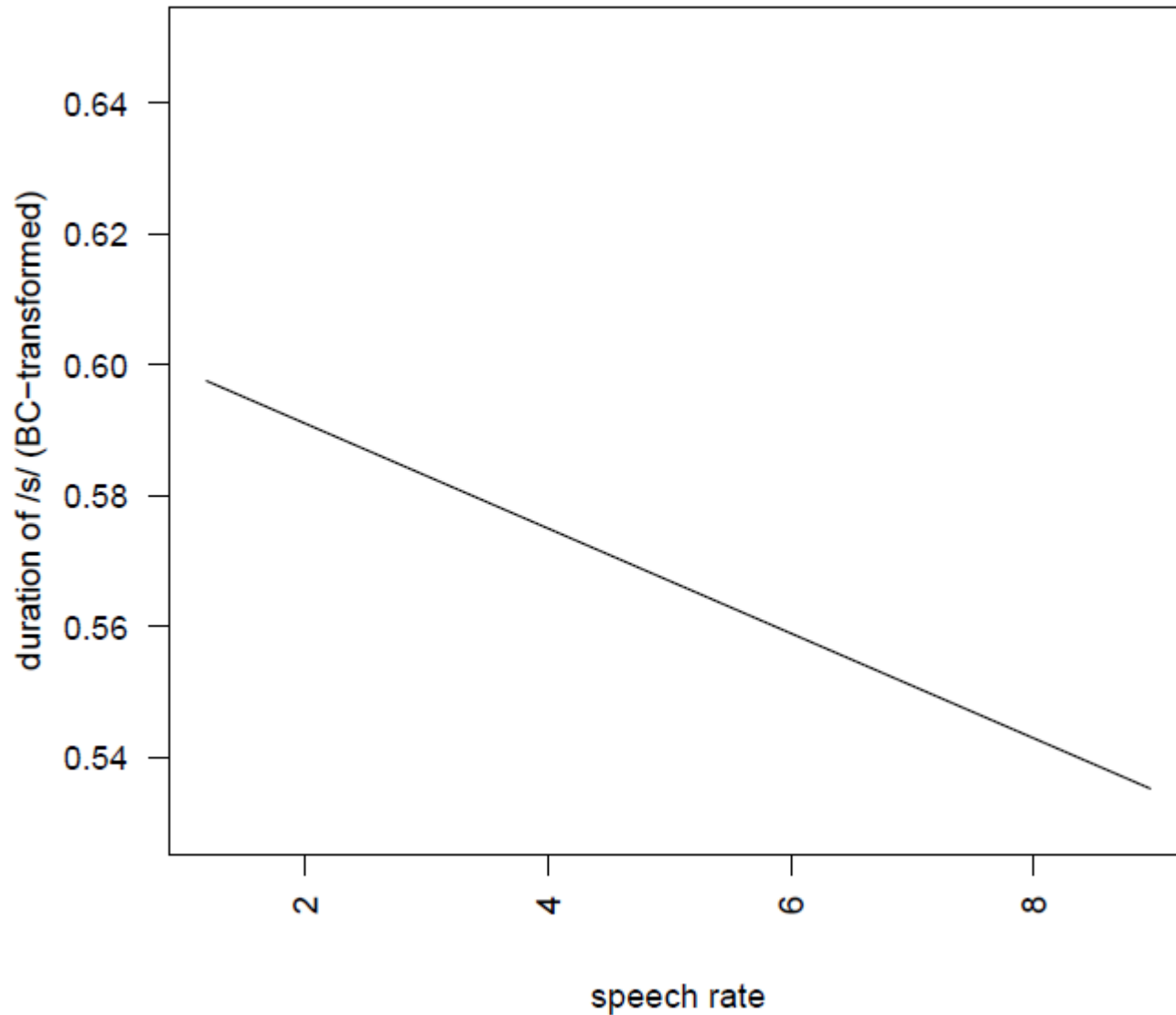
- final dataset of 7081 items for statistical modelling
  - 1581 non-morphemic
  - 4061 plural
  - 575 3rd person singular
  - 473 genitive
  - 61 plural-genitive
  - 76 *has*-clitic
  - 254 *is*-clitic



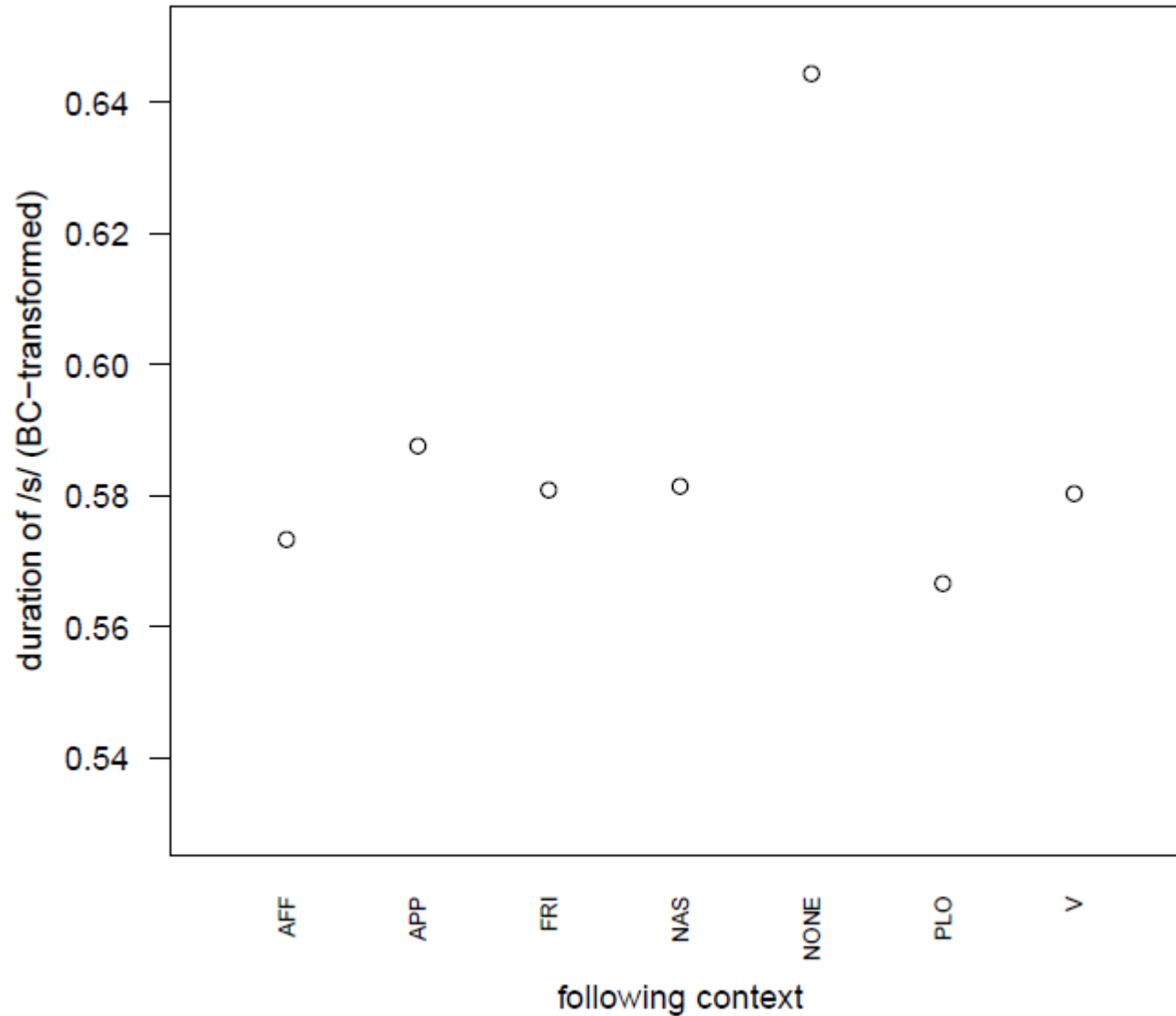
# Duration of S in NZE

- LMER to predict (Box-Cox transformed) duration of S based on type of S and covariates
  - type of S \* amount of voicing
  - speech rate
  - duration of base
  - duration of preceding sound
  - duration of following sound
  - number of consonants in rhyme
  - number of syllables in item
  - following context
  - number of uses of item in previous 30s
  - log of item frequency (in QB)
  - random effect: speaker
- $R^2 = 0.6$

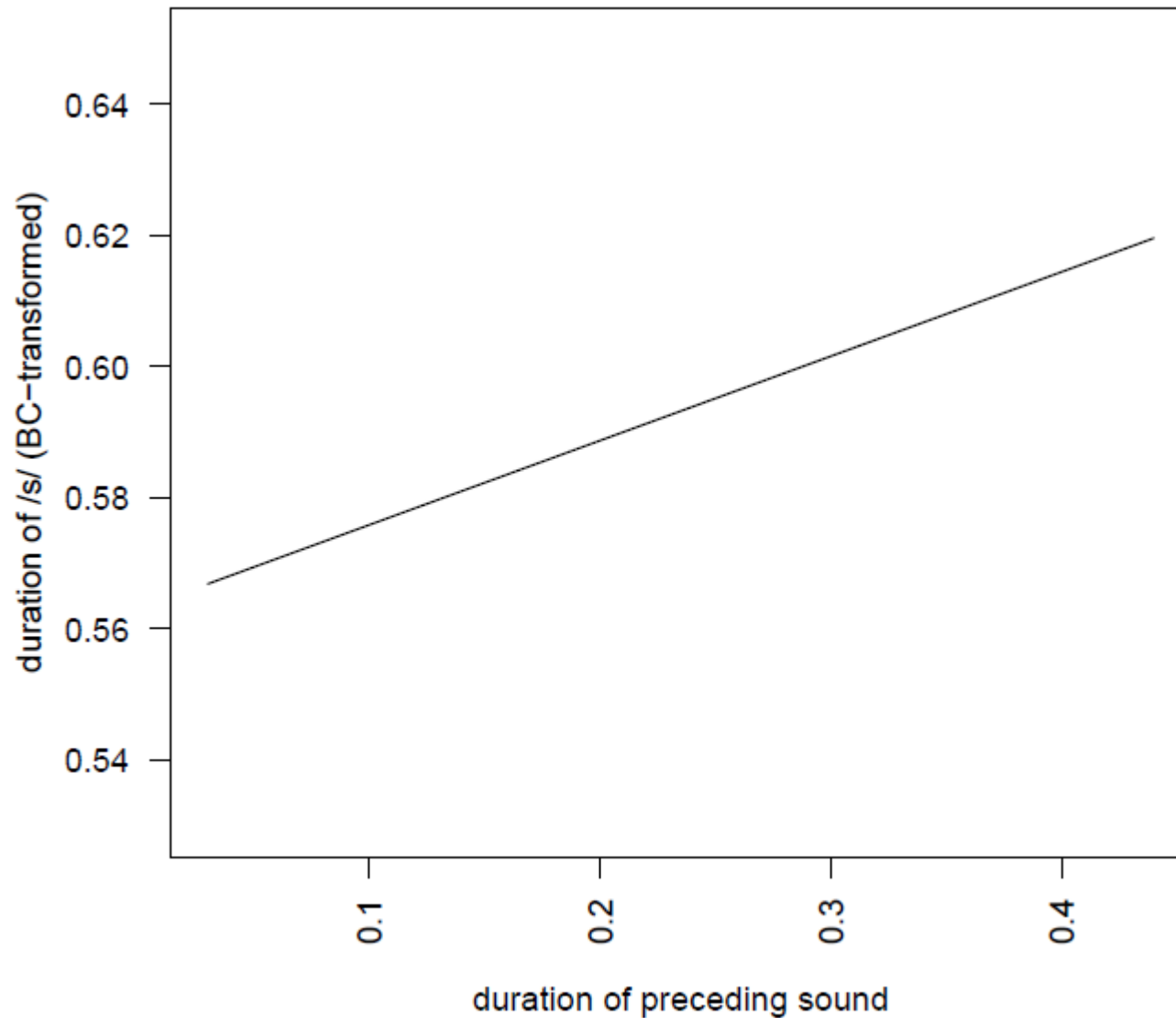
# Duration of S in NZE: covariates



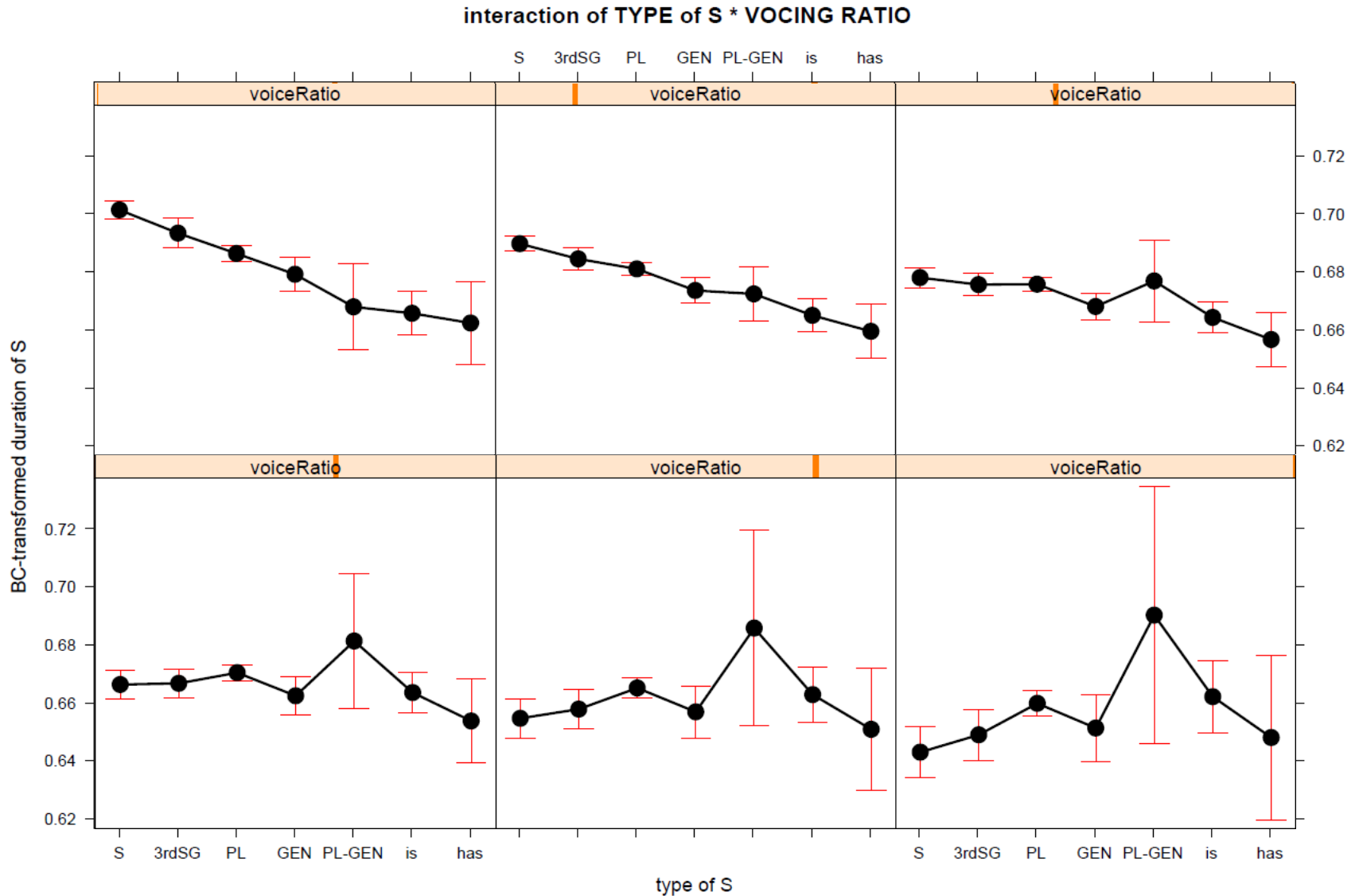
# Duration of S in NZE: covariates



# Duration of S in NZE: covariates

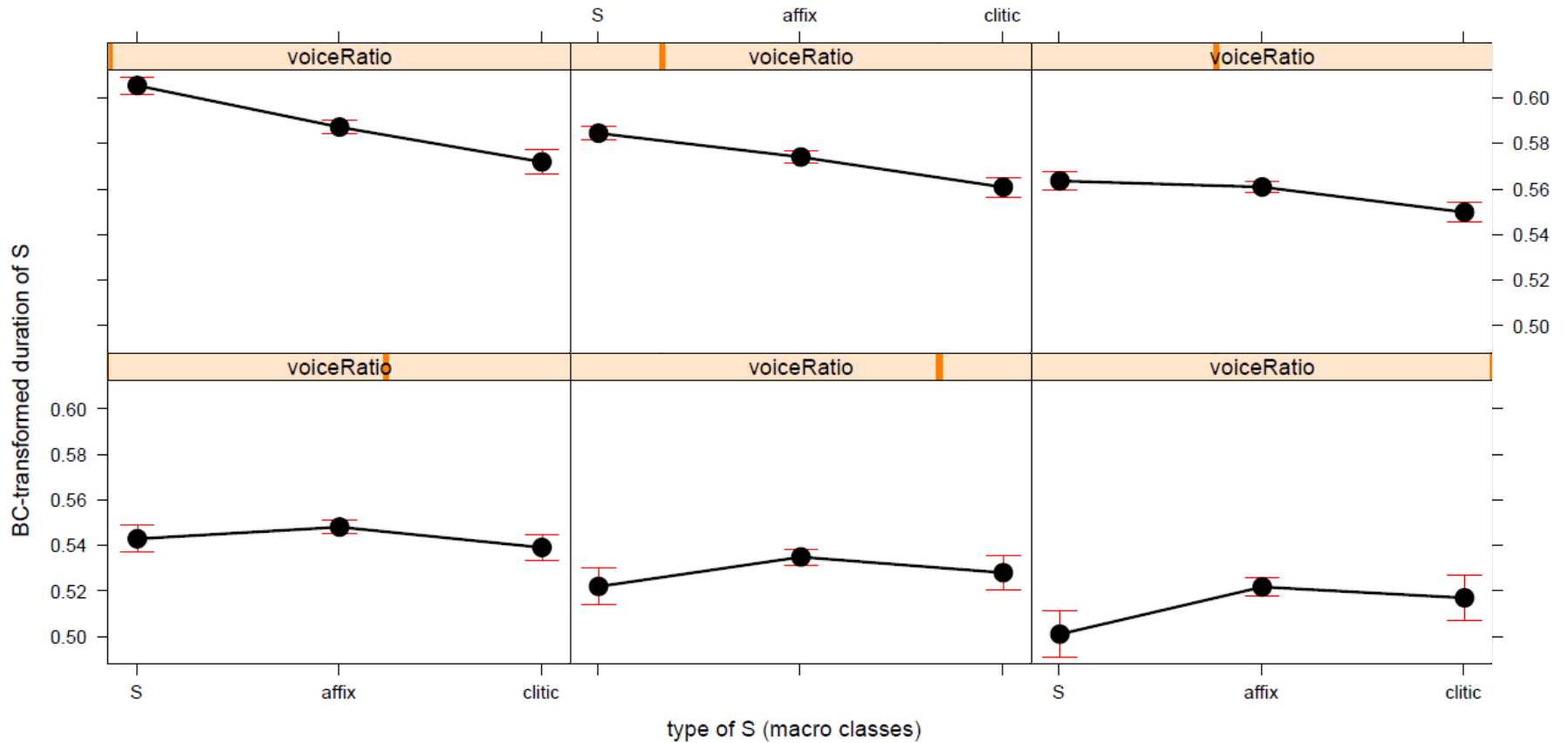


# Duration of S in NZE: type of S



# Duration of S in NZE: macro classes

interaction of type of S (macro class) and voicing ratio



# Discussion: duration of S in NZE

- The effect we found for AE in terms of S duration is even more pronounced in NZE.
- S duration correlates with type of morphological boundary involved (no boundary, suffix boundary, clitic boundary).
- Traditional analyses of English S morphemes do not cover or predict the acoustic differences found.
- The acoustic differences cannot be accounted for by purely phonetic processes (covariates are controlled).
- Phonetic detail reflects morphological structure.

# Effects of different S on the base

## What happens on the other side of the boundary?

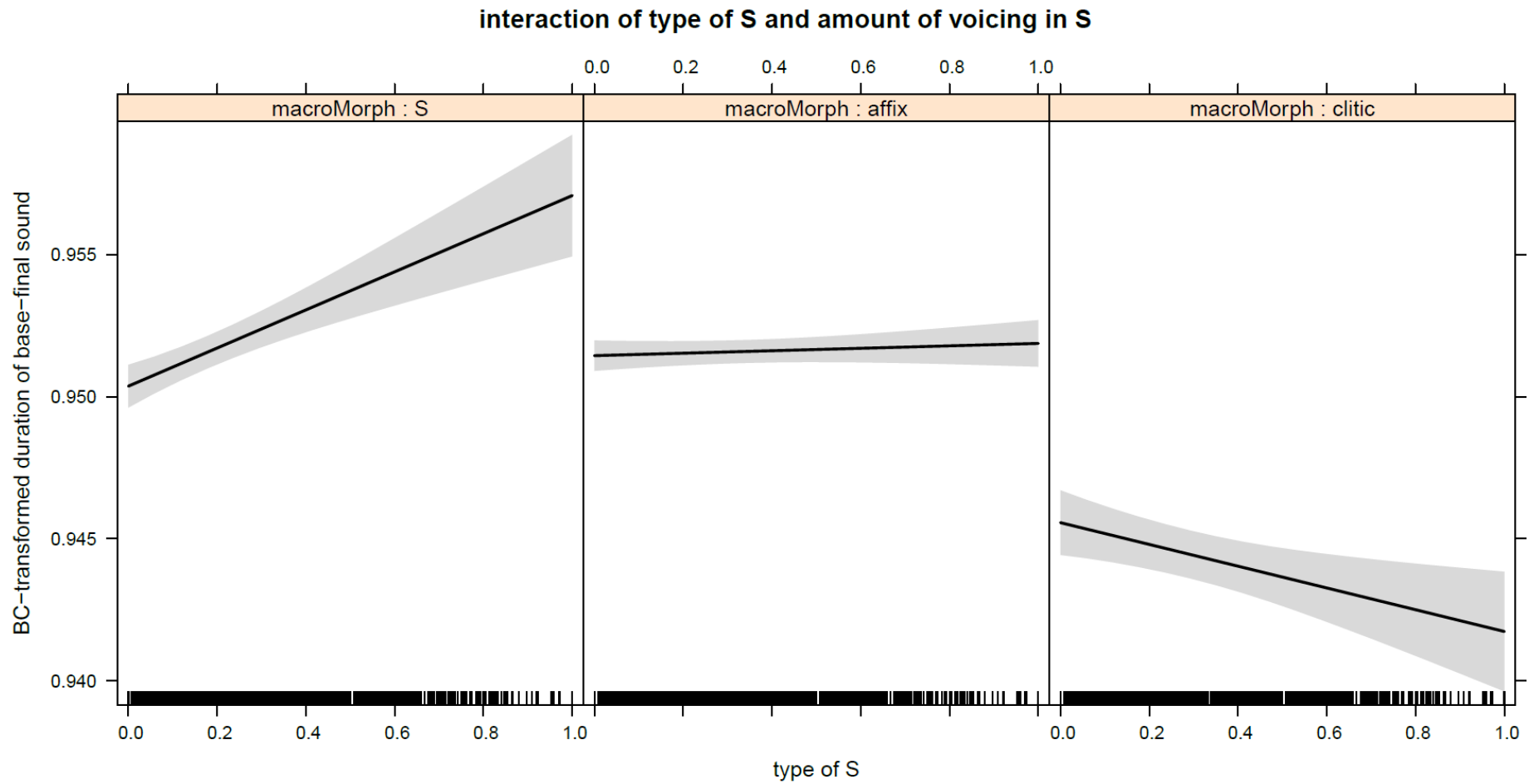
- phonological voicing of a sound is (among other things) encoded in the duration of the vowel preceding it
- vowels followed by voiceless consonants are shorter than vowels followed by voiced consonants (House & Fairbanks 1953)
  - **allophonic lengthening**
- thus, a difference in the duration of the vowel preceding the S should be attributable to the voicing ratio of the S



# Effects of different S on the base

- LMER to predict (Box-Cox transformed) duration of sound preceding the S based on type of S and covariates
  - type of S \* amount of voicing
  - type of sound preceding the S (manner & voicing)
  - number of syllables in item
  - number of consonants in rhyme
  - duration of S
  - duration of base
  - following context after S
  - speech rate
  - log of item frequency (QB)
  - log of following word frequency (QB)
  - random effect: speaker
- $R^2 = 0.44$

# Effects on the base: type of boundary



# Discussion: effects of different S on base

- for non-morphemic S, duration of preceding sound varies depending on voicing
  - in accordance with rules of allophonic lengthening: longer preceding sound with voiced S
- for suffixes, duration of preceding sound does not vary at all
  - no difference if /s/ or /z/ follows the base
  - no allophonic lengthening of base-final sound
- type of S has an effect on phonological processes in the base

# Summary & general discussion

**The effect we found for AE in terms of S duration is even more pronounced in NZE.**

- Confirms that phonetic detail reflects morphological structure.

**Allophonic lengthening is blocked in front of a suffix boundary.**

- effect similar to
  - Aitken's Law, Scottish Vowel Length Rule (Aitken 1981)
  - glottal epenthesis in German being blocked suffix-initially (e.g. Alber 2001)
- contradicts predictions of Lexical Phonology

# Thank you very much for your attention!

## Acknowledgements

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