

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)

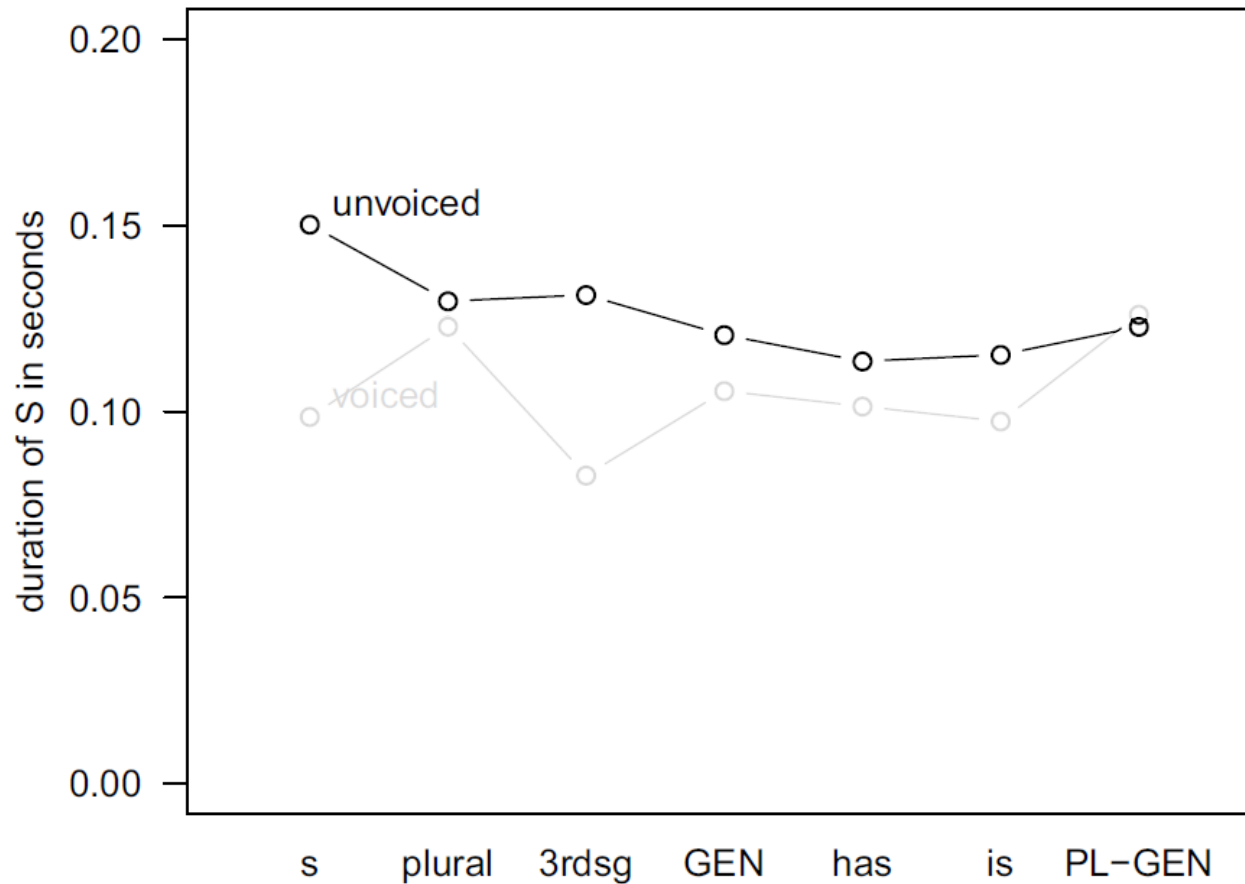
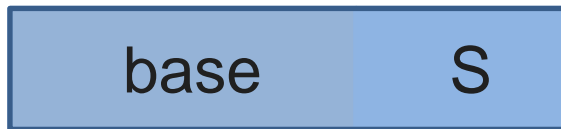


Figure 4

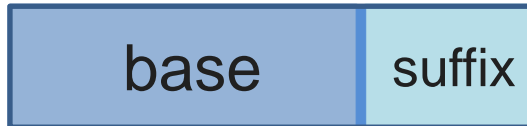
Interaction of type of S and voicing, Model 1 (Abbreviations: s = non-morphemic S, 3rdsg = 3rd person singular, GEN = genitive, PL-GEN = genitive-plural).

Plag et al. 2015 (AE)

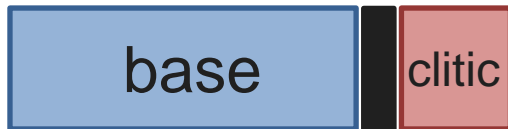
- Does the type of morphological boundary preceding the S have an effect on its duration?



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

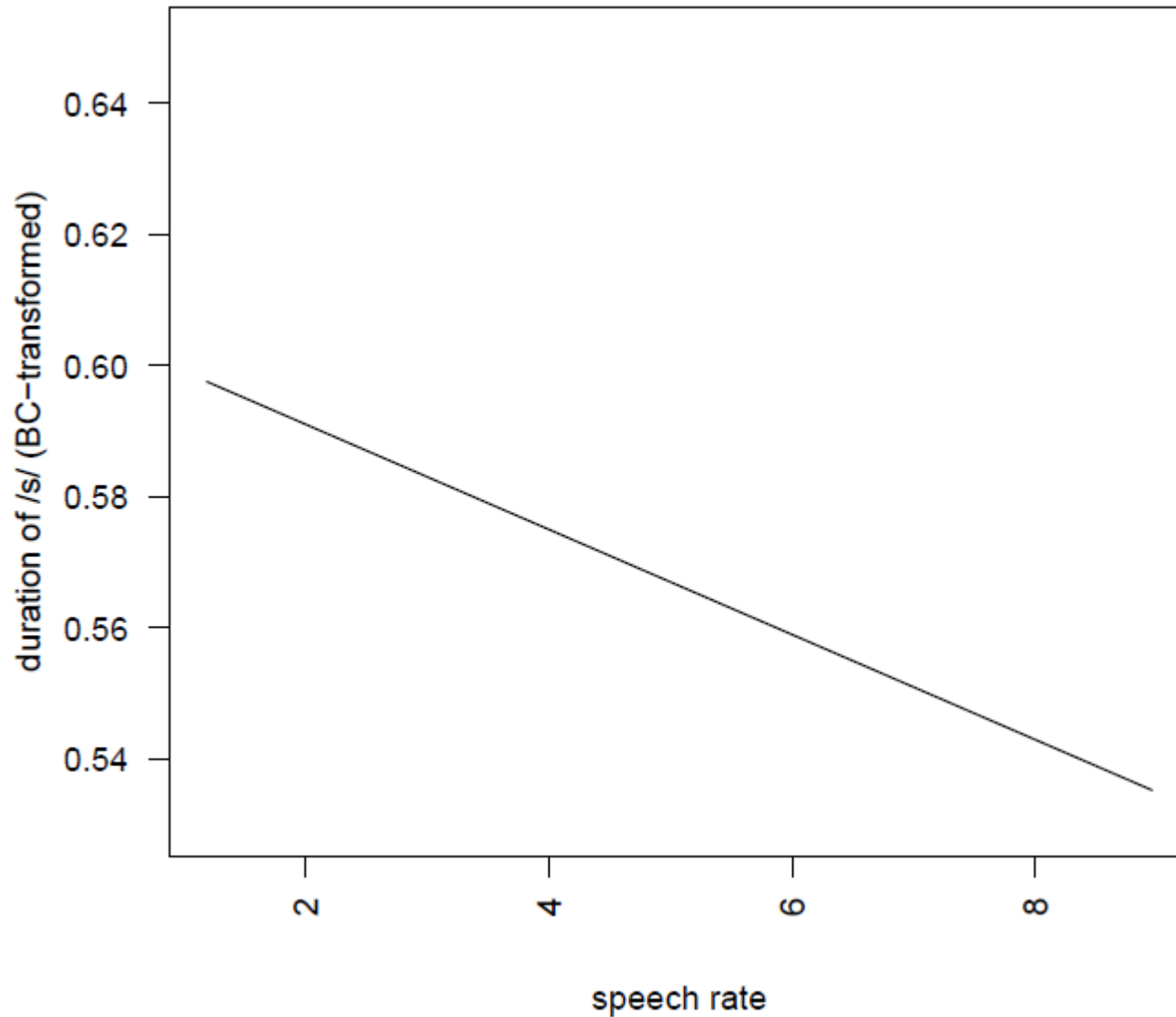
Phonetics of English Affixes: NZE

- 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

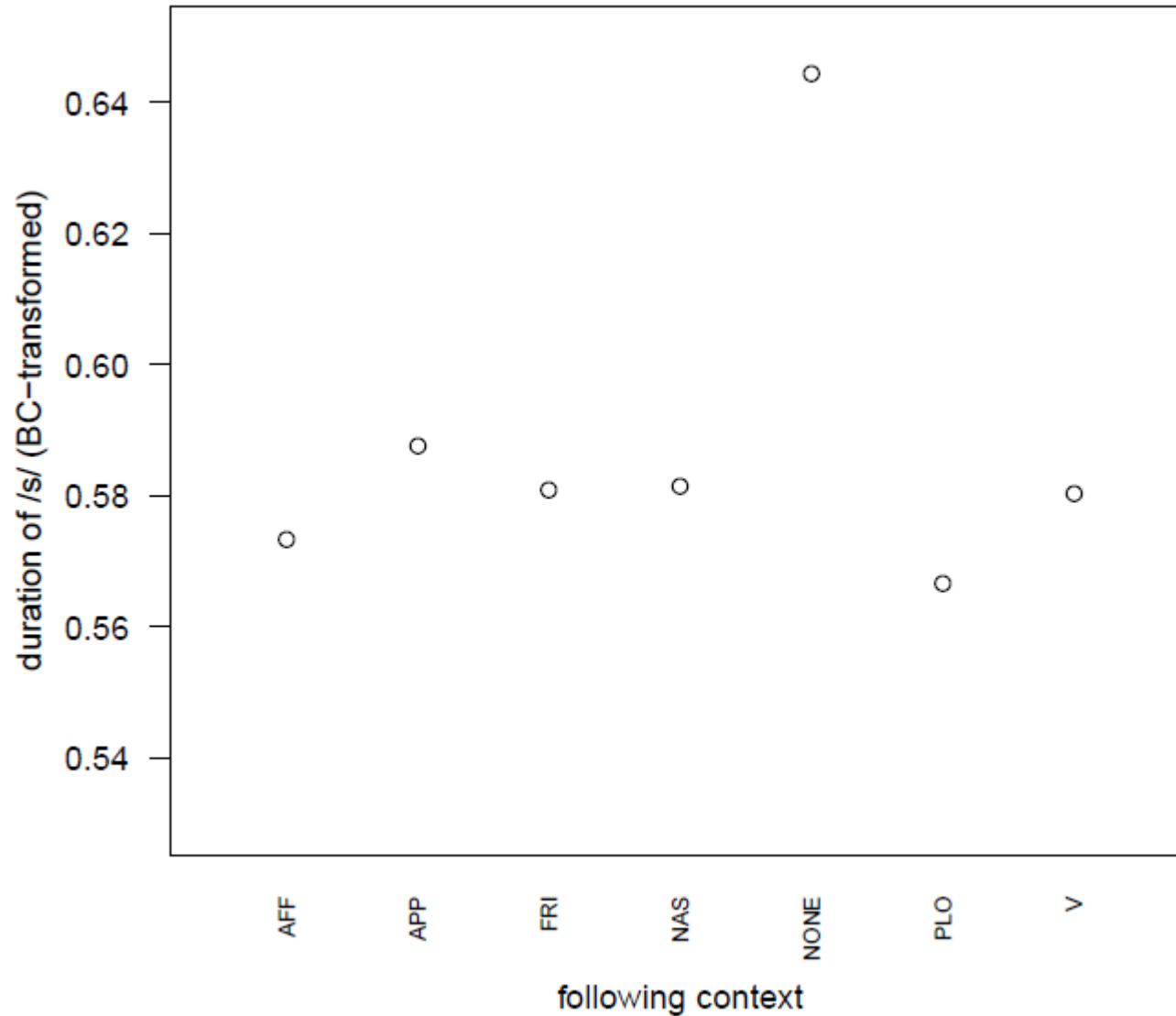
Duration of S in NZE

- 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
- $R^2 = 0.6$

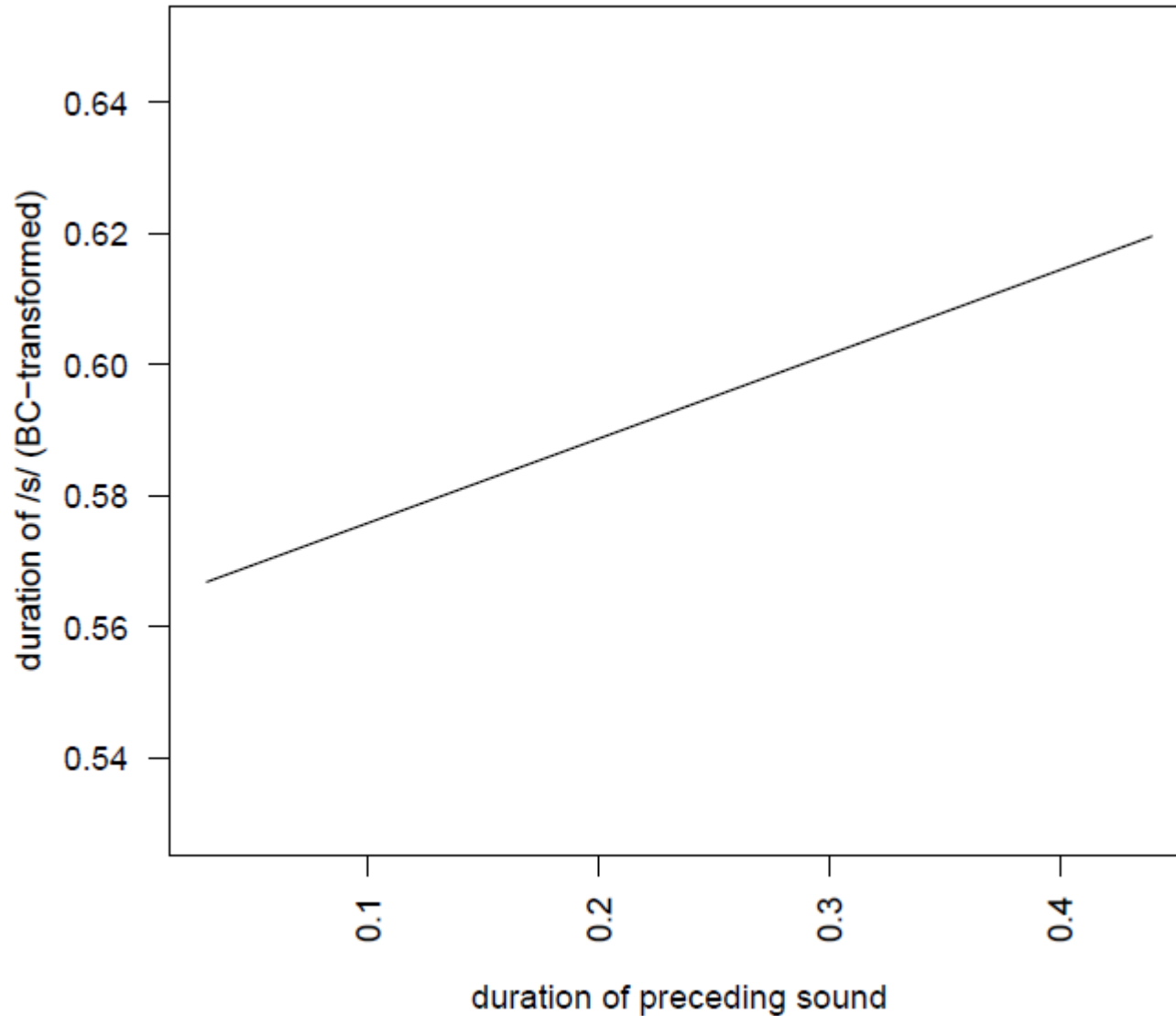
Duration of S in NZE: covariates



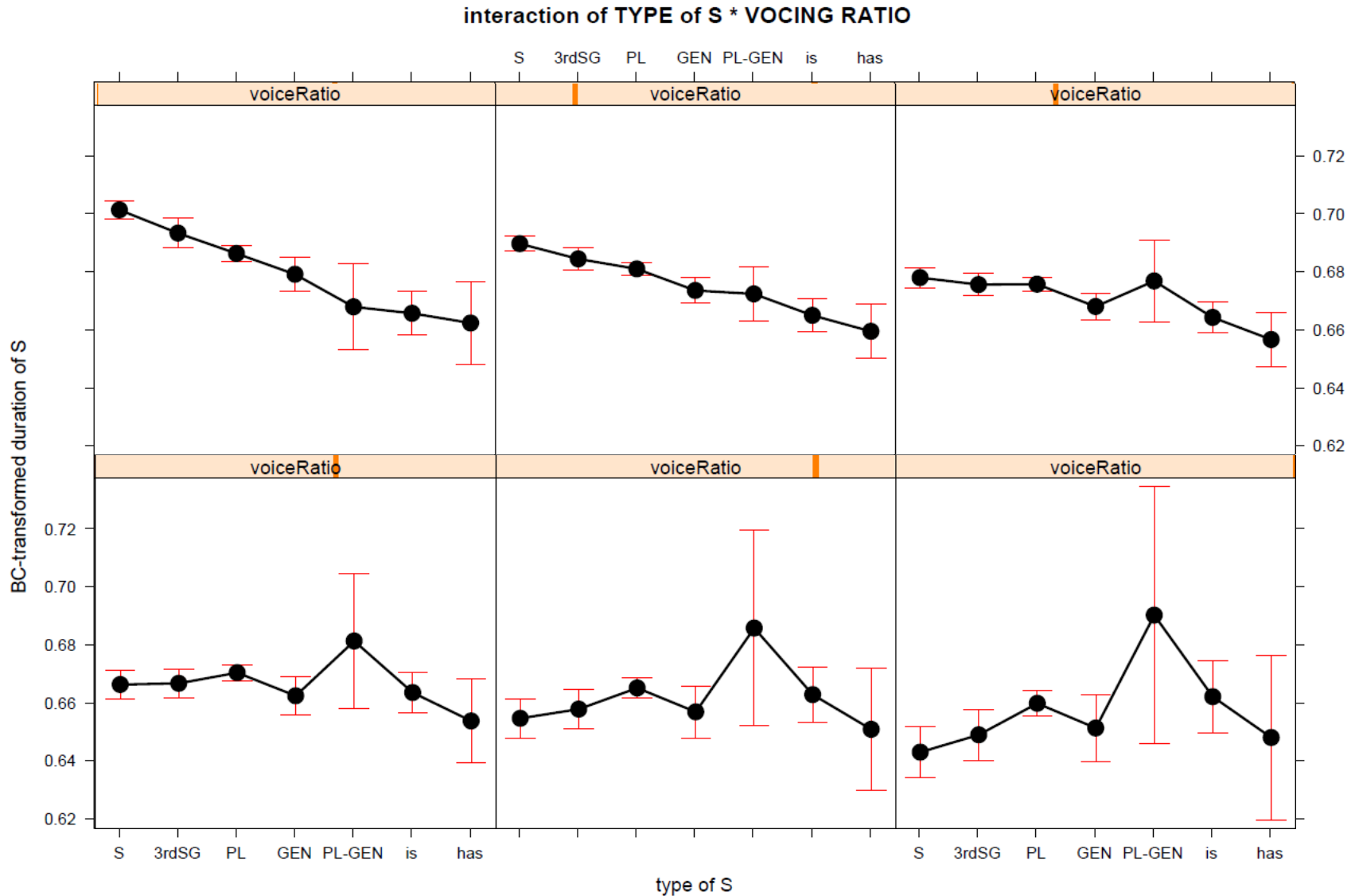
Duration of S in NZE: covariates



Duration of S in NZE: covariates

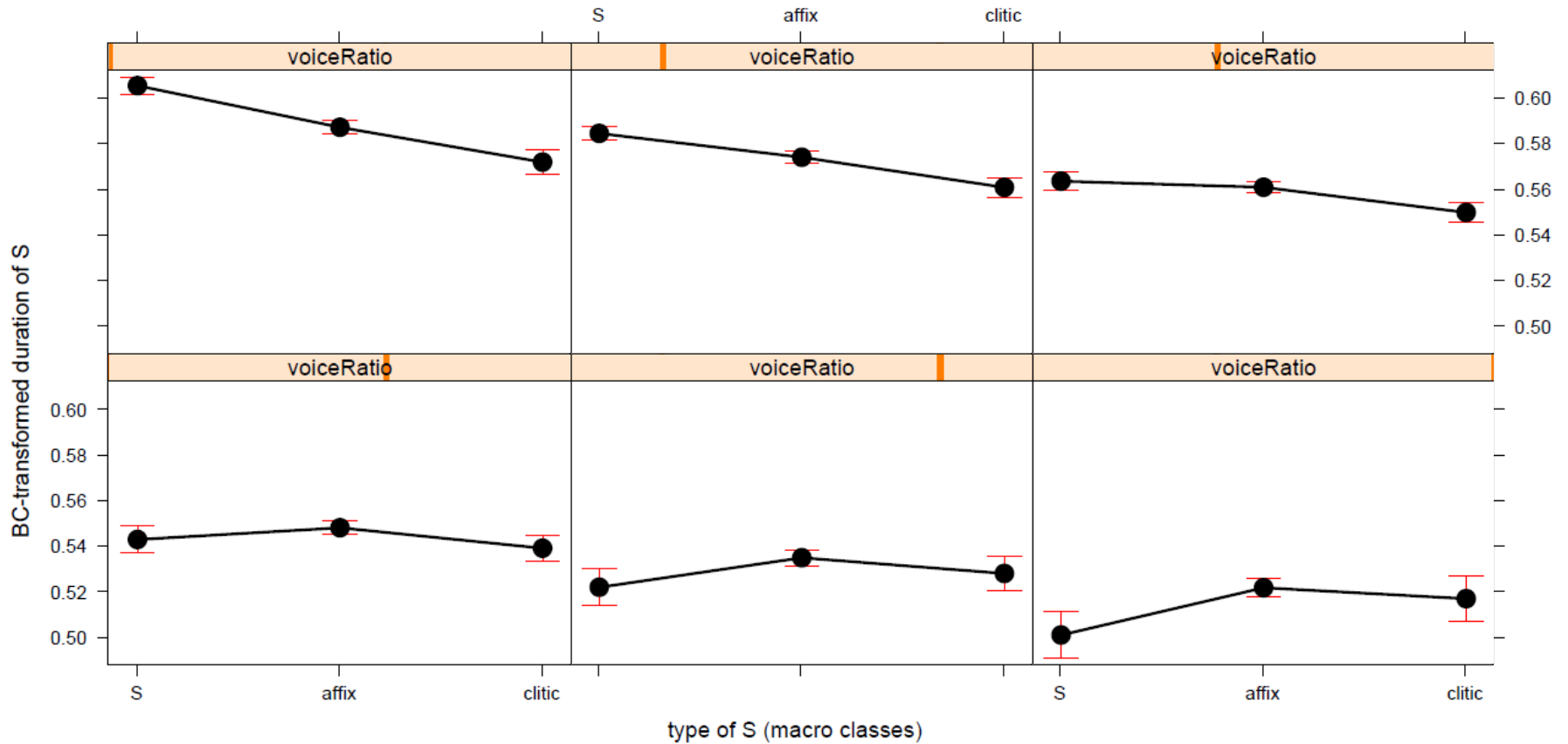


Duration of S in NZE: type of S



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

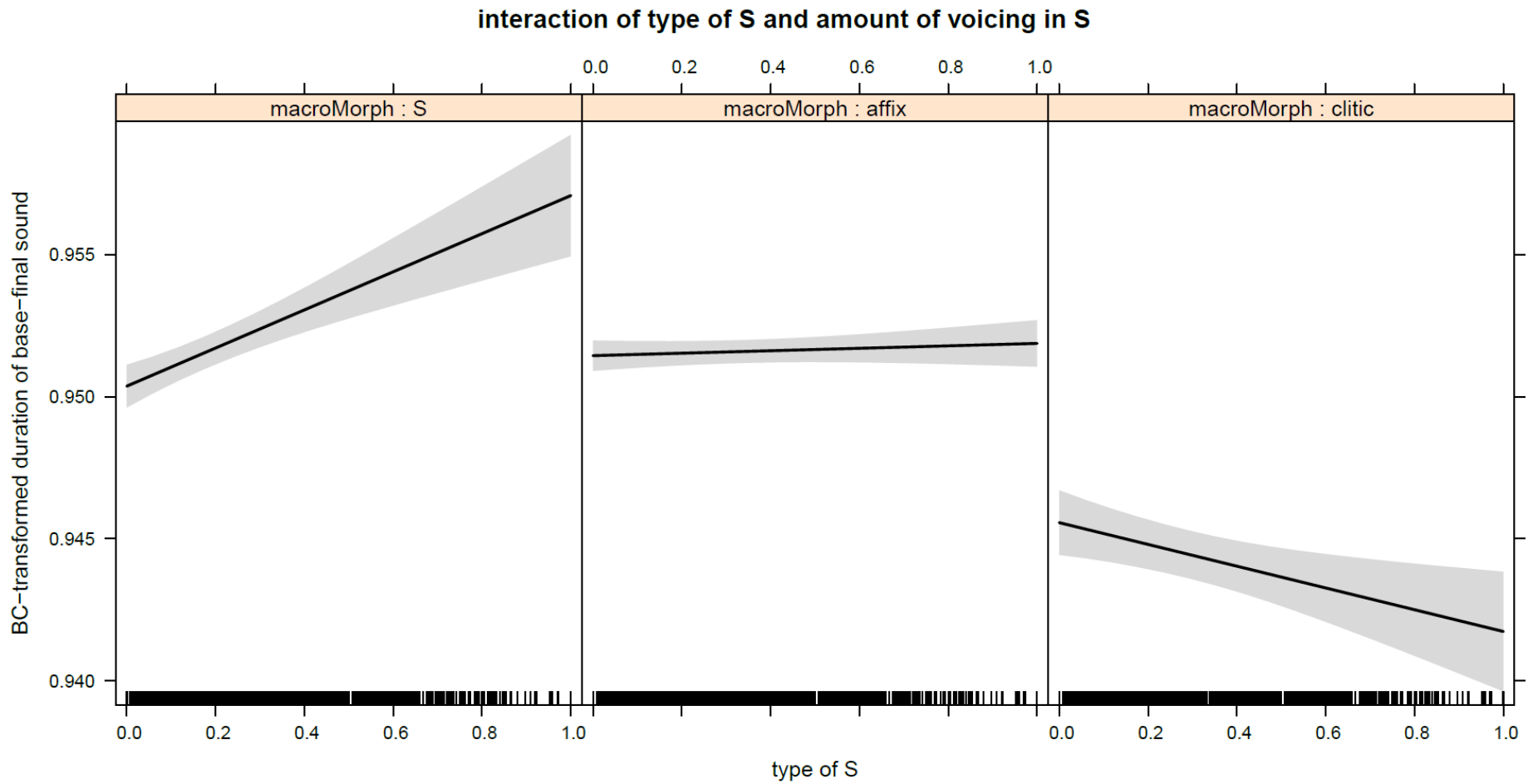
What happens on the other side of the boundary?

- 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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