

Phonetic cues of the fortis-lenis contrast in Bethesda Welsh

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What do we know?

- **aspiration/non-aspiration contrasts** (*Jones 1984: 41*)
 - Provection in some traditional S.E. dialects (*Thomas 1975; see also Thomas & Thomas 1989*).
- **not a voicing distinction** (*Ball 1984, Ball & Williams 2001*)
 - Cyfeiliog Welsh (Ceredigion), lenis fully voiced between voiced elements, partly word-finally (*Sommerfelt 1925: 17*)
- **vowel duration** (*Awbery 1984 & 1986, Hannahs 2013; Ball 1984: 10, 12*)
- **Closure duration** (*Ball 1984: 17*)
- **gemination of fortis consonants after stressed vowels** (*e.g. Hannahs 2013: 21 and references therein*)

Issues

- not based on much data
- not many dialects described
- differences between males and females not described
- pre-aspiration also a possible cue? (*Ball 1984: 18; Morris 2010*)
- VOT measurements problematic (*also Ní Chasaide 1985: 398-9*)
 - some authors do not measure word-final post-aspiration because VOT cannot be measured there (*e.g. Ball 1984: 17*)

Today's talk

- preliminary analysis of fortis and lenis tokens in 8 speakers from Bethesda
- inclusion of more features
- what are the phonetic differences between fortis and lenis stops in their Welsh?
- are there differences between male and female speakers?

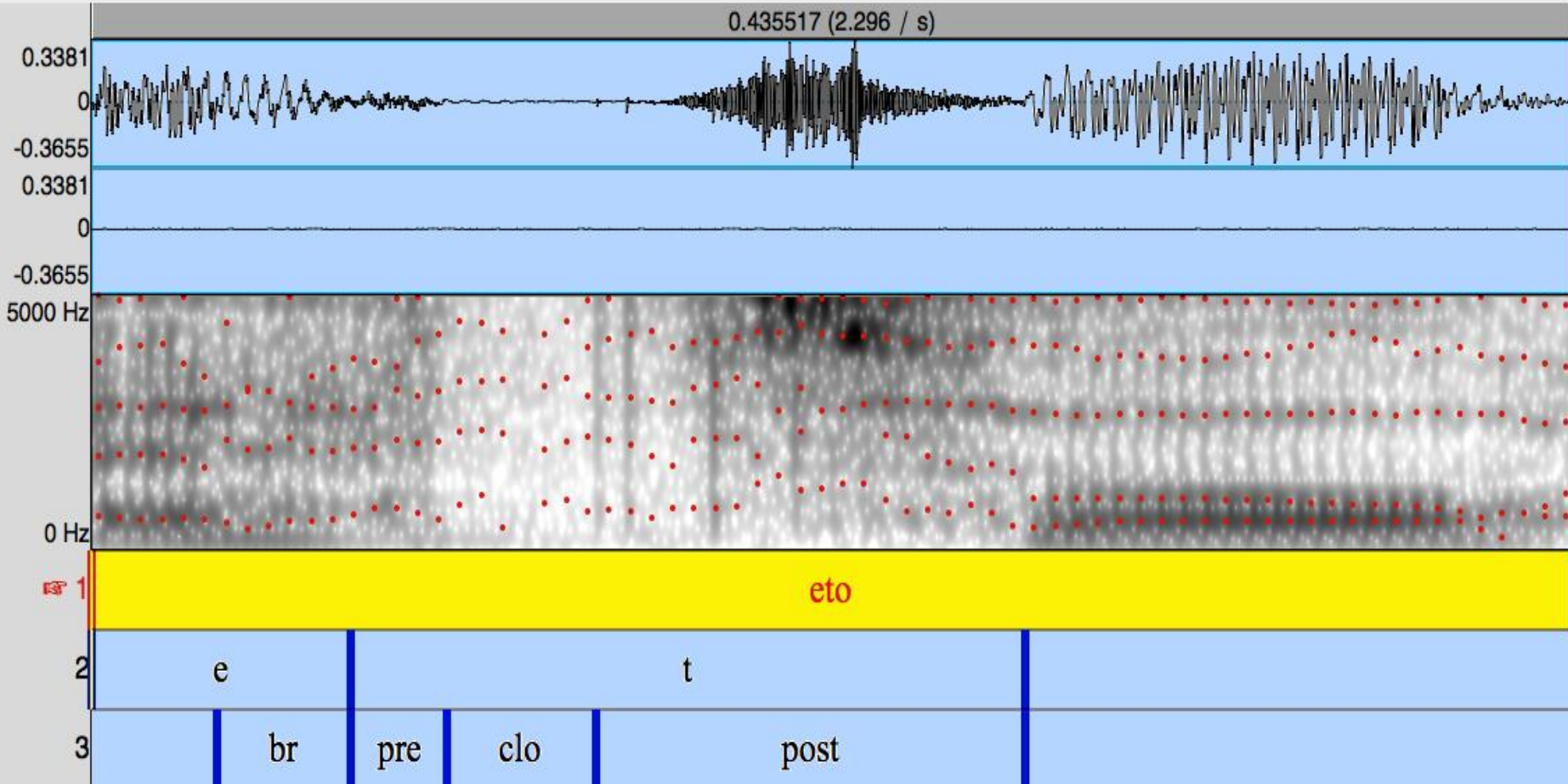
Methodology

- 4 male, 4 female L1 Welsh speakers
- raised in Bethesda
- 16-18 years
- word list
- 60-64 words per respondent
- 44 fortis, 16 lenis: Word-medial and word-final
- preceding vowel not controlled for
- $n=483$

Procedure

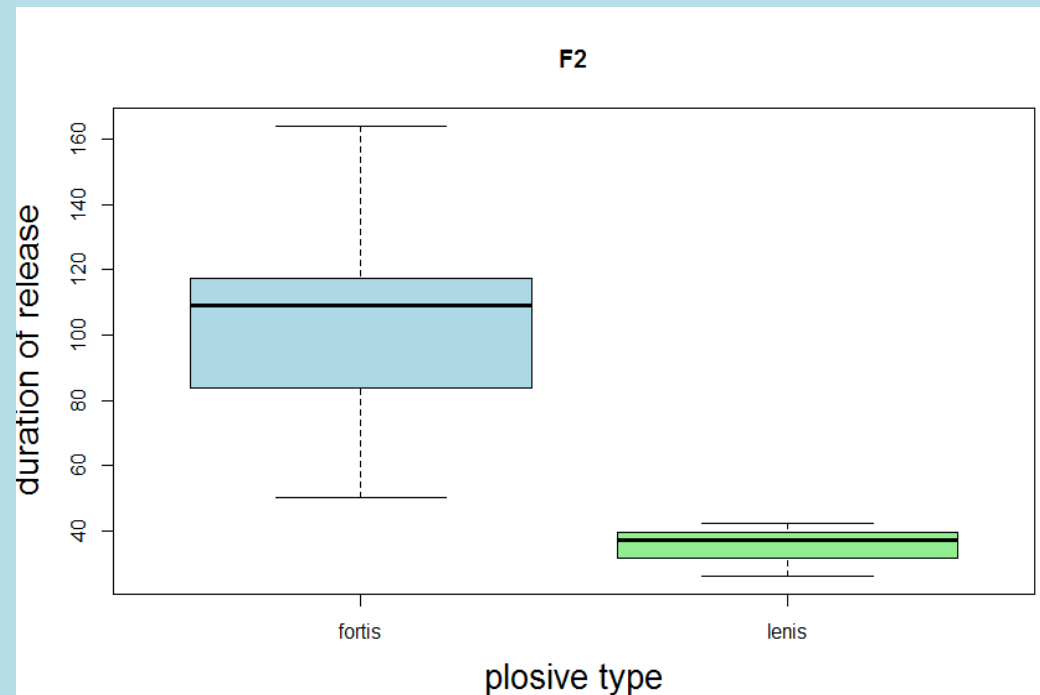
- release duration
- voicing (presence & duration)
- pre-aspiration (presence & duration)
- vowel duration
- voiceless closure duration
- monosyllables/disyllables

Procedure



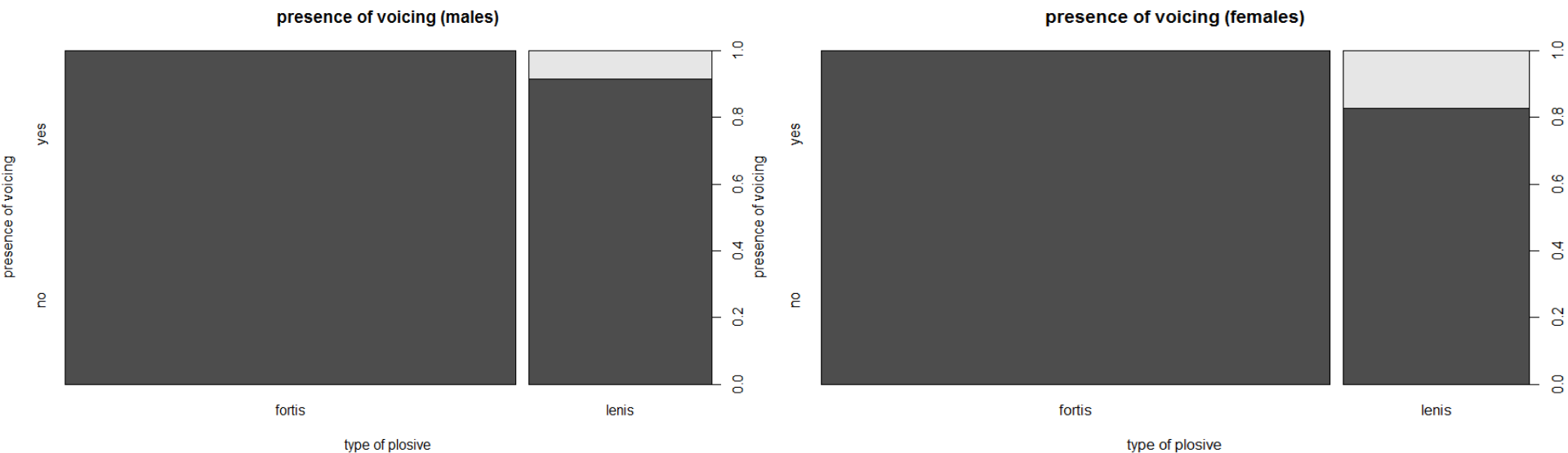
Release duration

- no significant difference for individual speakers
- female & male speakers show the same pattern
- monosyllables & disyllables the same pattern
- lower mean dur.
- duration range



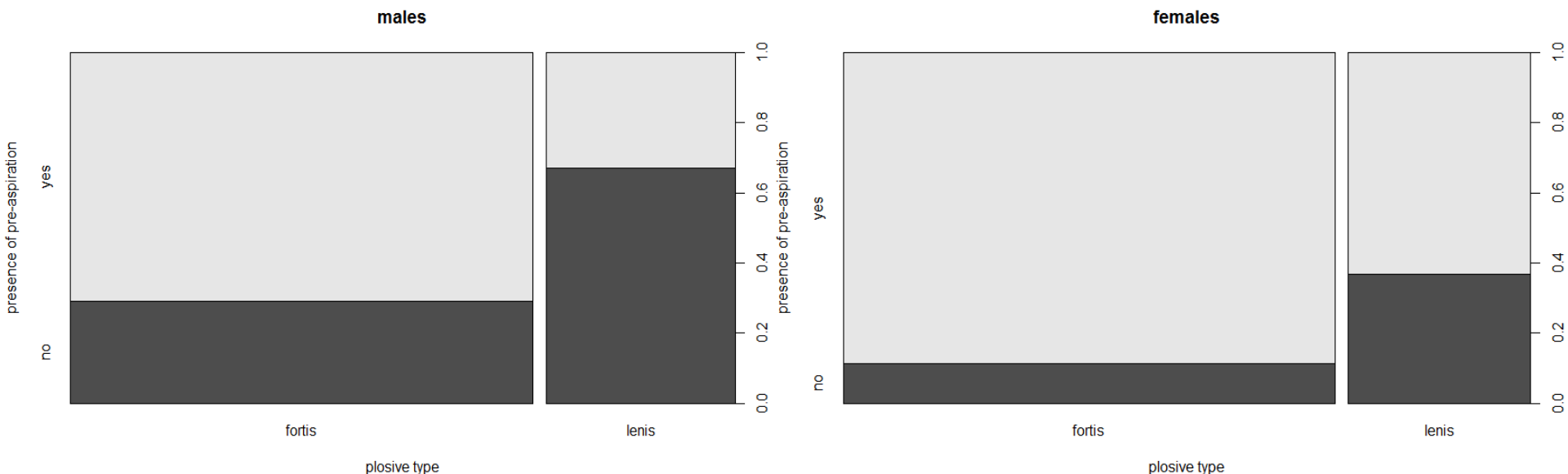
Not a voicing distinction?

- Little evidence of voicing ($n=17$; 3.5%)
- fortis-lenis distinction for females and males ($p<0.001$)



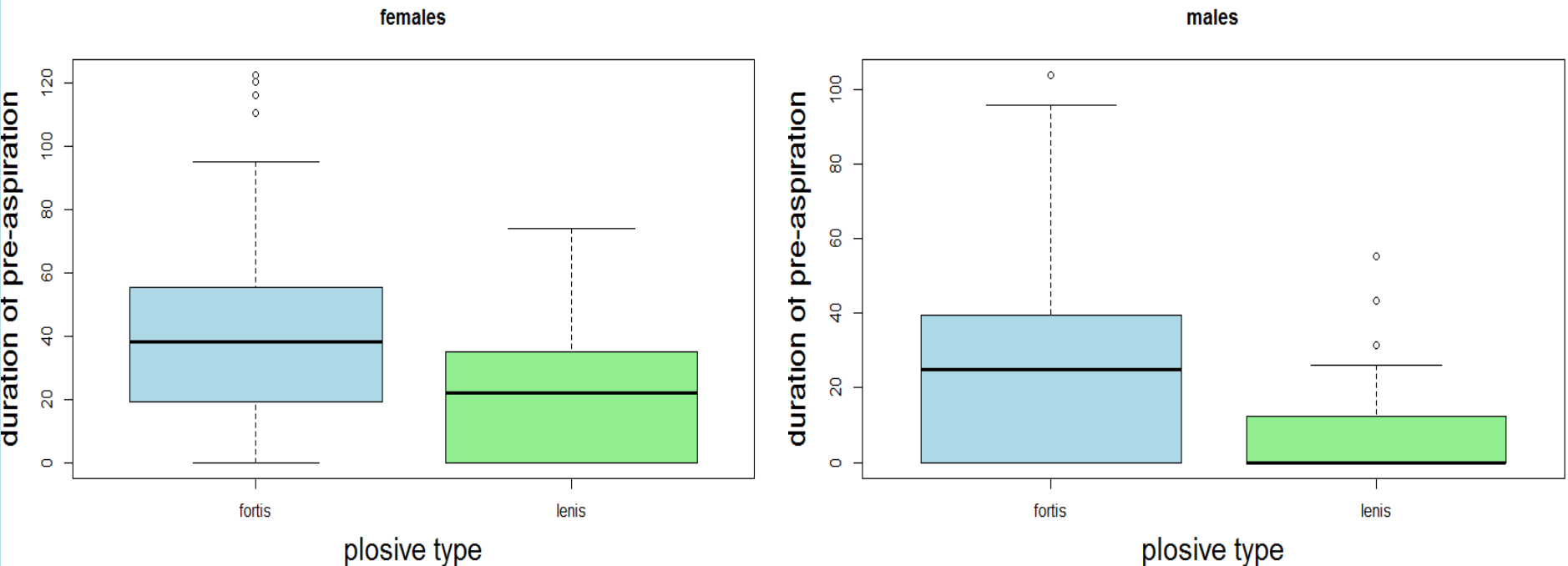
Is there pre-aspiration?

- pre-aspiration in both fortis ($n=276$, 79.5%) and lenis tokens ($n=64$, 47.1%)
- sig. difference between males and females before both fortis ($p<0.001$) and lenis ($p=0.0012$)
- sig. difference between fortis/lenis for both males and females ($p<0.001$)




Duration of pre-aspiration

- duration of pre-aspiration is not a cue of the fortis-lenis contrast:



Closure duration: post-tonic coda plosives

- fortis plosives geminated (*see Hannahs 2013: 21 and references therein*) → moraic in codas (Hannahs 2013: 31)
- monosyllables: V:C (lenis plosives), VC: (fortis plosives) – all dialects (Awbery 1984: 66-8, 74)
- polysyllables:
 - same in the south
 - only V in the north
 - V & V: in free variation in mid Wales (Awbery 1984: 68, 74, 77)
- Bow Street Welsh (Aberystwyth): fortis & lenis plosives lengthened (Pilch 1975: 89)
 - 
- closure duration = cross-linguistically the most prominent and common cue to gemination
- post-aspiration as a cue to gemination reported for Cypriot Greek (*Arvaniti & Tserdanelis 2000: 560; Arvaniti 2001*)

Closure duration

- duration of preceding vowel could influence the duration of the closure duration → not controlled for
- no conclusive results on correlations between the two in our data
- if lenis not geminated & not moraic and fortis geminated & moraic, then these should be two clearly separate categories → bimodal distribution
- no bimodal distribution
- for each gender
- for each speaker
- done on disyllables
- (2-3 lenis tokens in monosyllables)



Initial Statistical Analyses

- Overall, sig difference between voicing and presence of preaspiration for fortis and lenis (Chi-squared $p < 0.001$).
- No sig effects for continuous data (Wilcoxon Mann Whitney).

Mixed Effects Models

- Mixed effects models with word and subject as random factors.
- Voicing removed due to lack of tokens.
- Preaspiration ($t=0.627$), and consonant duration ($t=0.061$) significant predictors for fortis consonants (Intercept $t=21.003$).
- Not reliable indications or general patterns (due to low t-values).

Conclusions

- release duration differs in duration as expected but also in terms of range (but not significant).
- some voicing present (and a cue) but very infrequent.
- presence of preaspiration is a cue (but not duration).
- closure duration could be a cue irrespective of the overall duration (=length) of the coda plosive

Further work

- Aim to provide a more comprehensive analysis of fortis/lenis plosives in the three main dialectological areas for Welsh
- More controlled data
- Consideration of pre- and post-aspiration
- Possible sociolinguistic effects, in particular gender, area, linguistic background.

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