Allophonic Emergence: three ways allophonic rules come to be

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Formal Ways of Analyzing Variation (FWAV)
Háskóli Íslands

Emergence of Phonological Categories inspired by(Fruehwald, 2013)

Phonetic processes

- Operate over continuous phonetic dimensions

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- Are part of the mental representation of language

Introduction

In this talk, we'll argue that there are at least three ways that allophonic categories can emerge. We provide evidence that they have all been attested in recent sound changes, and outline a research program with the goal of supporting or falsifying these hypotheses.

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  - Perceptual
- **Our interpretation:** some generation reanalyzes a phonetic effect as an allophonic rule, introducing a new rule variant into the populations (of utterances within speakers, of speakers in a speech community).

Mechanical Means

- Some generation reanalyzes a phonetic effect as an allophonic rule, introducing a new rule variant into the populations (utterances, speech community).
- **Preaspiration and coda-devoicing in Icelandic** (**??**):

/hattur/ ('hat') → [hahtyr]
/henta/ ('to suit') → [hɛn̥ta]

Mechanical Means

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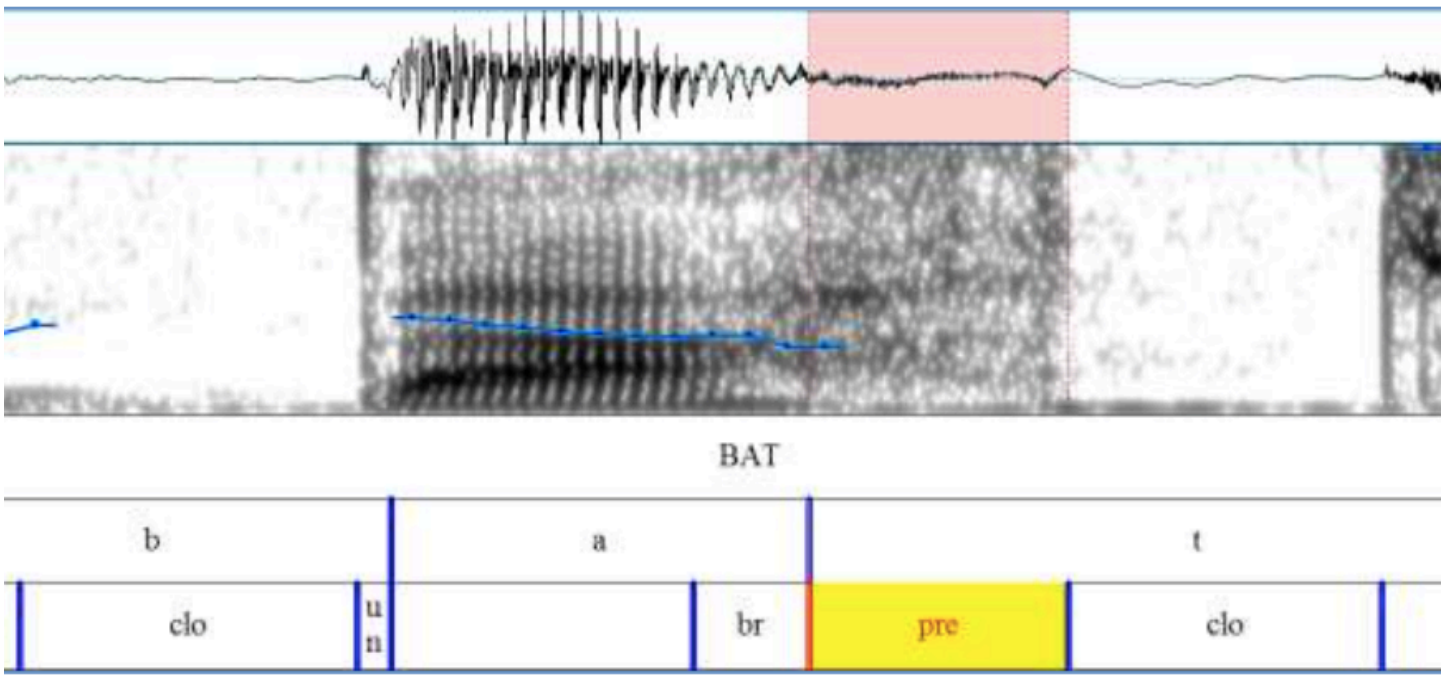
Diachrony (**??**):

1. Icelandic loses contrastive vowel length.
2. Lengthening Rule: vowels in open syllables lengthen, closed syllables shorten (active rule)
3. Spread glottis gesture is (mis-)timed in the segment preceding voiceless non-continuant codas.
4. Given Lengthening Rule, speakers reanalyze the early-timed gesture as an allophonic rule (our interpretation of **?**).

- The new rule, new allophone, must spread through the populations of speakers and utterances.
- **?** suggests that the rule has not entirely spread through Northern Iceland yet.

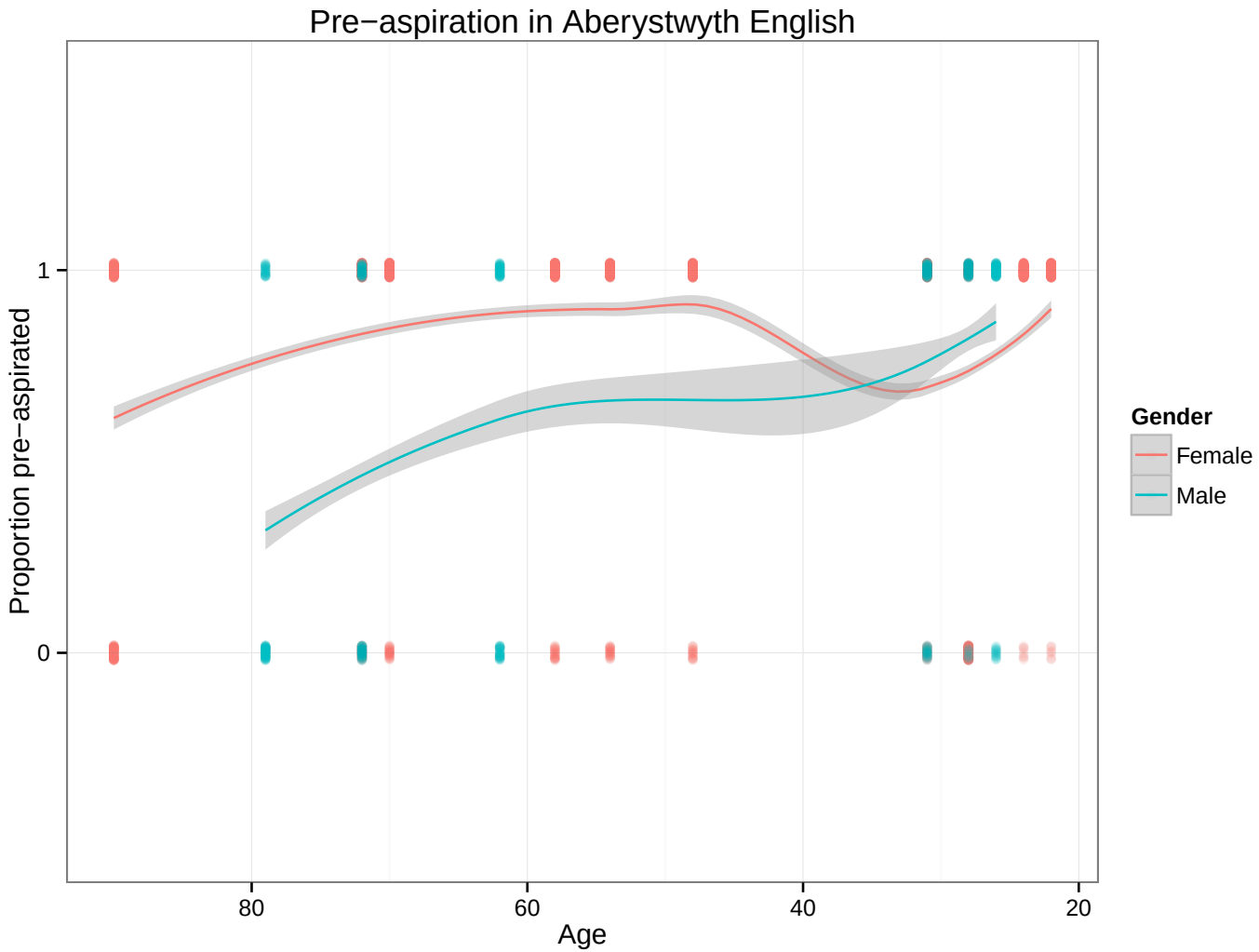
Preaspiration in Aberystwyth English (Hejná, 2014)

- The same change appears to be in progress in Aberystwyth English, Northwest British English, and possibly other British Englishes.
- As in Icelandic, it effects both vowels preceding voiceless codas and liquids preceding a voiceless consonant in codas (Hejna, p.c.).



Preaspiration in Aberystwyth English (Hejná, 2014)

- New allophone is still spreading:



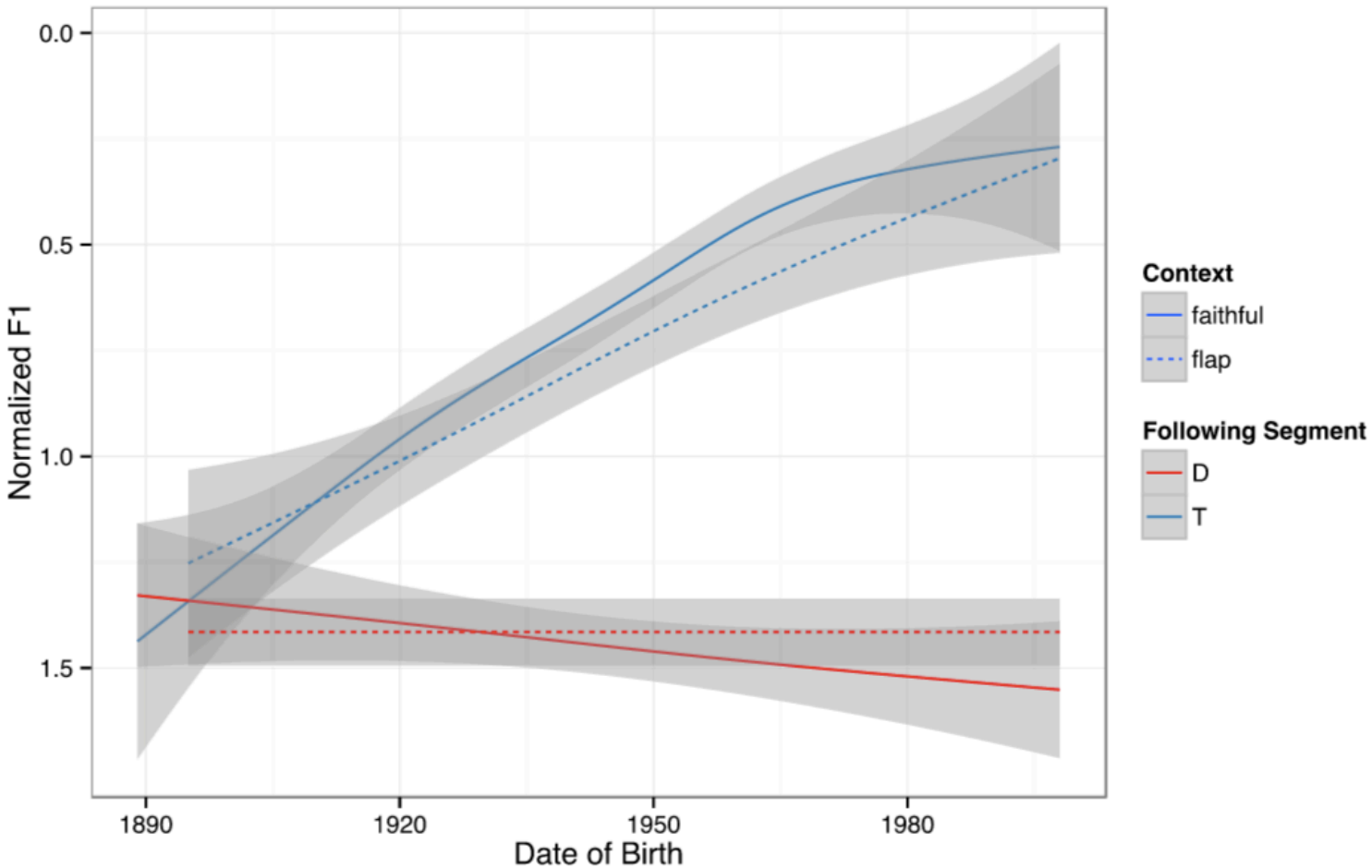
Spontaneous Phonologization

Scenario proposed by Janda and Joseph (2003); Fruehwald (2013)

- Speakers **spontaneously** create an allophone without any phonetic motivation.
  - Allophonic categories emerge in individual speakers' grammars before any phonetic motivation

Spontaneous Phonologization:

PRICE-raising in Philadelphia English (Fruehwald 2013)



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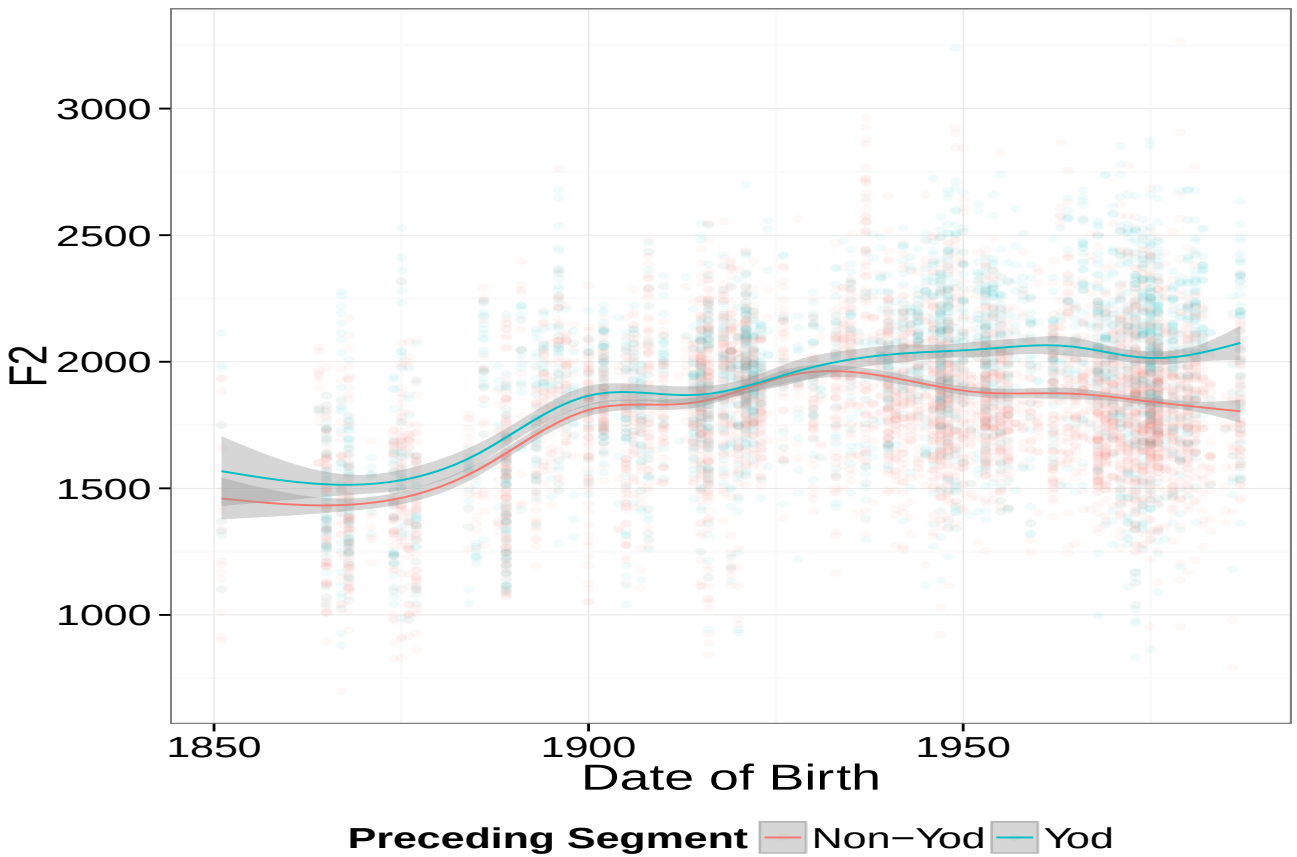
  - Different from Ohala (1981) because the phonologization is not the result of compounded perception or production errors
  - Different from Fruehwald (2013); Janda and Joseph (2003) because phonetics still play a role

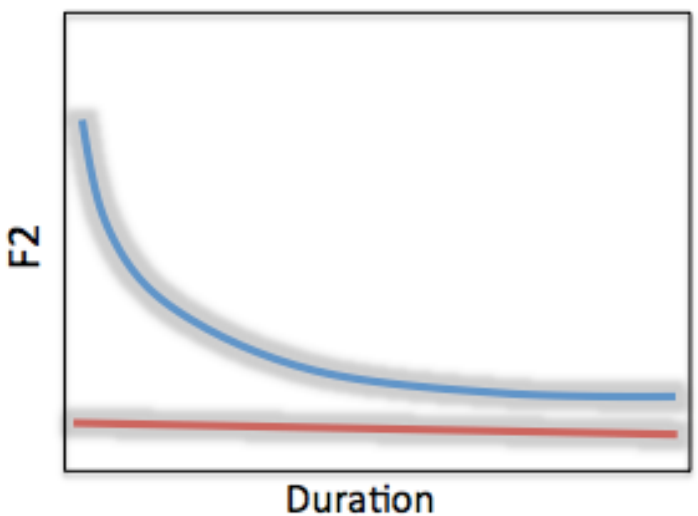
Phonological Specialization:

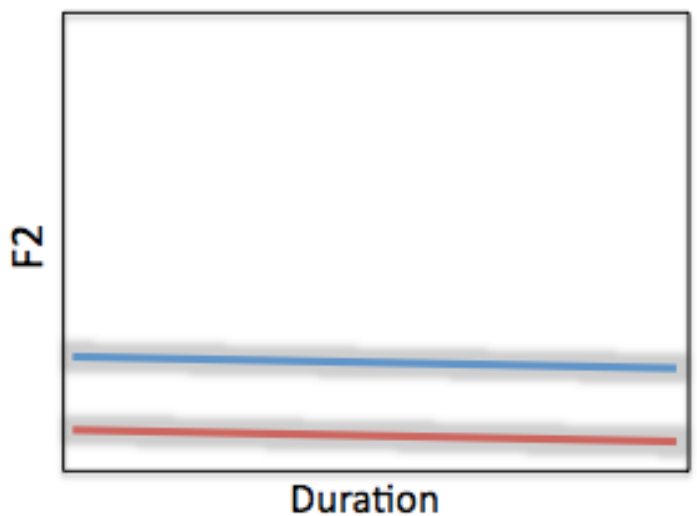
GOOSE-NEW split in New Zealand English (Seyfarth and Sneller 2014)



Effect of duration: coarticulation vs. allophony

- If a difference in acoustic output is caused by coarticulation rather than allophony, then the difference will be bigger for shorter tokens
- If the difference is caused by allophony, then long and short tokens will all show a difference





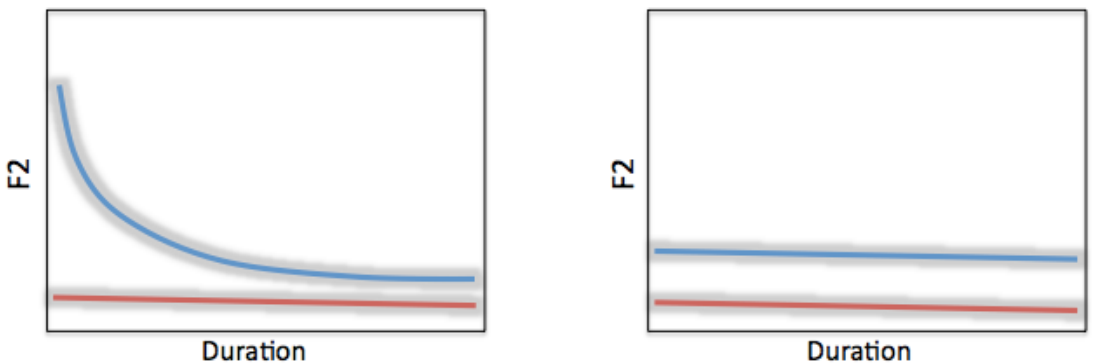
Effect of duration: Mechanical means

Mechanical means

- Because the allophonic split is the result of accruing phonetic effects, we should see an effect of duration for most speakers, until a reanalysis has been made.
- After the reanalysis, as the new allophone spreads, the earlier effect of duration should decrease over time.

Effect of duration: Mechanical means

Mechanical means



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- Because there is no phonetic effect that precedes the phonological effect, we should see no effect of duration at any time
  1. Speakers with one category show no coarticulation (no difference to be found)
  2. Speakers with two categories show two phonological categories (no effect of duration)

Effect of duration: Spontaneous phonologization

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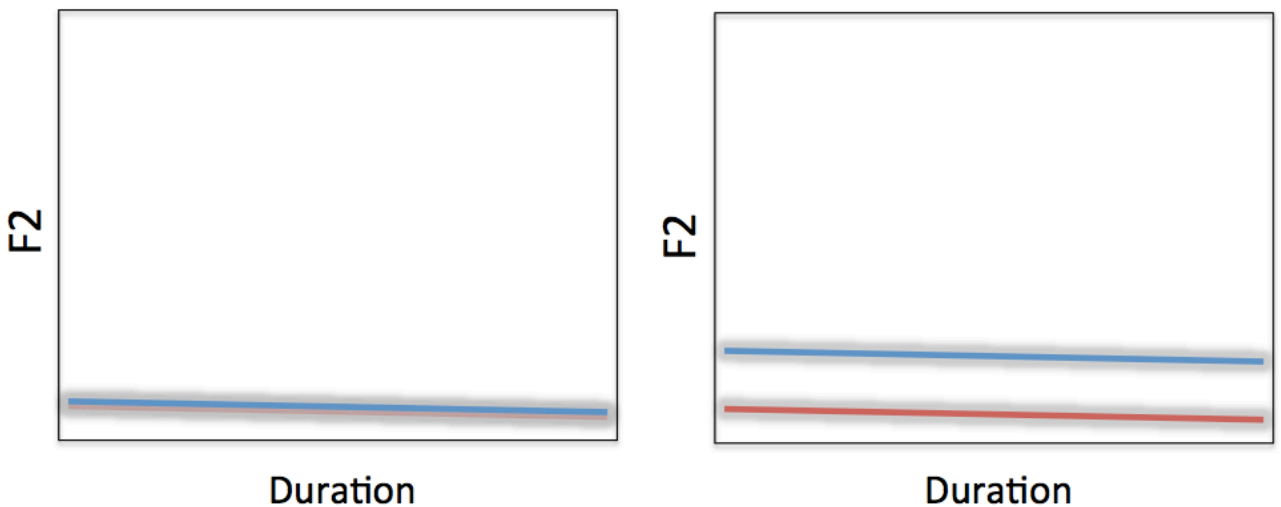

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- and younger speakers with two distinct categories for tokens of all duration

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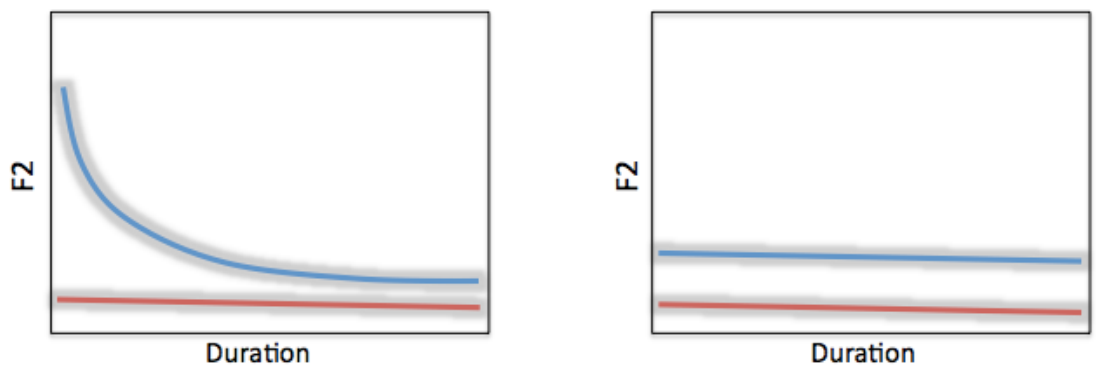

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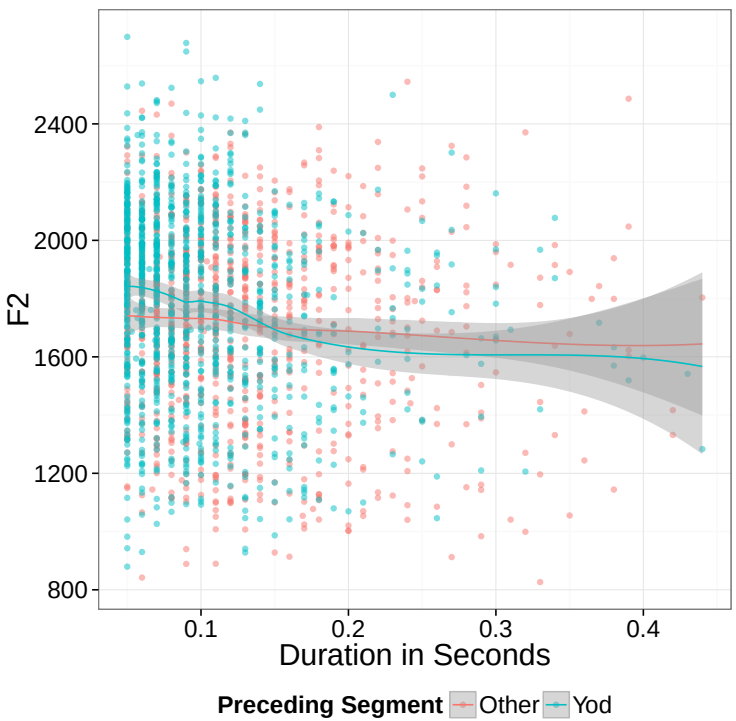
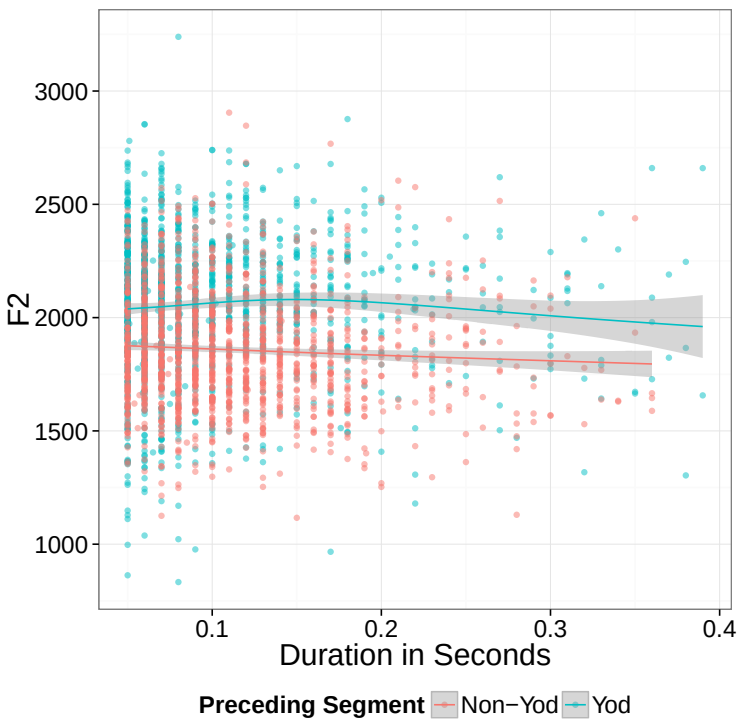
Phonological specialization in New Zealand English





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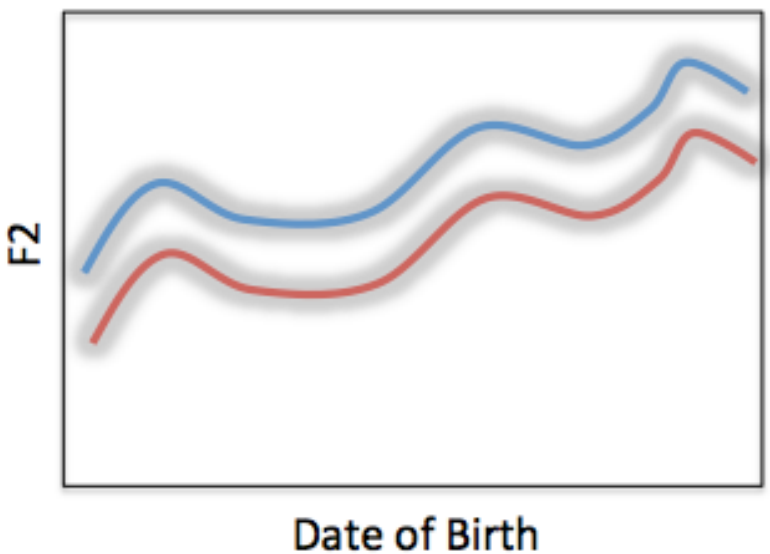

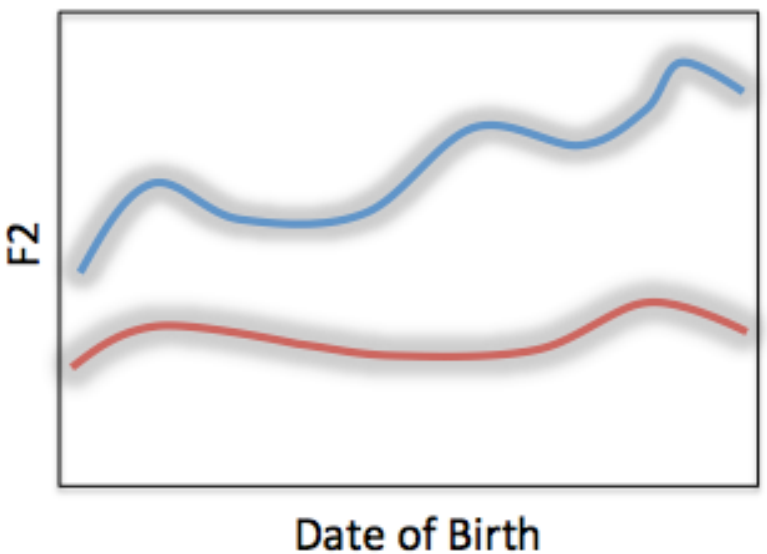

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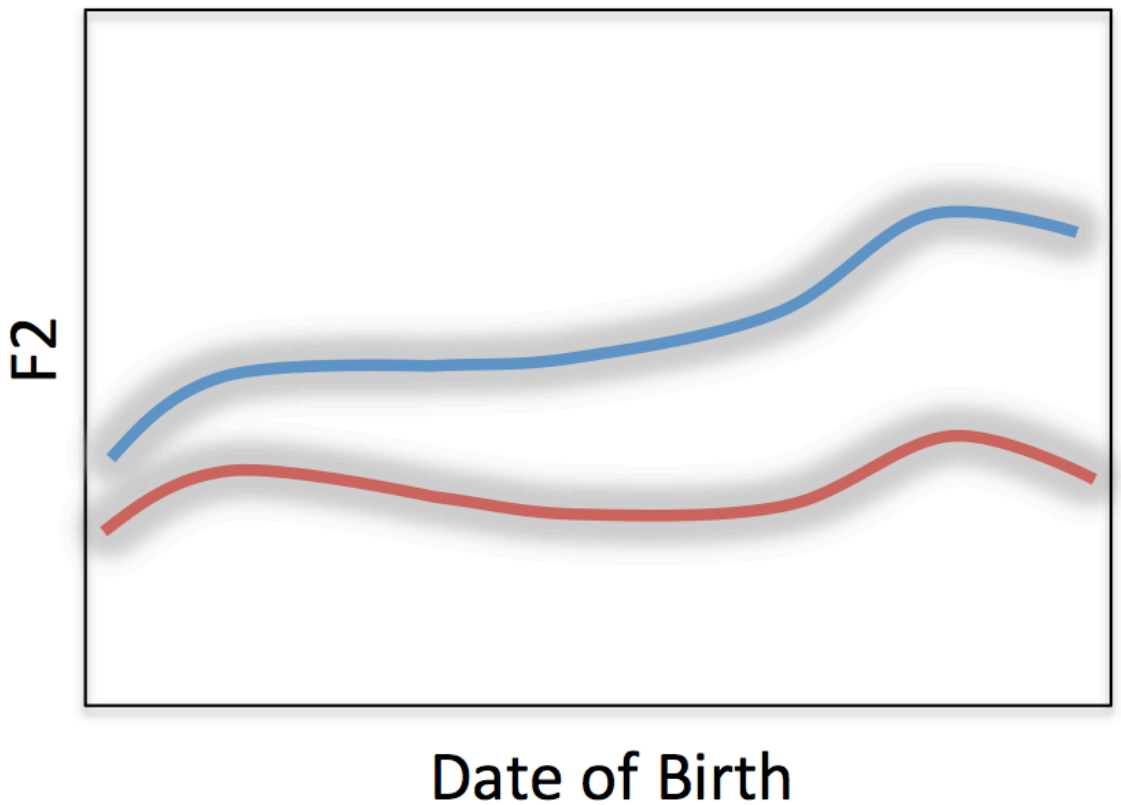

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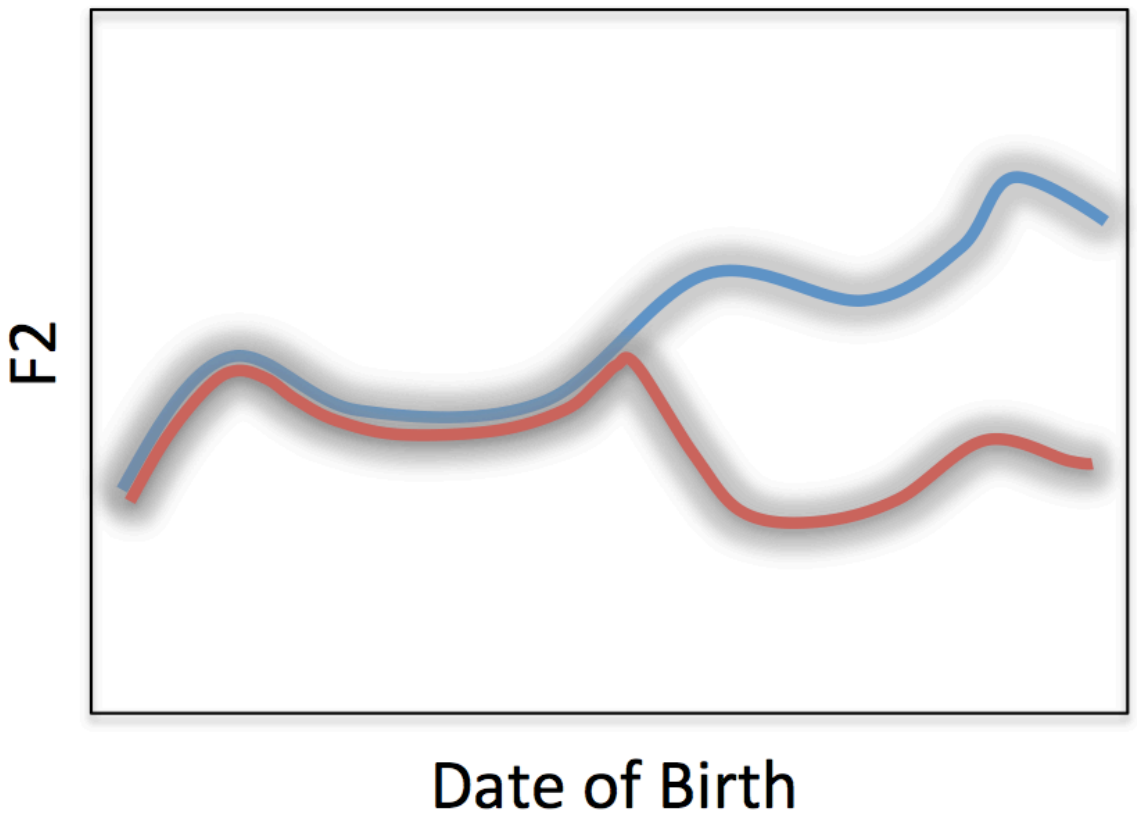

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- However, we may still see an effect of coarticulation for the early speakers

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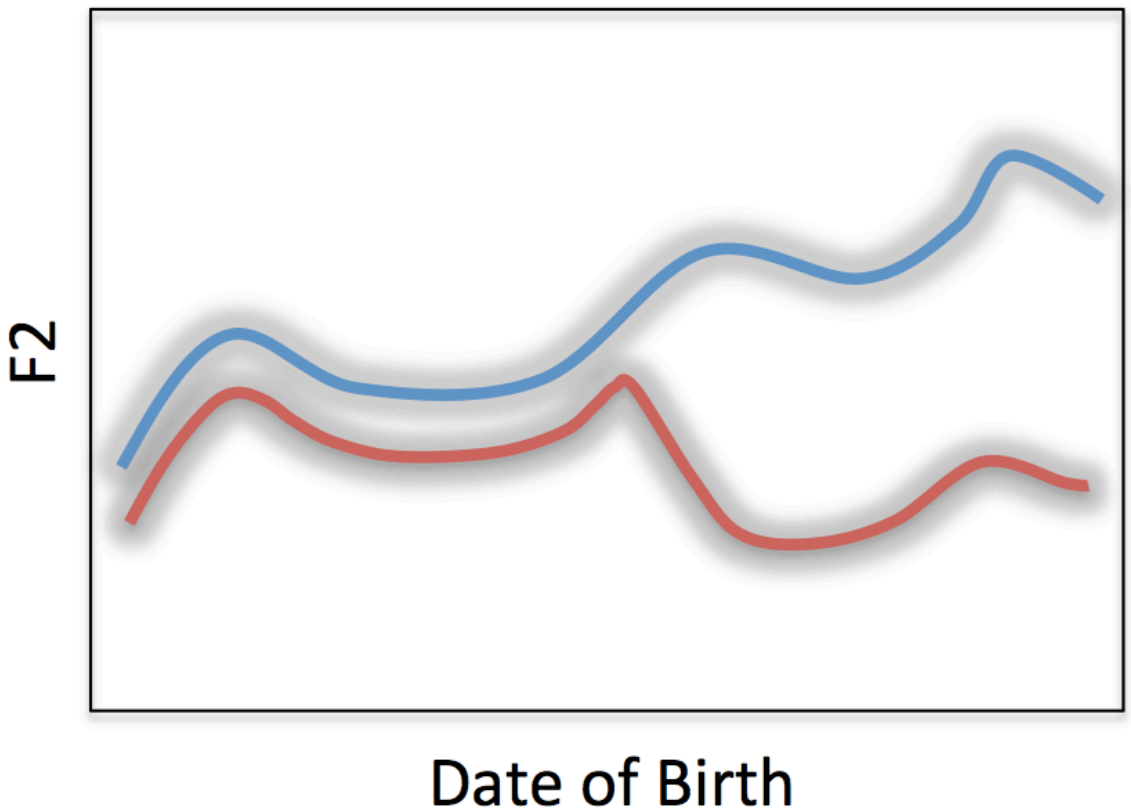

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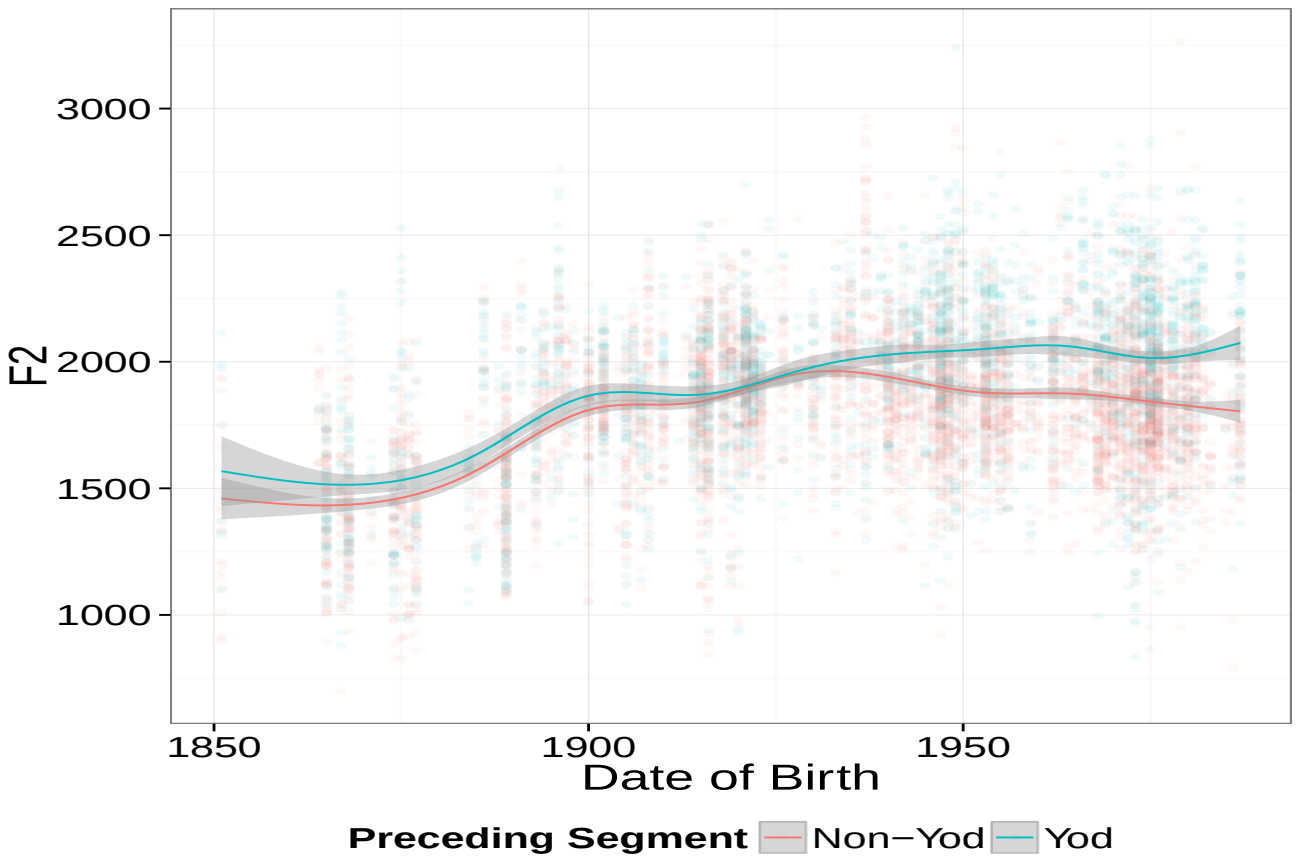

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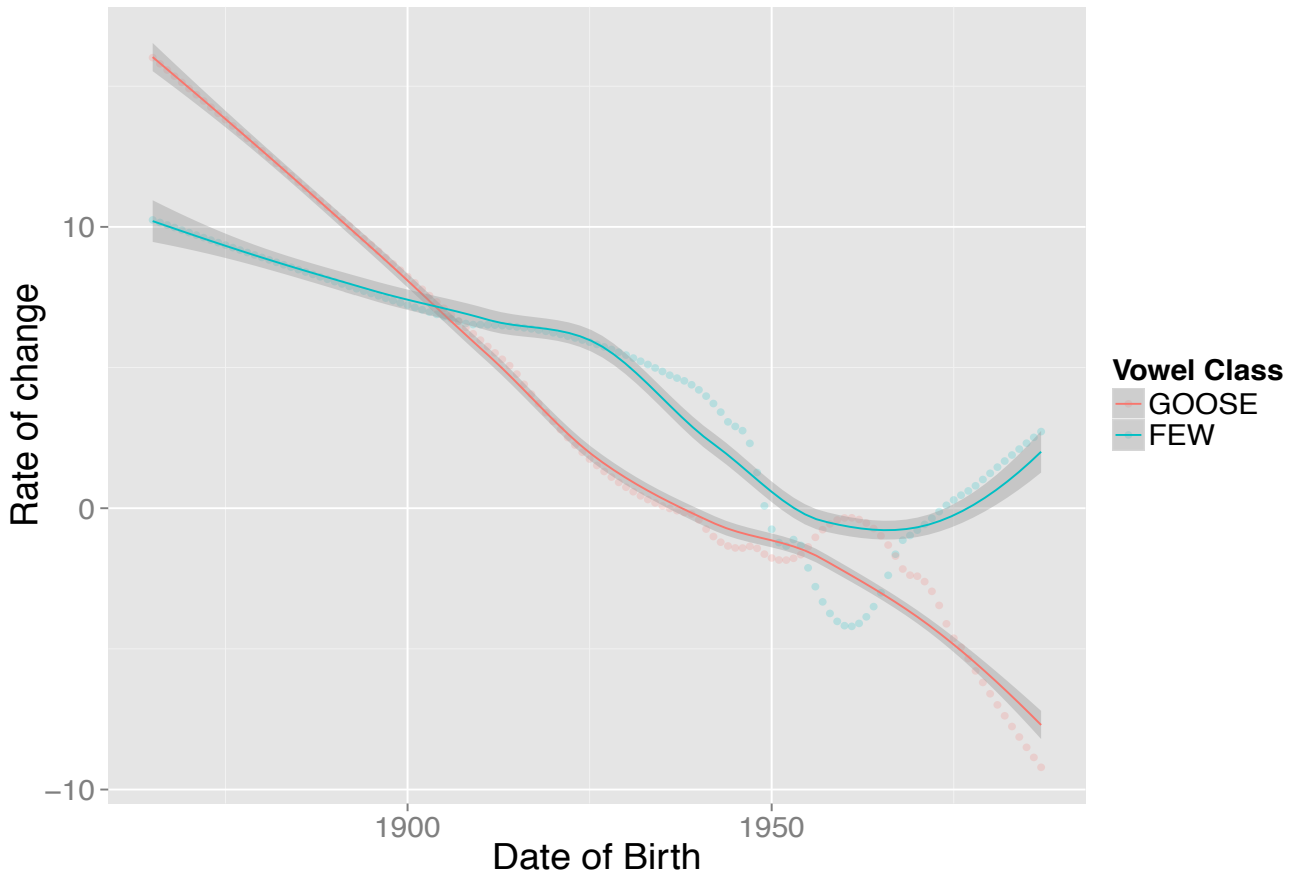

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- Questions going further: how does allophone emergence relate to phoneme emergence?

References I

Cho, Sunghye. 2015. Development of pitch contrast in korean prosody.

Fruehwald, Josef. 2013. Phonological involvement in phonetic change. Doctoral Dissertation, University of Pennsylvania.

Hejná, Michaela. 2014. Pre-aspiration and glottalizaiton in aberystwyth english.

Janda, Richard D, and Brian D Joseph. 2003. Reconsidering the canons of sound-change: Towards a "big bang" theory. In *Historical Linguistics 2001. Selected Papers from the 15th International Conference on Historical Linguistics*, ed. Barry Blake and Kate Burridge, 205–219. Melbourne: John Benjamins.

References II

Ohala, John. 1981. The listener as a source of language change. In *Papers from the parasession on language and behavior*, ed. C S Masek, R A Hendrick, and M F Miller. Chicago Linguistics Society.

Thank you!