

# GENERATIONAL CHANGE IN FORMANT TRAJECTORIES

## THE LOW-BACK-MERGER SHIFT IN LONGVIEW, WASHINGTON

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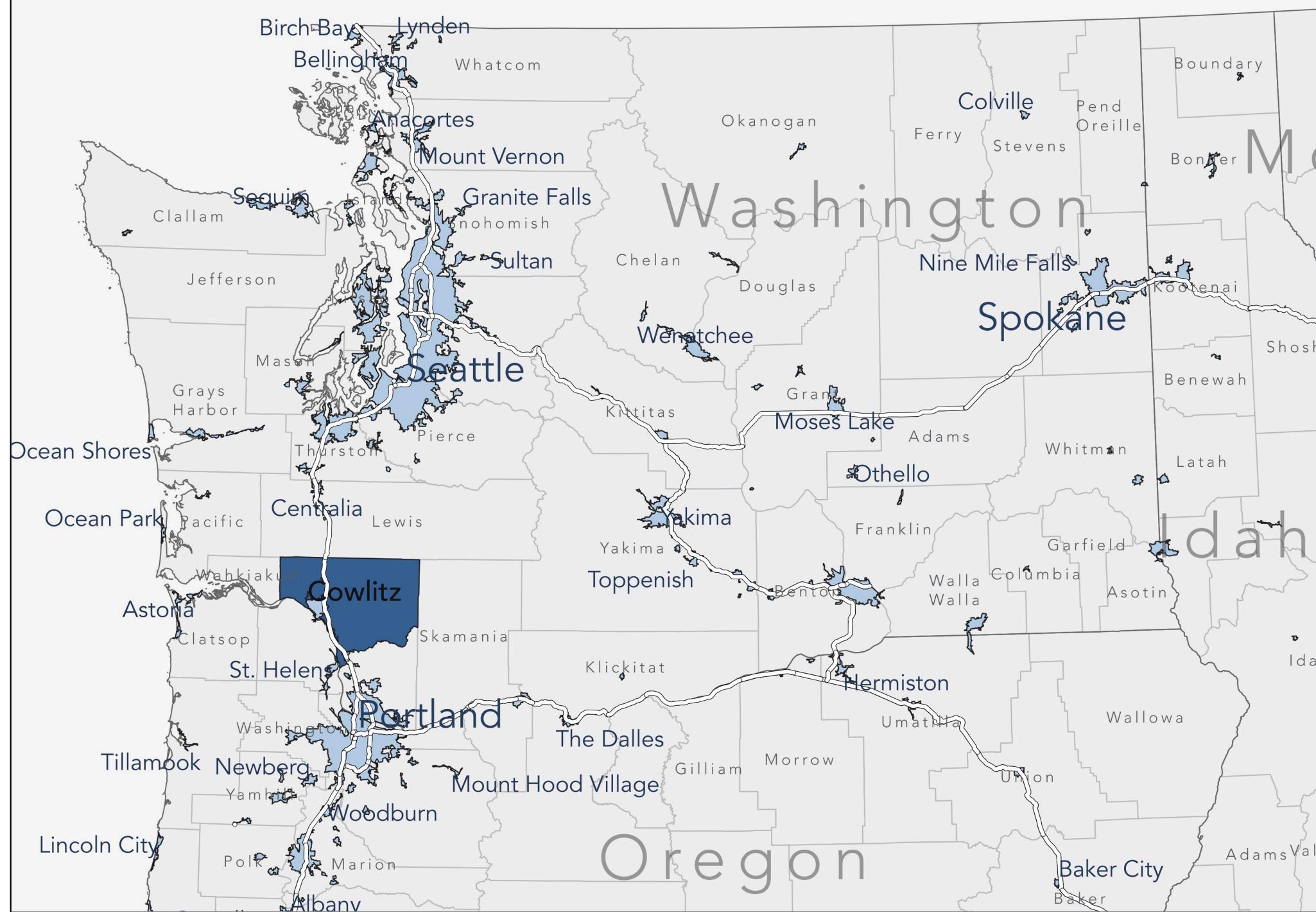
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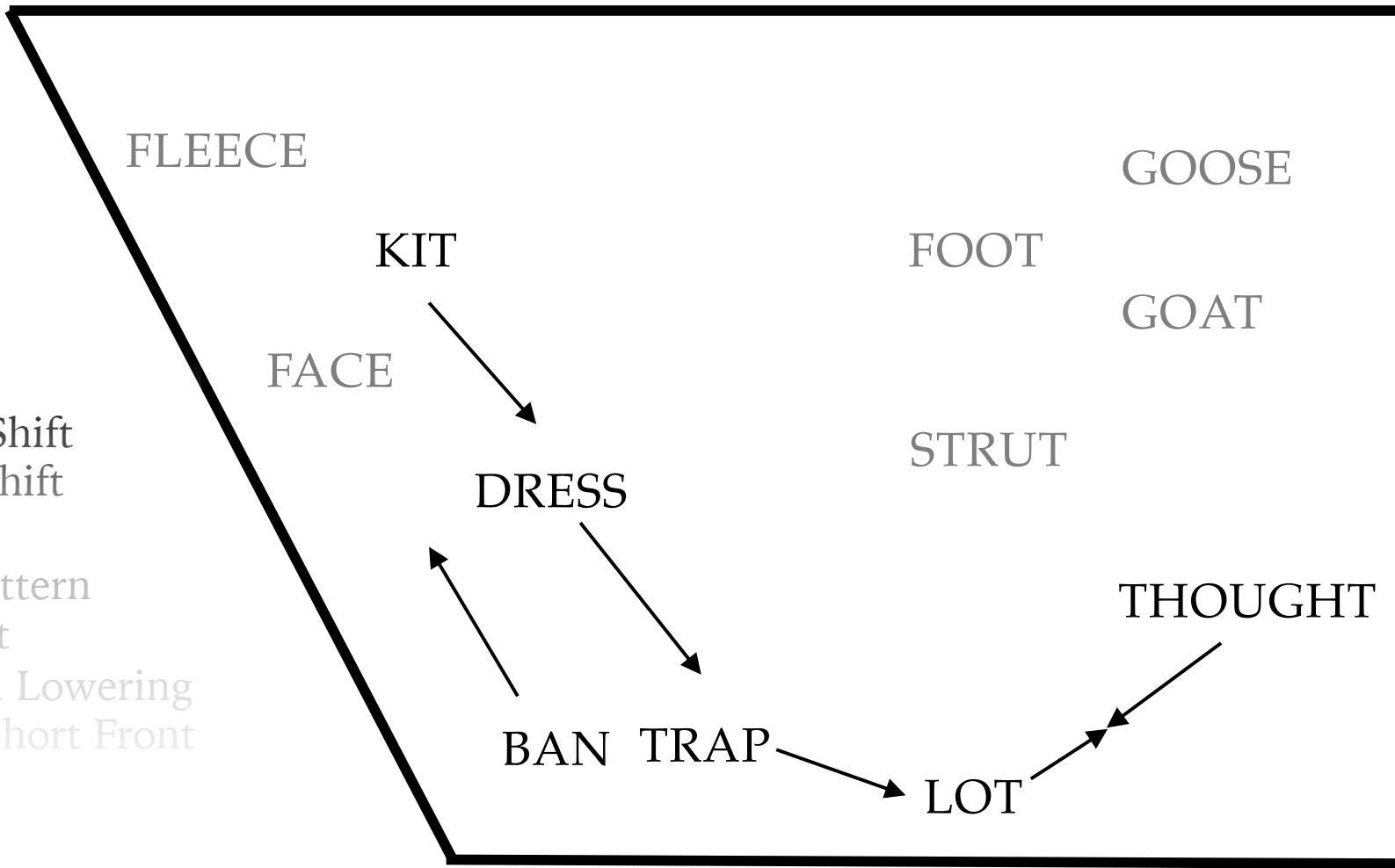
4<sup>th</sup> Cascadia Workshop in Sociolinguistics  
May 6, 2022



# THE “LOW-BACK-MERGER SHIFT”

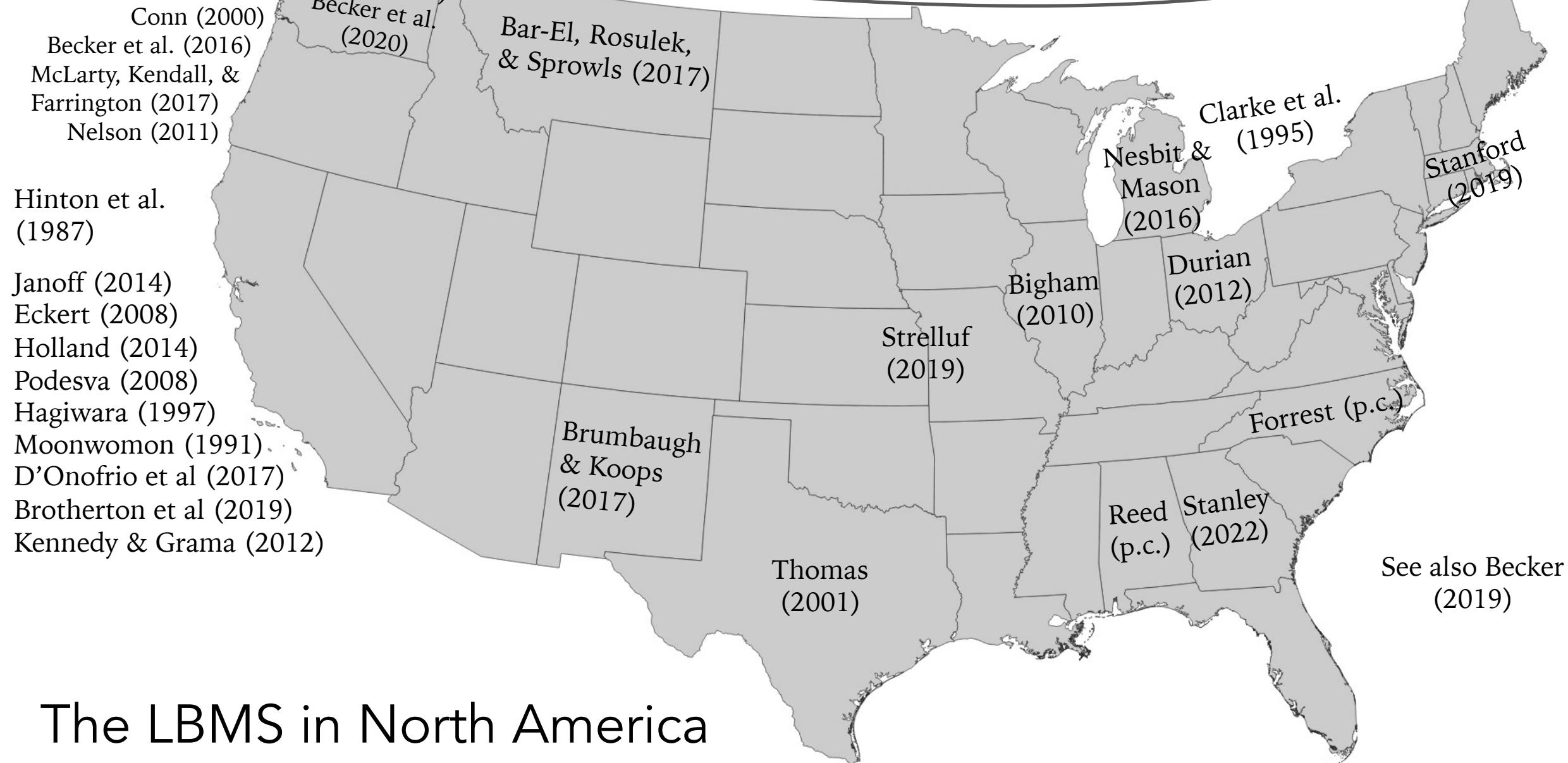
(Becker 2019)

a.k.a.  
California Vowel Shift  
Canadian Vowel Shift  
Elsewhere Shift  
Western Vowel Pattern  
Third Dialect Shift  
Short Front Vowel Lowering  
North American Short Front  
Vowel Shift



Hall (2000), Tamminga & Sadlier-Brown (2008),  
Roeder et al (2018), Presnykova et al (2018)

Labov, Ash, & Boberg (2006)

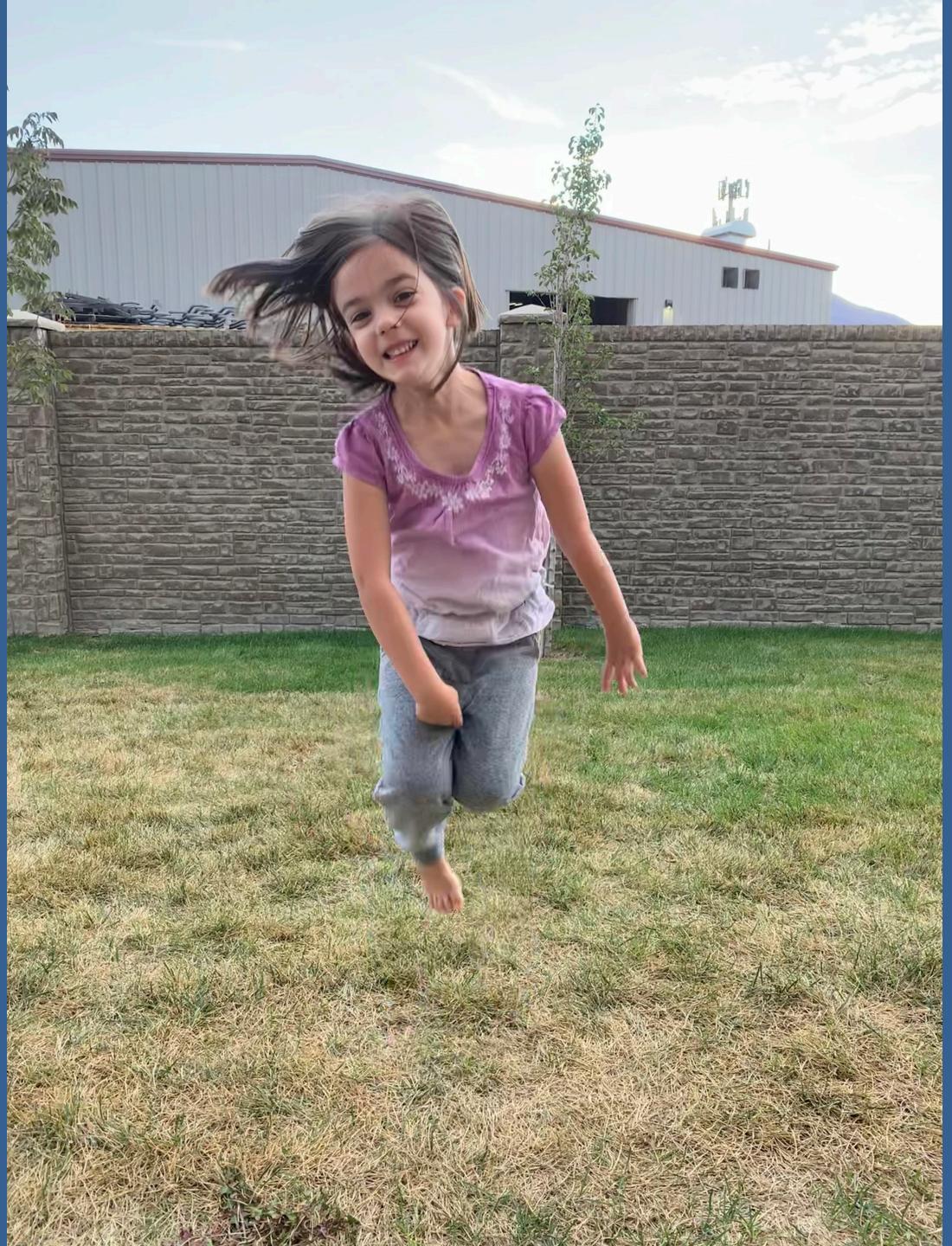


The LBMS in North America

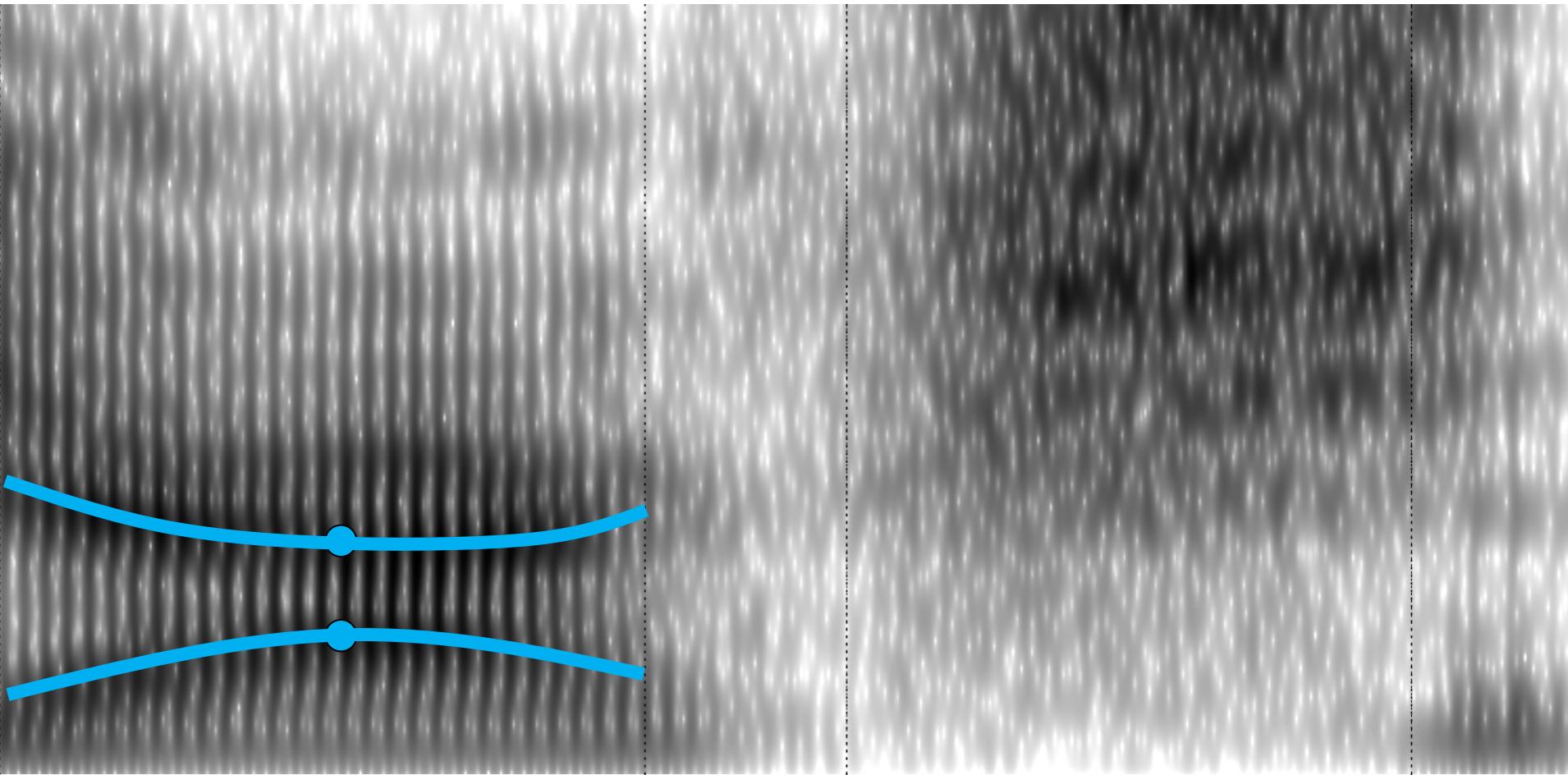
There is a growing consensus in the field that dynamic measurements of vowels provide a more complete view of vowel characteristics, and they avoid a necessarily arbitrary choice of selecting a specific time point where the measurements are taken.

– Strycharczuk & Scobbie (2017:330)





dʒ	æ	k	s	ə	n
jackson					



# RESEARCH QUESTION

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How have vowel formant trajectories changed as part of the LBMS?

# METHODS

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# DATA COLLECTION

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**When** Summer 2016

**Recruitment** face-to-face, business cards, snowball, family

**Method** Traditional sociolinguistic interviews (Labov 1984)

**Speakers** 54

**Audio** 45h 16m

**Corpus size** 350,000 words

**Vowels analyzed** 128,370

# DATA PROCESSING

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**Transcription** Manual

**Forced-Alignment** Montreal Forced Aligner (McAuliffe et al. 2017)

**Formant Extraction** Praat (Boersma & Weenink 2018)

**Filtering** Mahalanobis distance (Mahalanobis 1936)

**Normalization** ANAE method (Labov, Ash, Boberg 2006; cf. Nearey 1978)

**Statistical Modeling** GAMMs

**Software** R (R Core Team 2018), tidyverse (Wickham 2018)

**Visuals** ggplot2 (Wickham 2015)

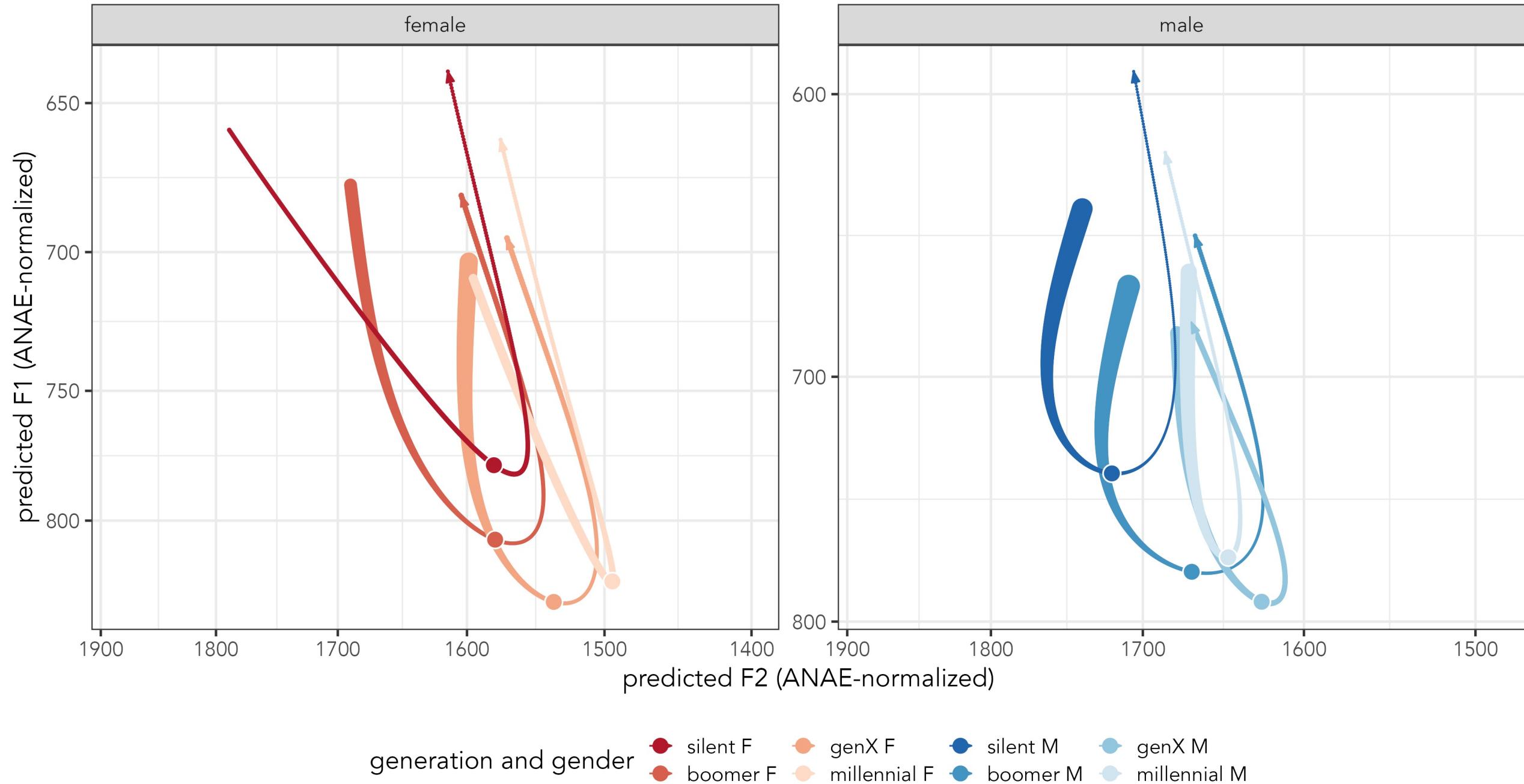
```
mdl_seed <- mgcv::bam(anae_hz ~  
  formant_sex_gen +  
  s(percent, by=formant_sex_gen, k=4) +  
  log(dur) * formant_sex_gen +  
  s(word, formant, bs="re") +  
  s(speaker, formant, bs="re"),  
  data=df, discrete=TRUE)  
  
rho <- start_value_rho(mdl_seed)  
  
mdl <- update(mdl_seed, rho=rho, AR.start=df$start_event)
```

See Wood (2017), Sóskuthy (2017), Gahl & Baayen (2019), Stanley et al (2021)

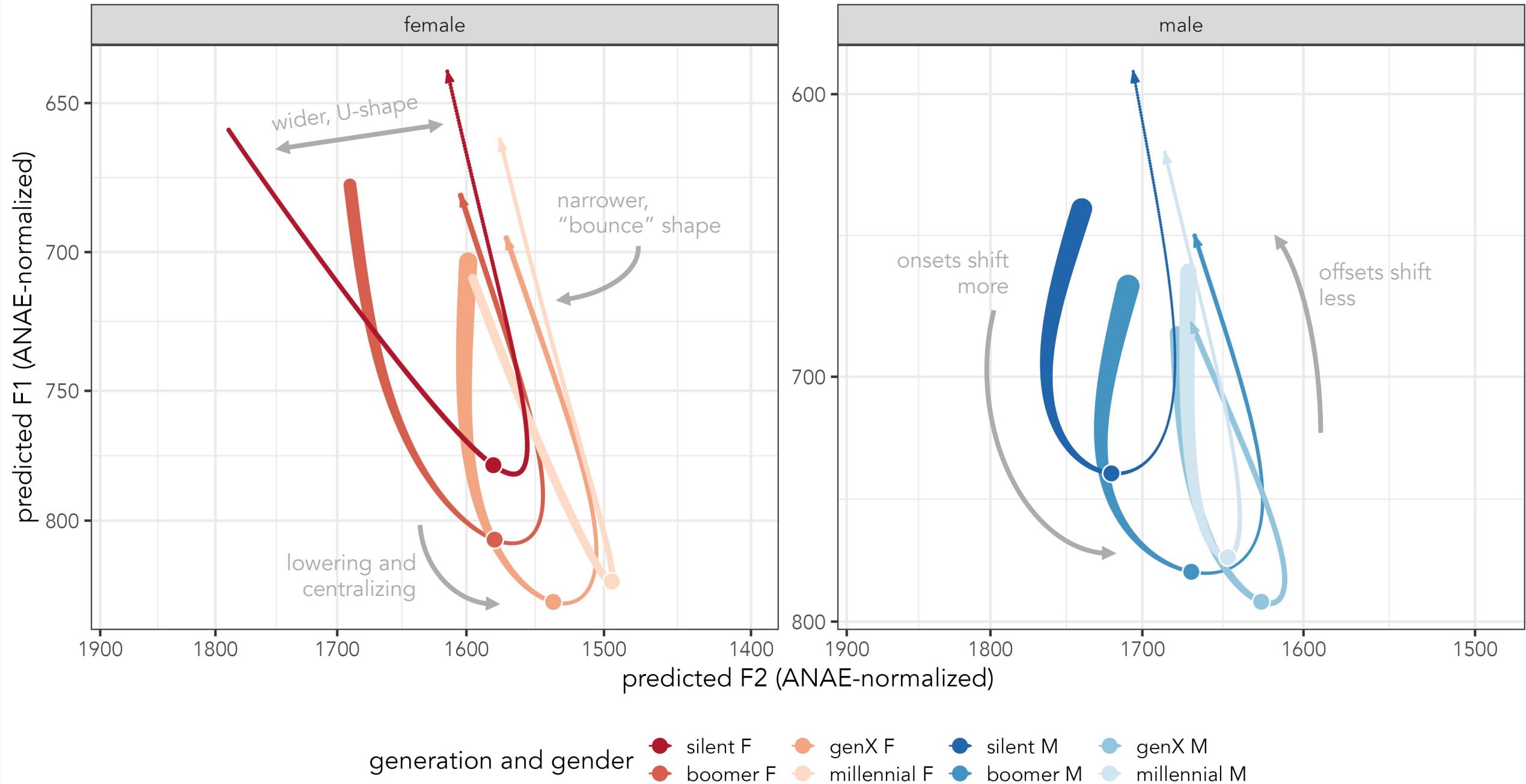
# RESULTS

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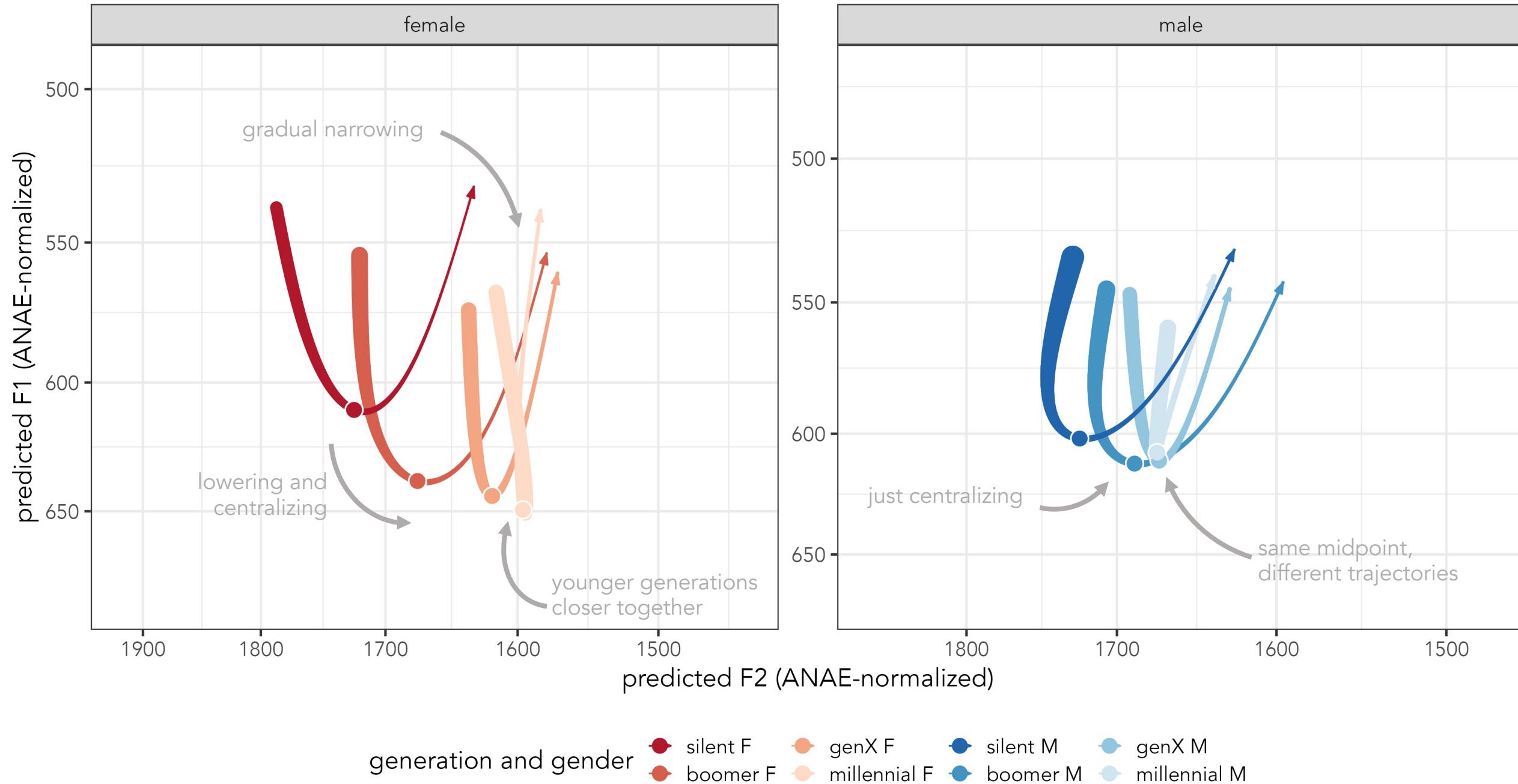
# Predicted vowel trajectories for BAT in Cowlitz County, WA, by gender and generation



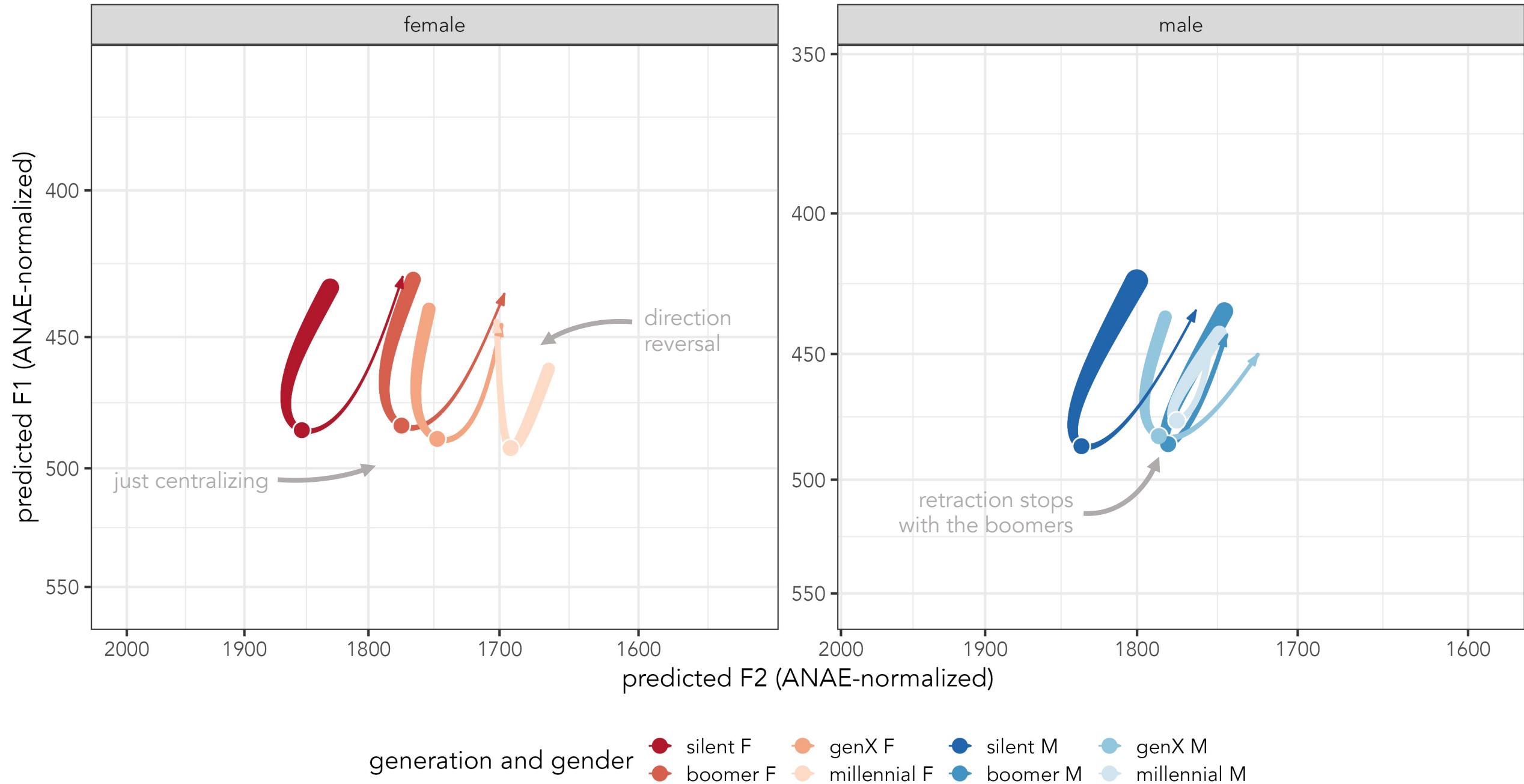
# Predicted vowel trajectories for BAT in Cowlitz County, WA, by gender and generation



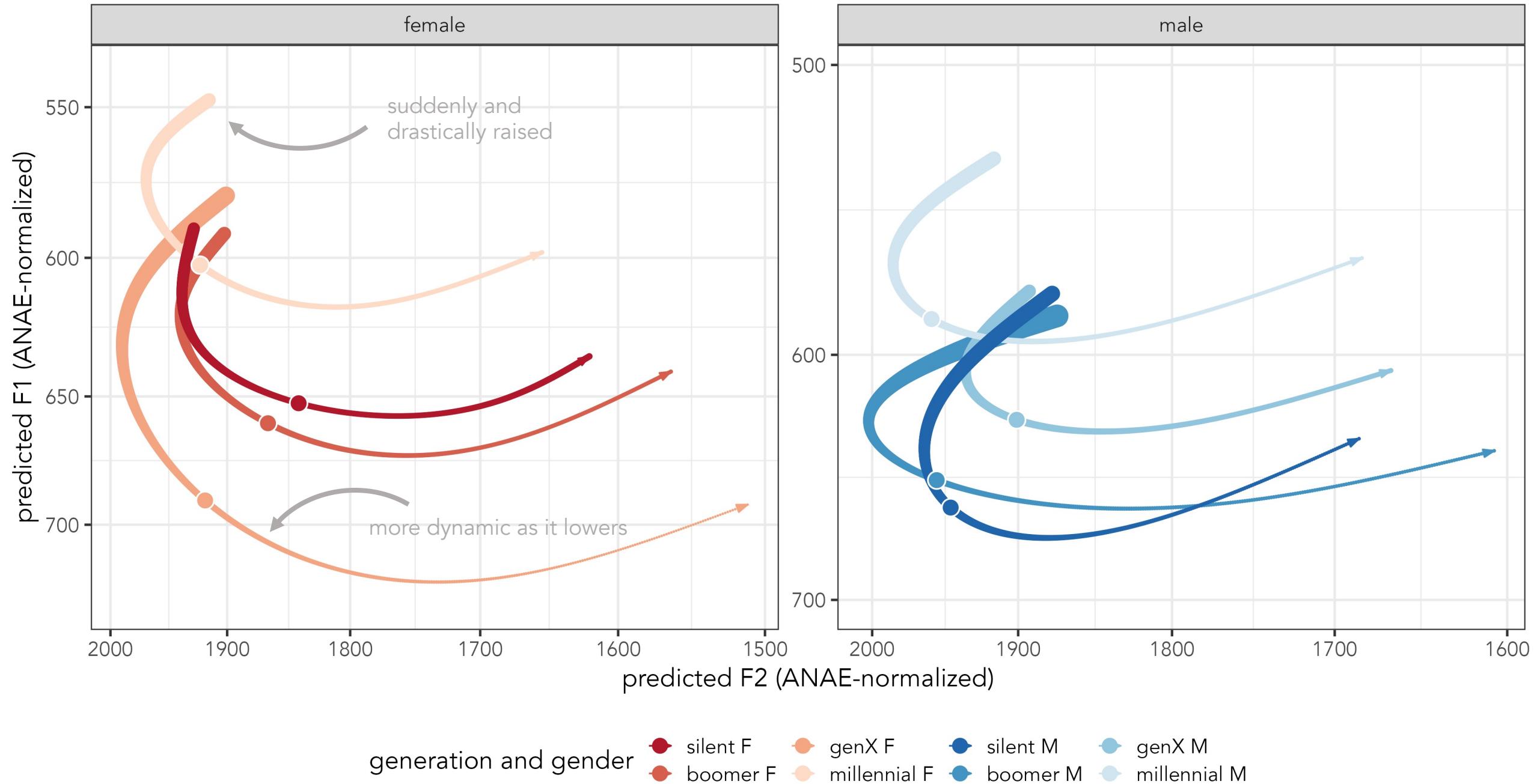
# Predicted vowel trajectories for BET in Cowlitz County, WA, by gender and generation



# Predicted vowel trajectories for BIT in Cowlitz County, WA, by gender and generation



# Predicted vowel trajectories for BAN in Cowlitz County, WA, by gender and generation



# DISCUSSION

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# VOWEL DYNAMICS OF VOWEL SHIFTS

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As the front lax vowels lower and centralize, their formant dynamics change

- Specifically, F2 is less dynamic, resulting in a “bounce” shape in F1-F2 plots.
- More evident for lower vowels than higher ones.

Formant dynamics *may* change as global position changes (but not always).

- Especially true with BAT and BET here.
- BIT mostly unclear.
- BAN did not have substantial changes in vowel dynamics.

# EXTRA INFORMATION

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What is learned through a single-point analysis?

- BAT and BET lower and centralize.
- BIT retracts and then stops.
- BAN lowers and then raises (for women)

What additional information is gained through dynamics?

- Independent onset-offsets.
- Narrowing in the F2 dimension.
- Trajectory change without midpoint change.
- Global vowel shift without trajectory change.
- Reversal of trajectory direction.
- Dynamicity changes.

# CONCLUSIONS

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How many of these trajectory changes have been or could be exploited for sociolinguistic reasons?

What kind of sociolinguistic findings are we overlooking by focusing exclusively on midpoints?

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# Thanks for attending!

A current version of this study can be found at  
[joeystanley.com/cwsl2022](http://joeystanley.com/cwsl2022)

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