

# Back Vowel Distinctions and Dynamics in Southern US English

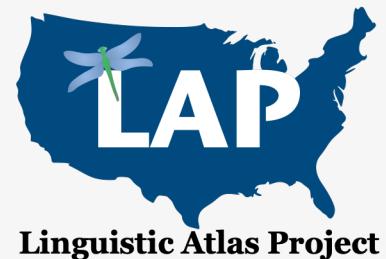
---

Joseph A. Stanley

joeystan@uga.edu  
@joey\_stan

Margaret E. L. Renwick

mrenwick@uga.edu



---

LSA 2020  
January 5, 2020  
New Orleans, LA



# Overview

---

We investigate low/back vowels /u, ɔv, ɔ, ɔ, a/ in Southern American English (SAE).

Research on SAE has analyzed changes in **position** over generational time.

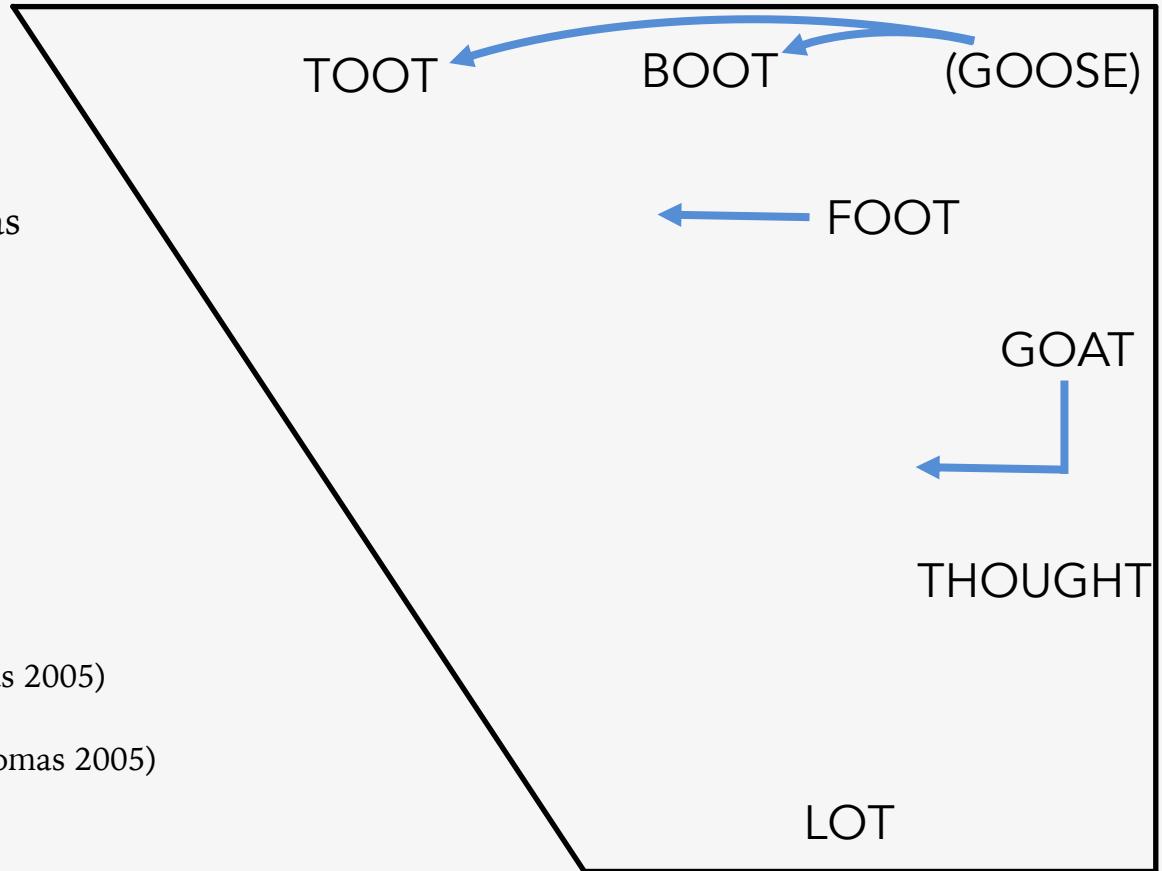
Most work on **trajectories** is limited to impressionistic coding (“loss of upgliding”) or reduces trajectories to summary statistics (vector length, rate of change)

We analyze both the **position** and the **shape** of back vowels’ formant trajectories in apparent time, using new data from the Digital Archive of Southern Speech (DASS).

# Back Vowel Fronting

## GOOSE

- Fronting since Civil War (Fridland 2001, Kurath & McDavid 1961)
- **Fronted nucleus [ʌu]** (Thomas 2007, Thomas & Coggshall 2014)
- We differentiate two allophones
  - TOOT: post-coronal
  - BOOT: non-post-coronal



## GOAT

- **Nucleus lowered in early 1900s** (Thomas 2005)
- Fronting spread after WWII: [əu] (Thomas 2005)

## FOOT

- Fronting is correlated with GOOSE and GOAT

# Low Back Vowels

THOUGHT

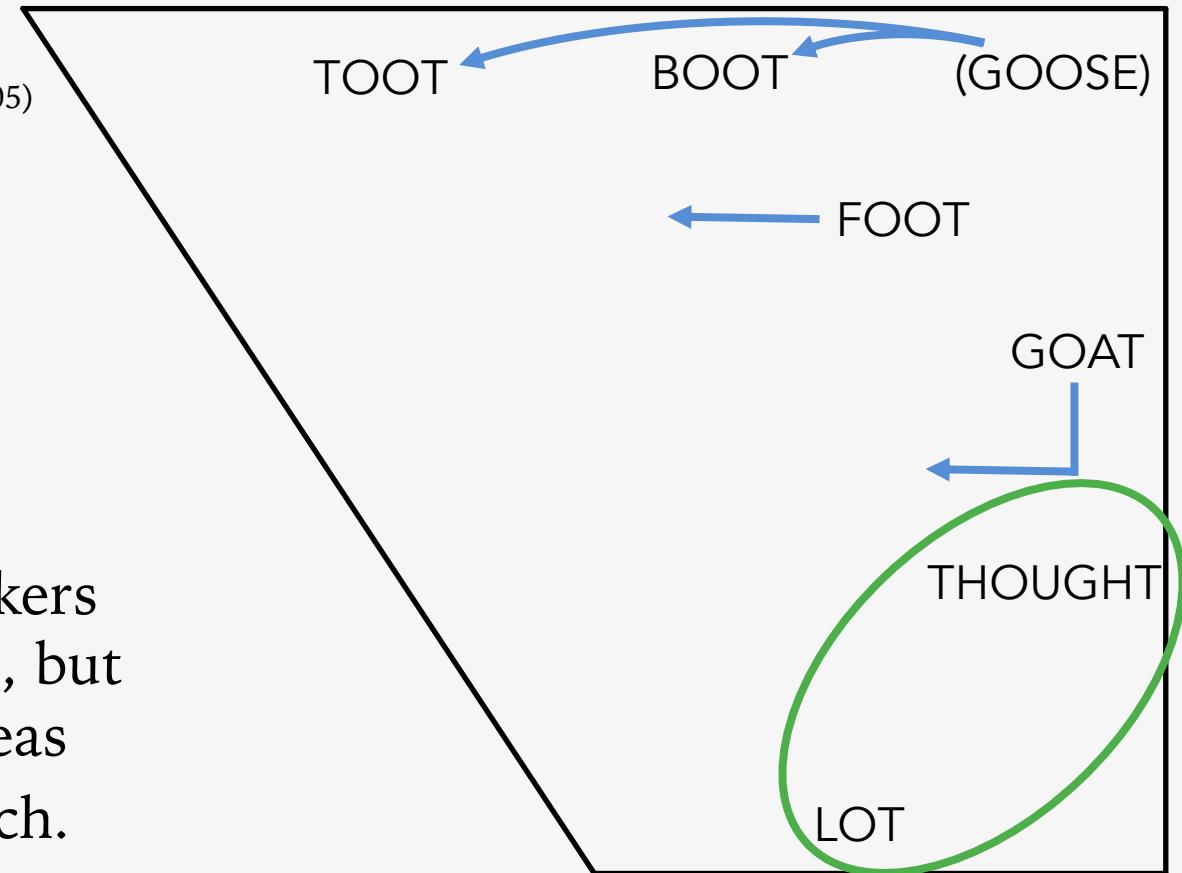
- Traditionally **upgliding**: [əʊ] (Thomas 2005)

LOT

- A very stable [ɑ] (Thomas 2005)

Low Back Merger?

- Recently spreading in younger speakers in areas like KY (Irons 2007), GA (Stanley 2019), but not Memphis (Fridland 2015) and other areas
- Not expected to occur in older speech.



# Why study vowel dynamics?

---

Southern back vowels may be inherently diphthongal

Southern vowels' inherent formant dynamics are rarely explored

(cf. Fox & Jacewicz 2009, Farrington et al. 2018, Renwick & Stanley forthcoming)

As Southern shifting is ongoing, vowel dynamics may change across generations

Our research question: How do back vowels' formant trajectory shapes and relative positions vary across male and female speakers of different generations?

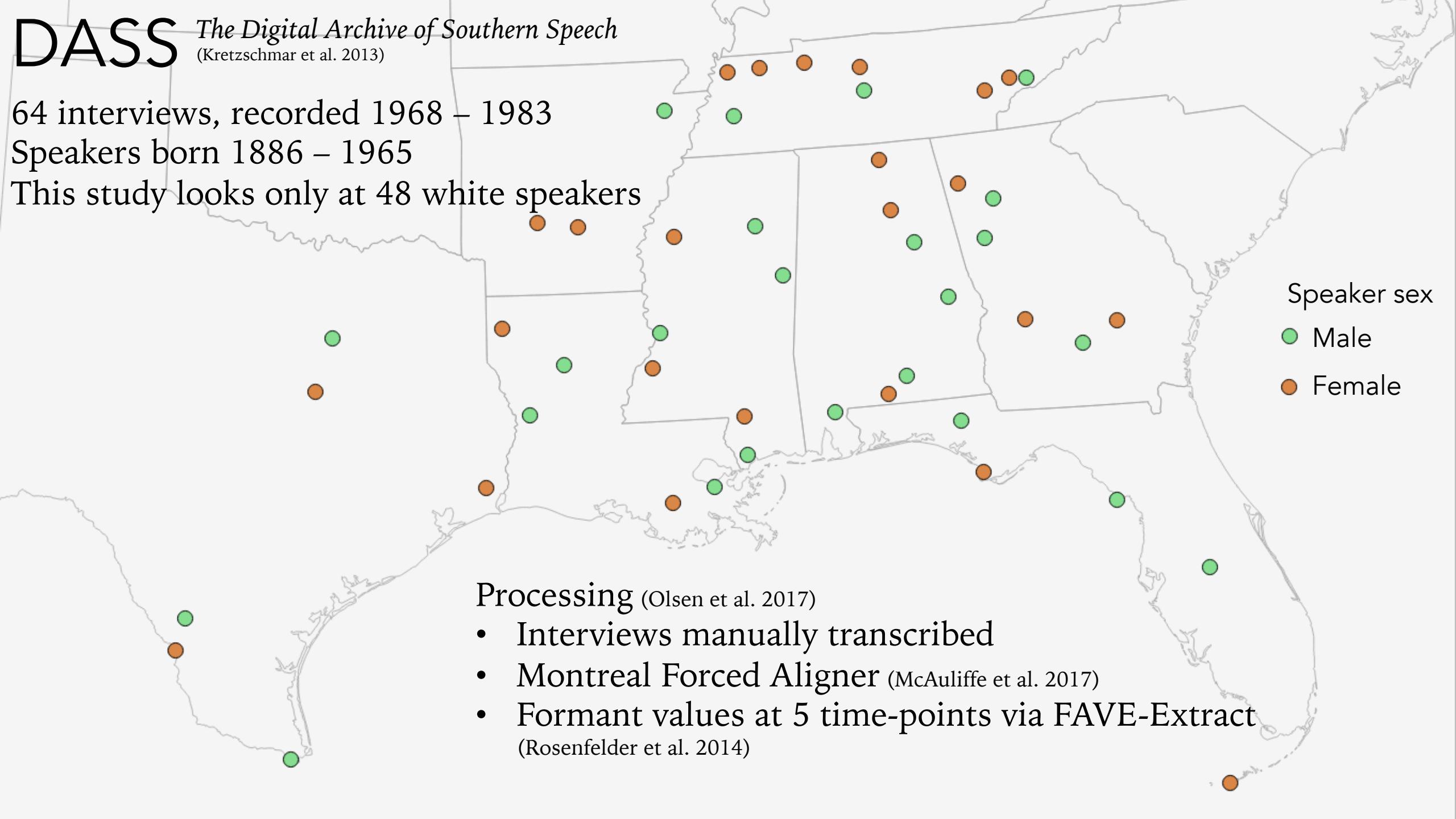
# Methods

---

64 interviews, recorded 1968 – 1983

Speakers born 1886 – 1965

This study looks only at 48 white speakers



Processing (Olsen et al. 2017)

- Interviews manually transcribed
- Montreal Forced Aligner (McAuliffe et al. 2017)
- Formant values at 5 time-points via FAVE-Extract  
(Rosenfelder et al. 2014)

# Back vowel data

---

Vowel (Allophone)	Tokens
GOOSE (BOOT)	2,430
GOOSE (TOOT)	13,489
FOOT	8,965
GOAT	30,946
THOUGHT	13,157
LOT	15,962
Total analyzed	84,949

- Total tokens: 243,136
- Stressed vowels only
  - Stop words removed  
(e.g. function words)
  - No pre-liquid tokens
  - Outliers filtered with Mahalanobis distance according to a 95%  $\chi^2$  distribution
  - Analyzed tokens were Bark-transformed following Gahl & Baayen (2019)

# Analyzing Trajectories

---

Generalized Additive Mixed-Effects Models (GAMMs; Wood 2017)

- Useful for multiple measurements per token across their durations
- Models the trajectory *itself* rather than its *properties* (length, etc.)
- Like linear models, GAMMs incorporate parametric effects
- Incorporate *smooth terms*, accounting for nonlinear predictors
- Random effects available, to account for idiosyncratic behavior

GAMMs are visualized using predicted values and difference smooths

See also Sóskuthy (2017), Gahl & Baayen (2019), Renwick & Stanley (forthcoming)

# Model Specification

---

```
mgcv::bam(bark_raw ~  
  formant_sex_vowel_gen +  
  s(percent, by = formant_sex_vowel_gen, k = 4) +  
  log_dur +  
  s(speaker, allophone, formant, bs = "re") +  
  s(speaker, allophone, formant, percent, bs = "re") +  
  s(word, formant, bs = "re"),  
  data = dass)
```

Dependent variable: Bark-transformed, unnormalized values; all data pooled

Fits different smooths for each combo of formant, sex, vowel, and generation

Controlled for duration

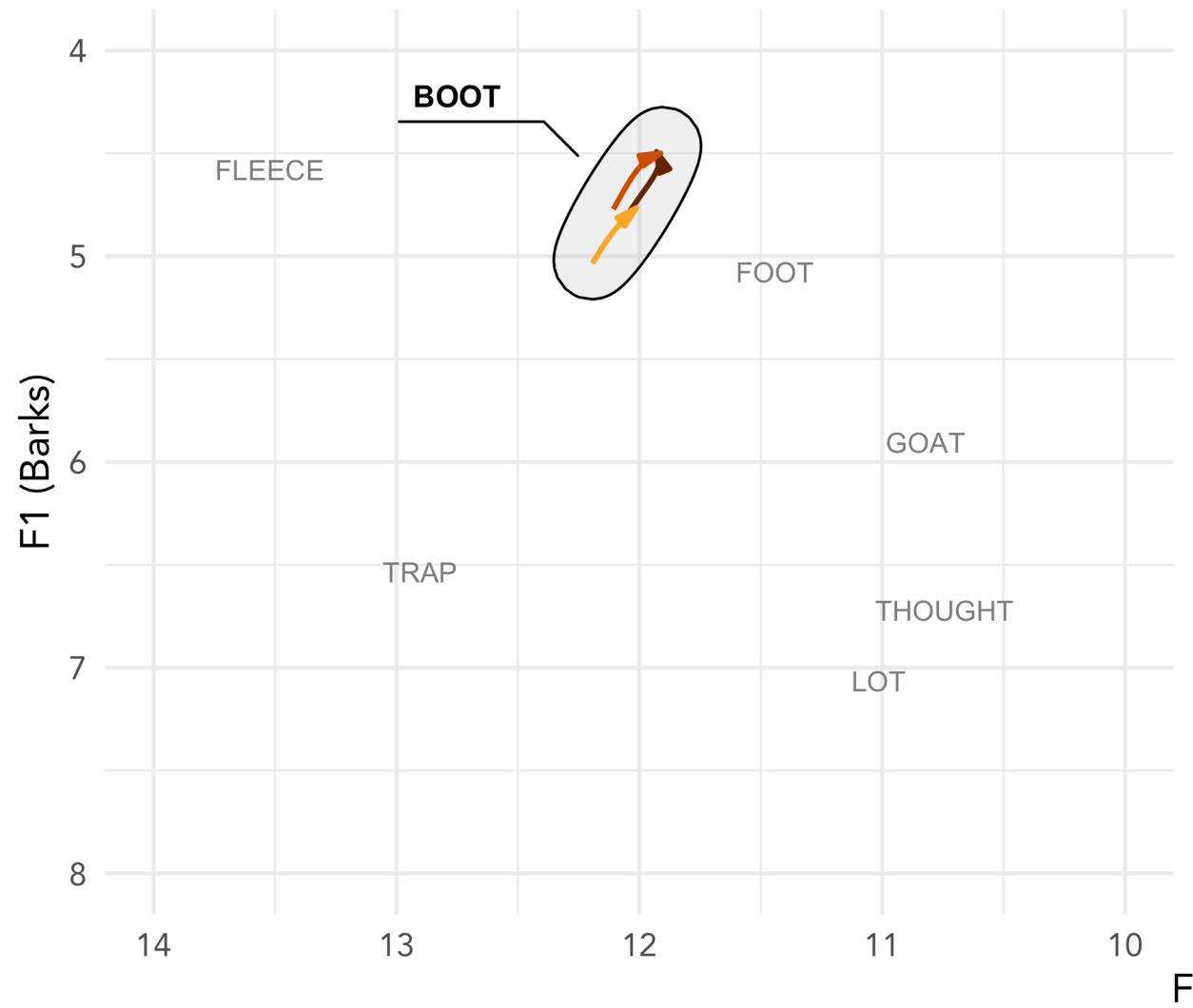
Random intercept and slope for speaker, interacting with vowel and formant.

Random intercepts for word, by formant

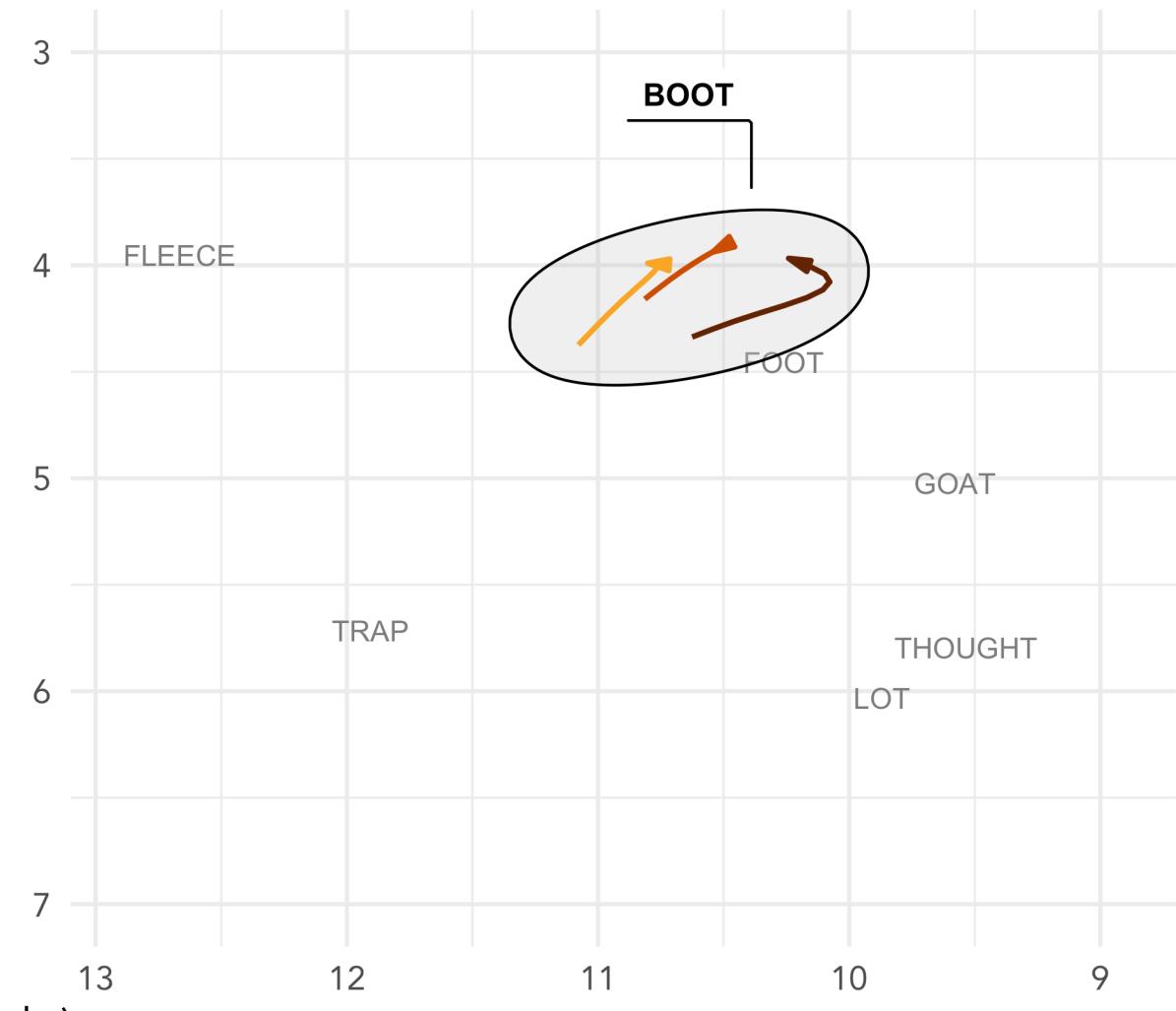
# Results

---

## Women



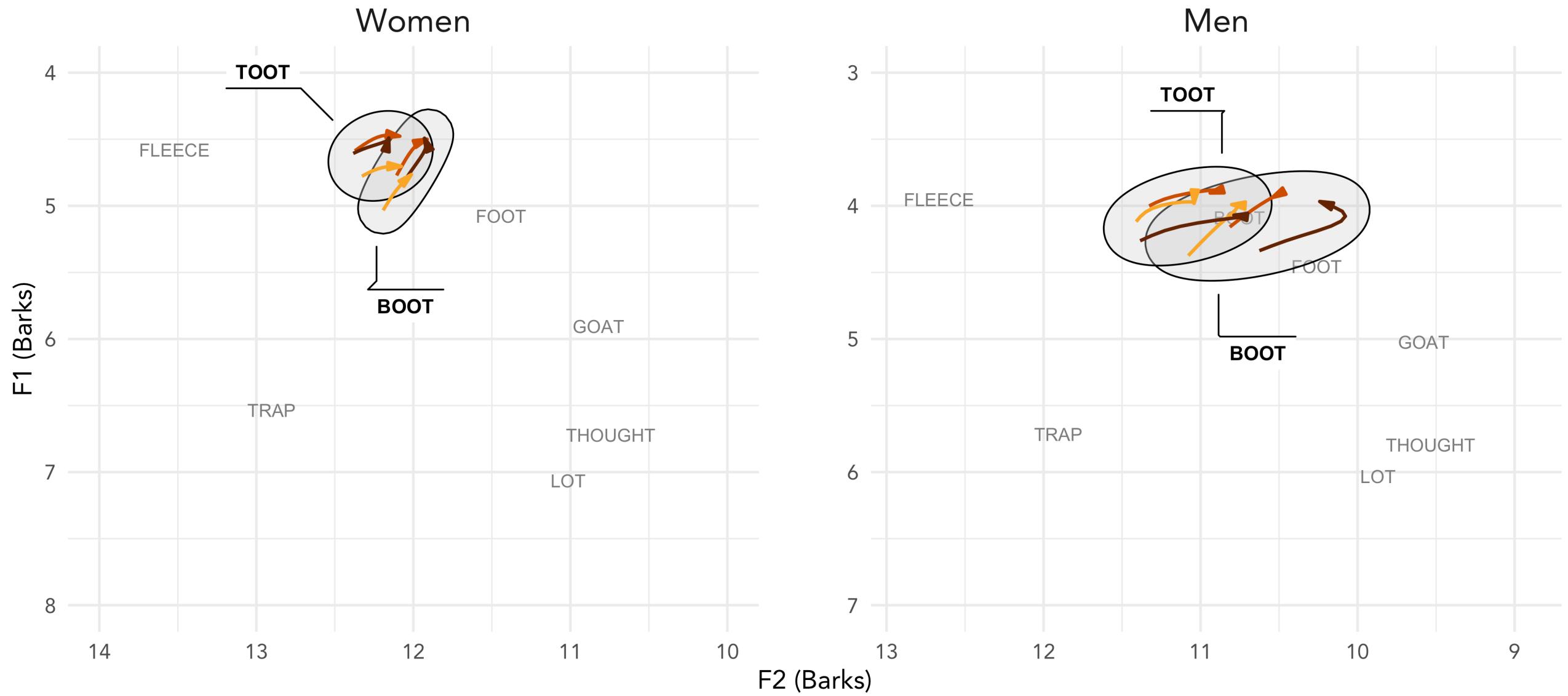
## Men



Lost Generation  
1886–1900  
(n = 17)

G.I. Generation  
1901–1927  
(n = 19)

Silent/Boom Generation  
1928–1965  
(n = 12)

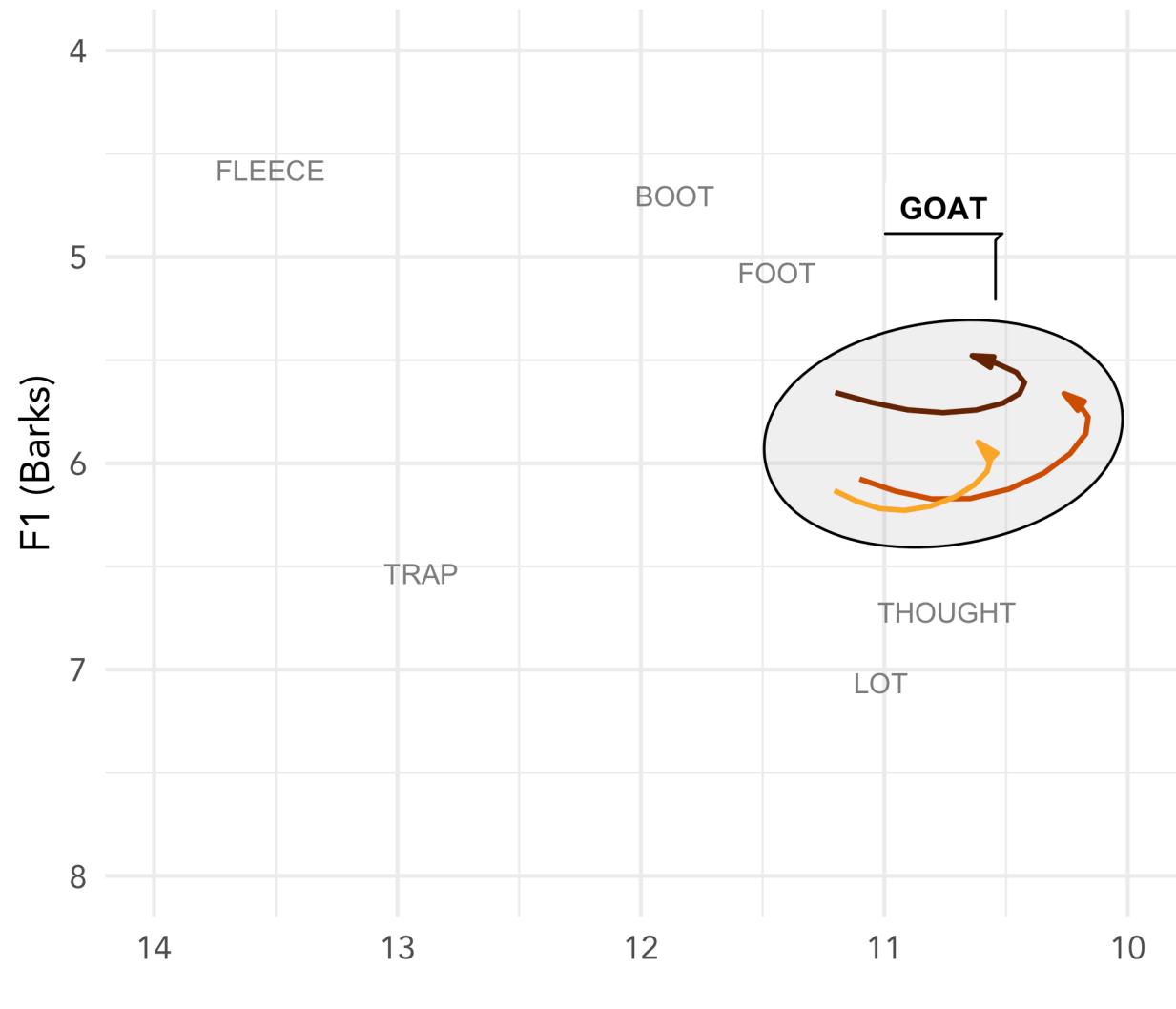


Lost Generation  
1886–1900  
(n = 17)

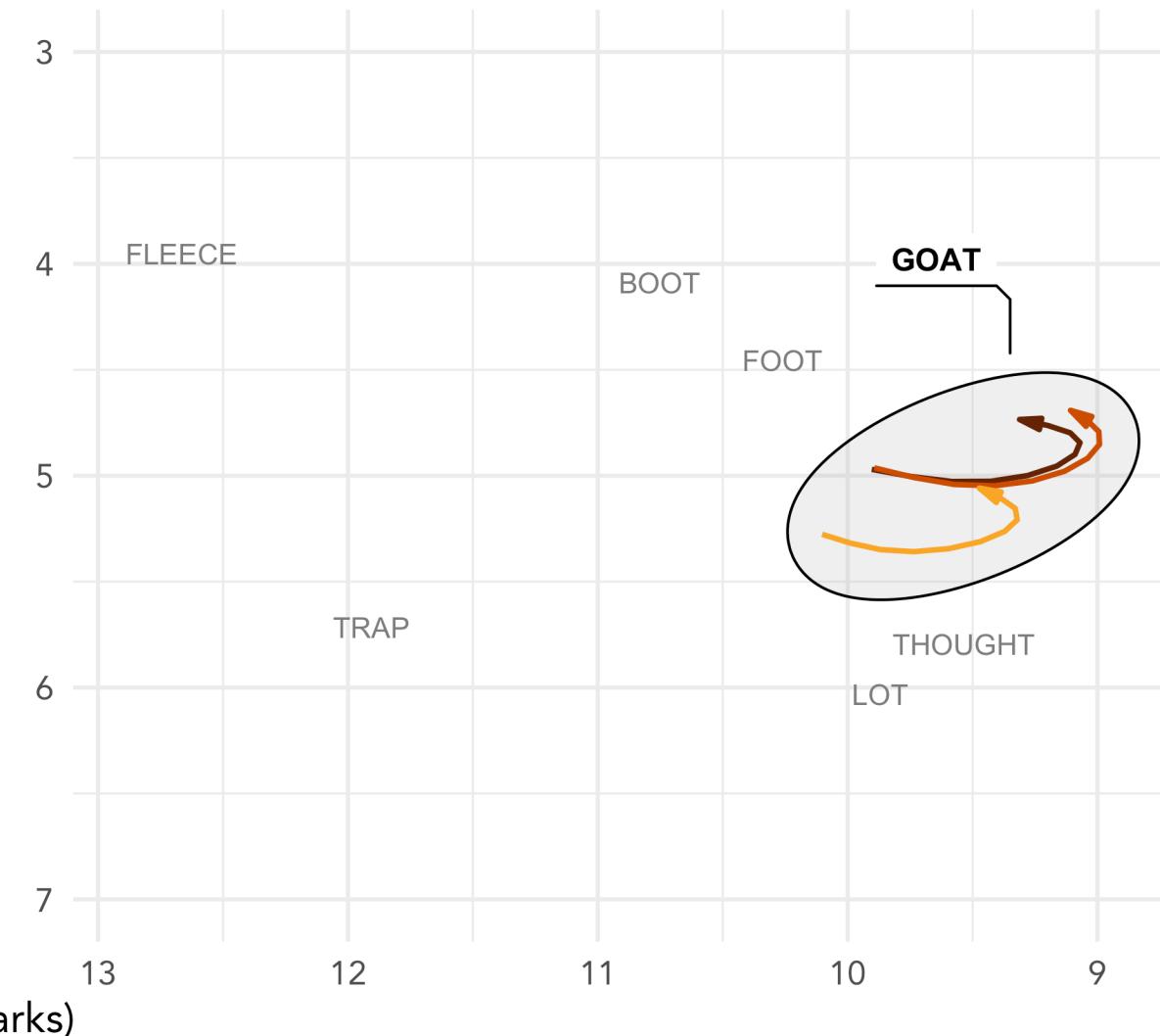
G.I. Generation  
1901–1927  
(n = 19)

Silent/Boom Generation  
1928–1965  
(n = 12)

## Women



## Men

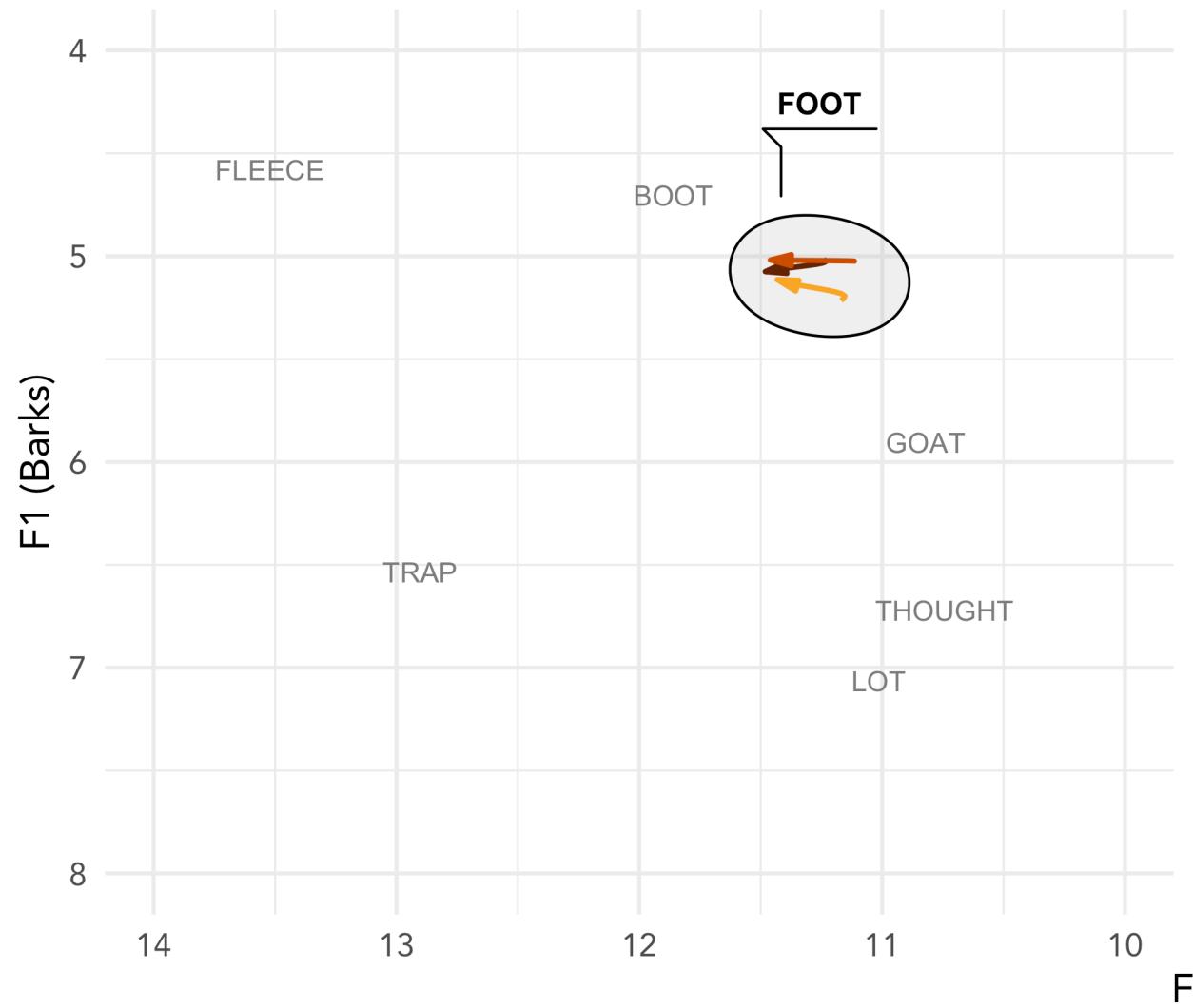


Lost Generation  
1886–1900  
(n = 17)

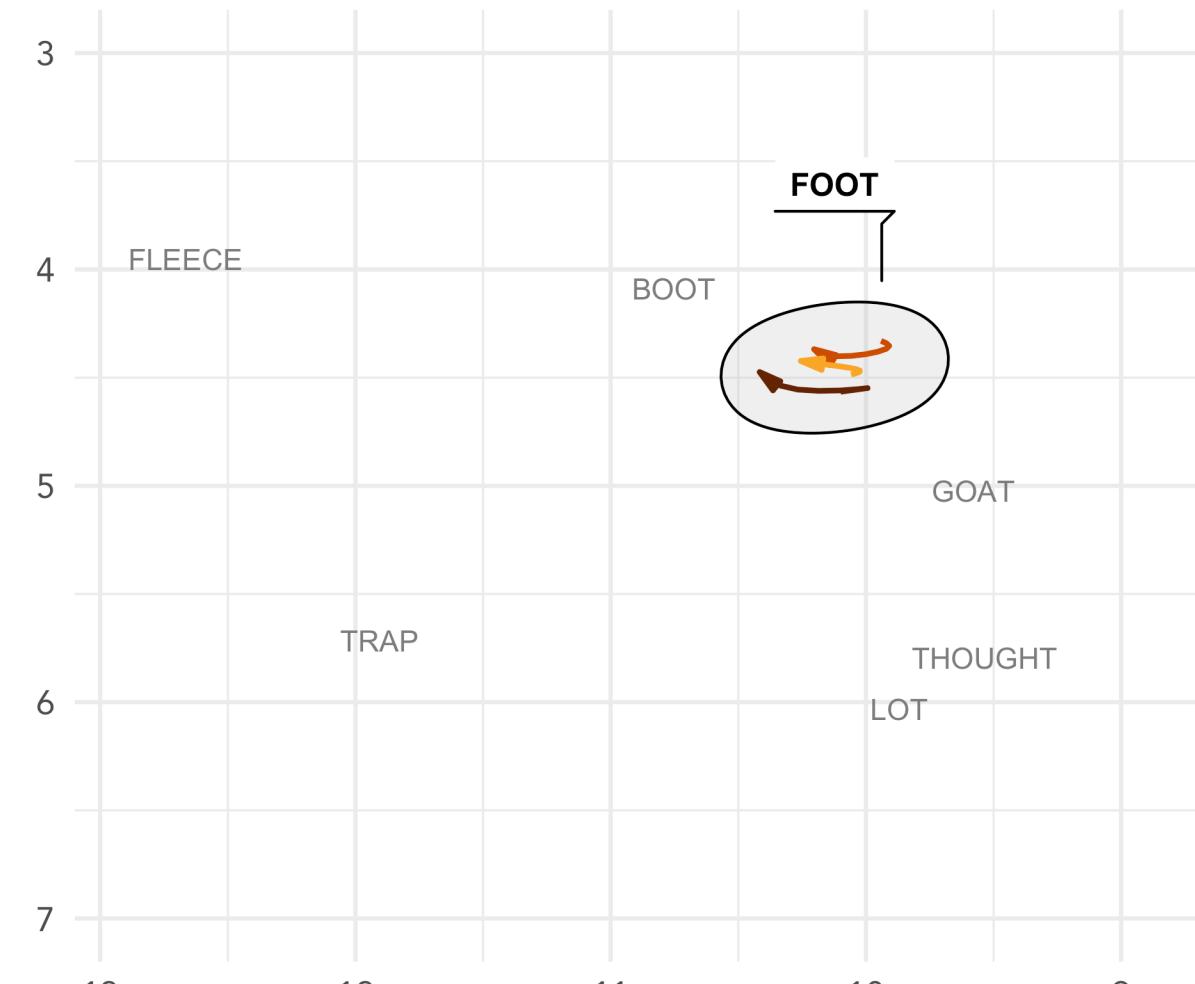
G.I. Generation  
1901–1927  
(n = 19)

Silent/Boom Generation  
1928–1965  
(n = 12)

## Women



## Men



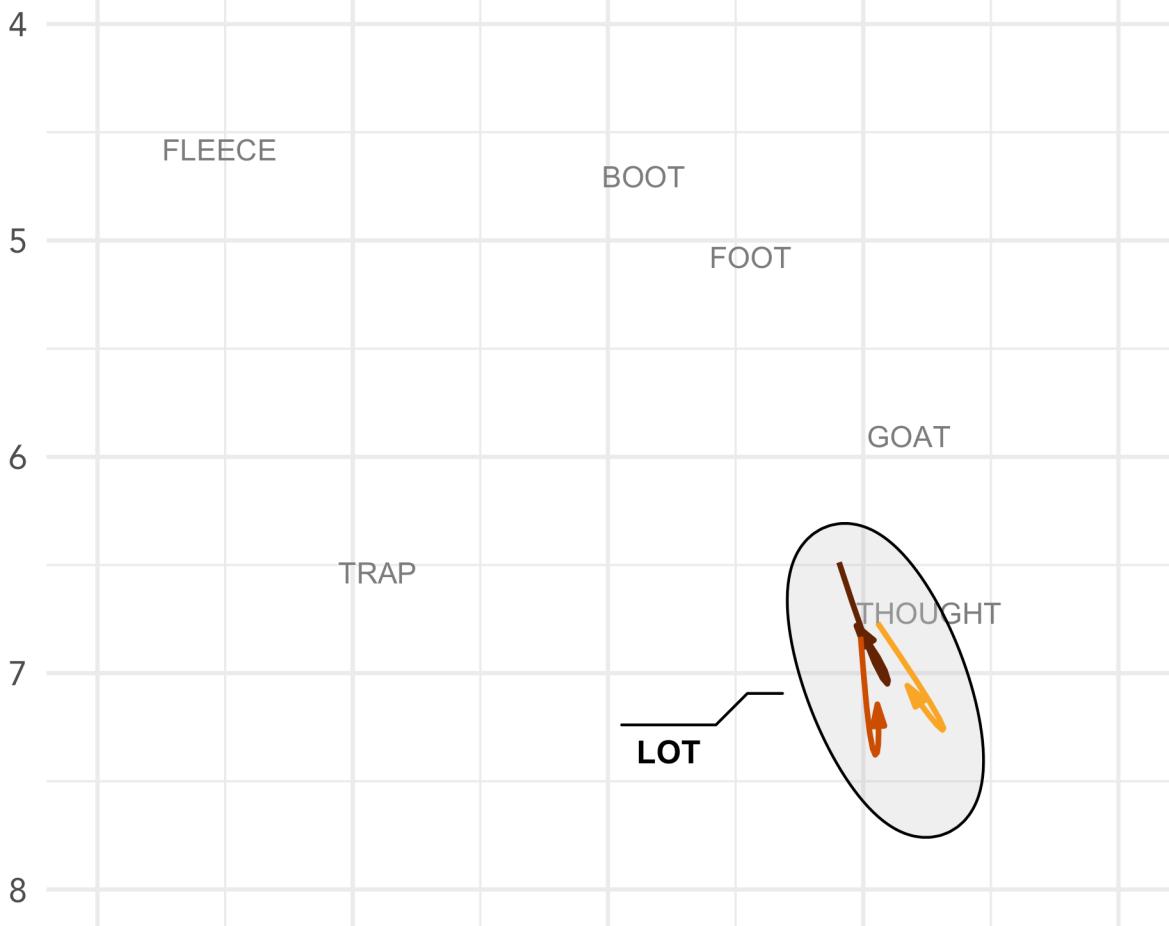
Lost Generation  
1886–1900  
(n = 17)

G.I. Generation  
1901–1927  
(n = 19)

Silent/Boomer Generation  
1928–1965  
(n = 12)

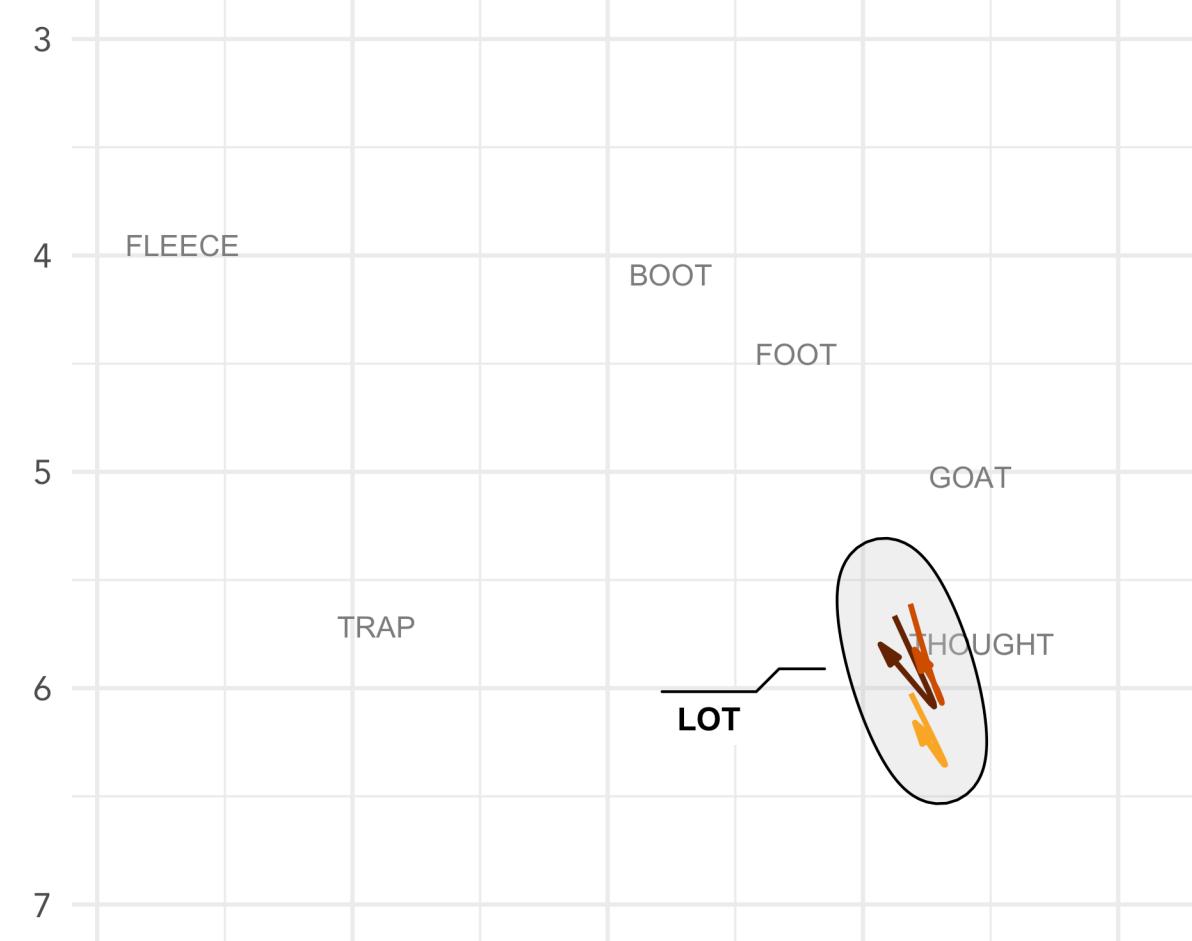
## Women

F1 (Barks)



## Men

F1 (Barks)

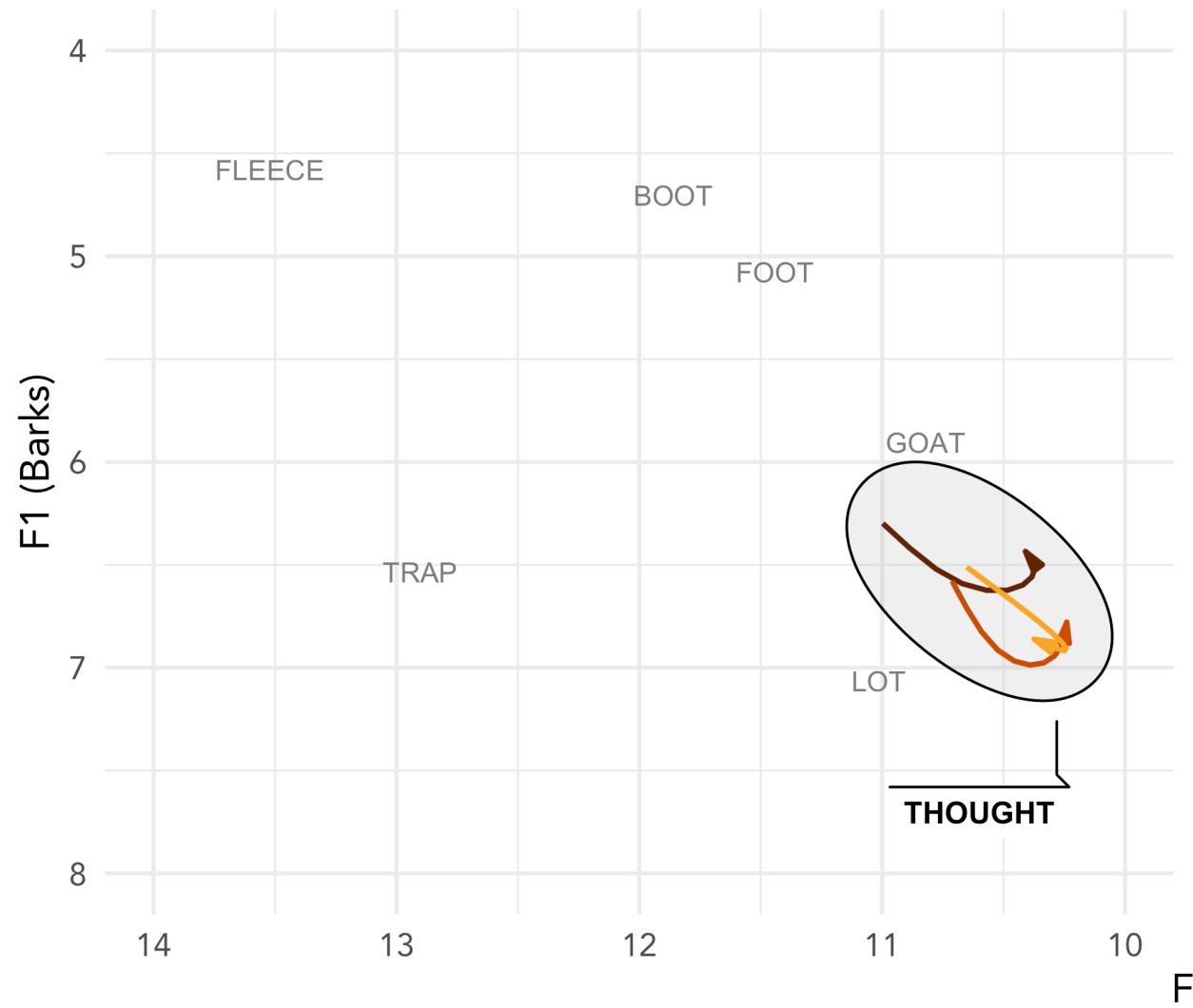


Lost Generation  
1886–1900  
(n = 17)

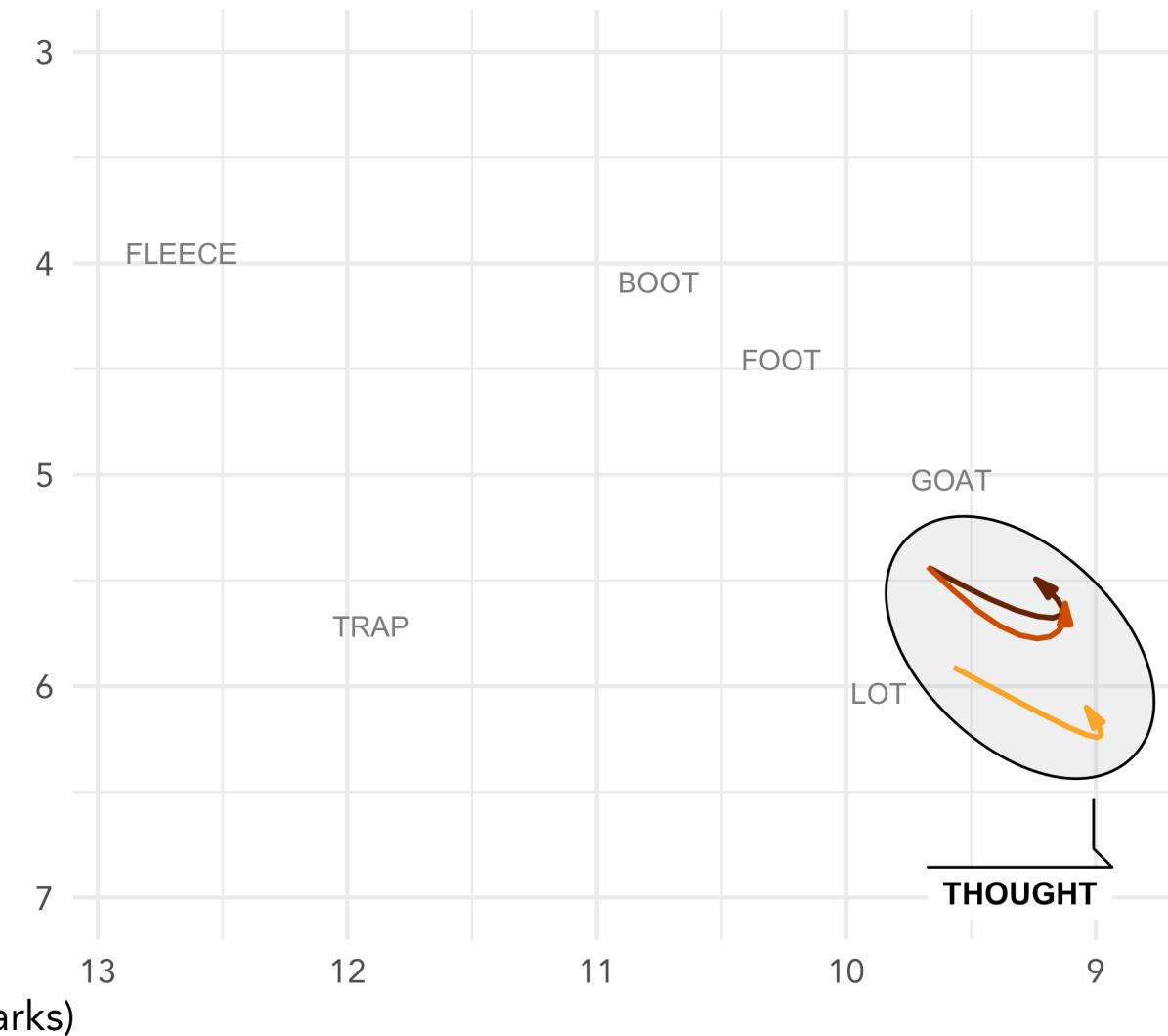
G.I. Generation  
1901–1927  
(n = 19)

Silent/Boomer Generation  
1928–1965  
(n = 12)

## Women



## Men

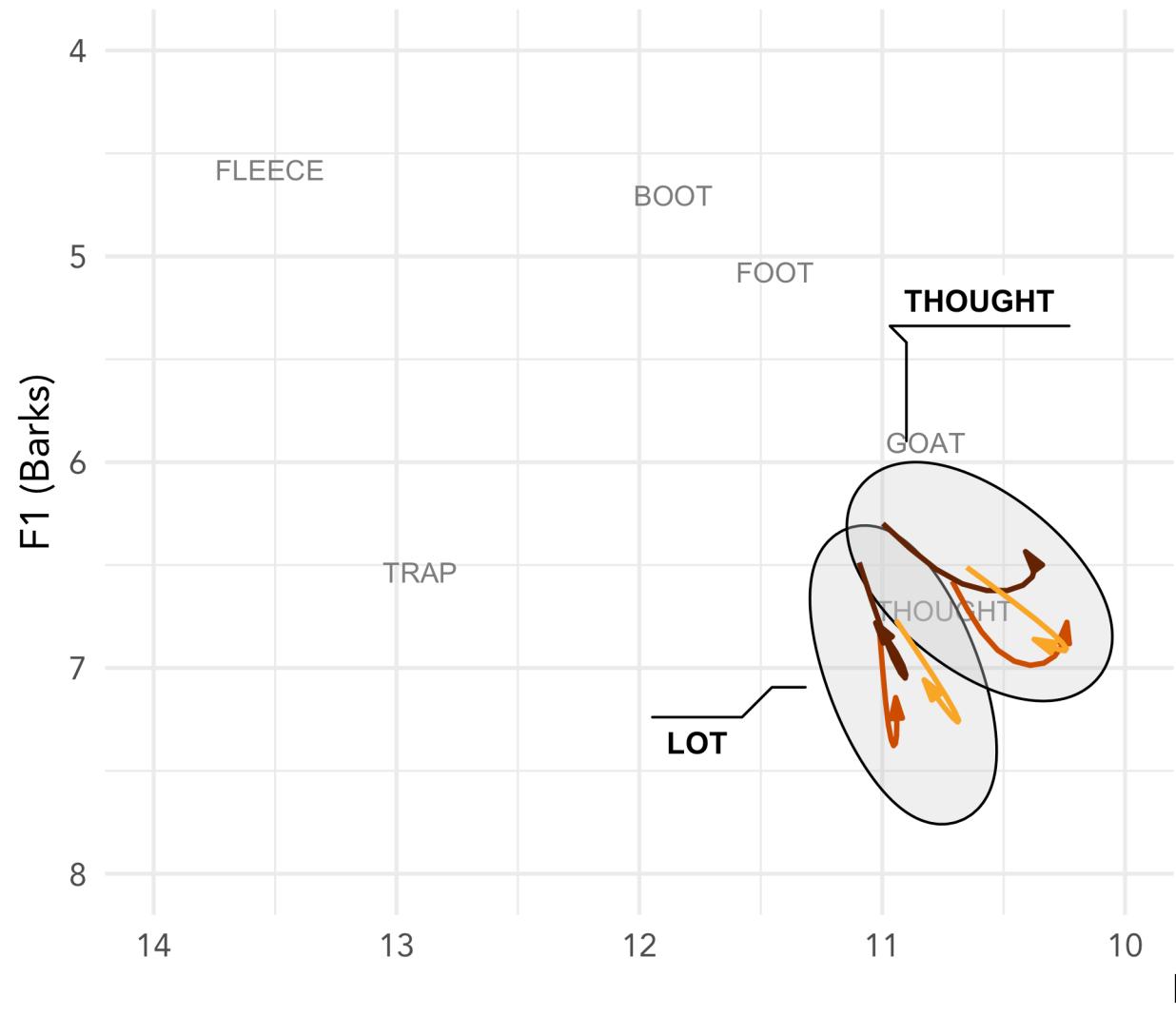


Lost Generation  
1886–1900  
(n = 17)

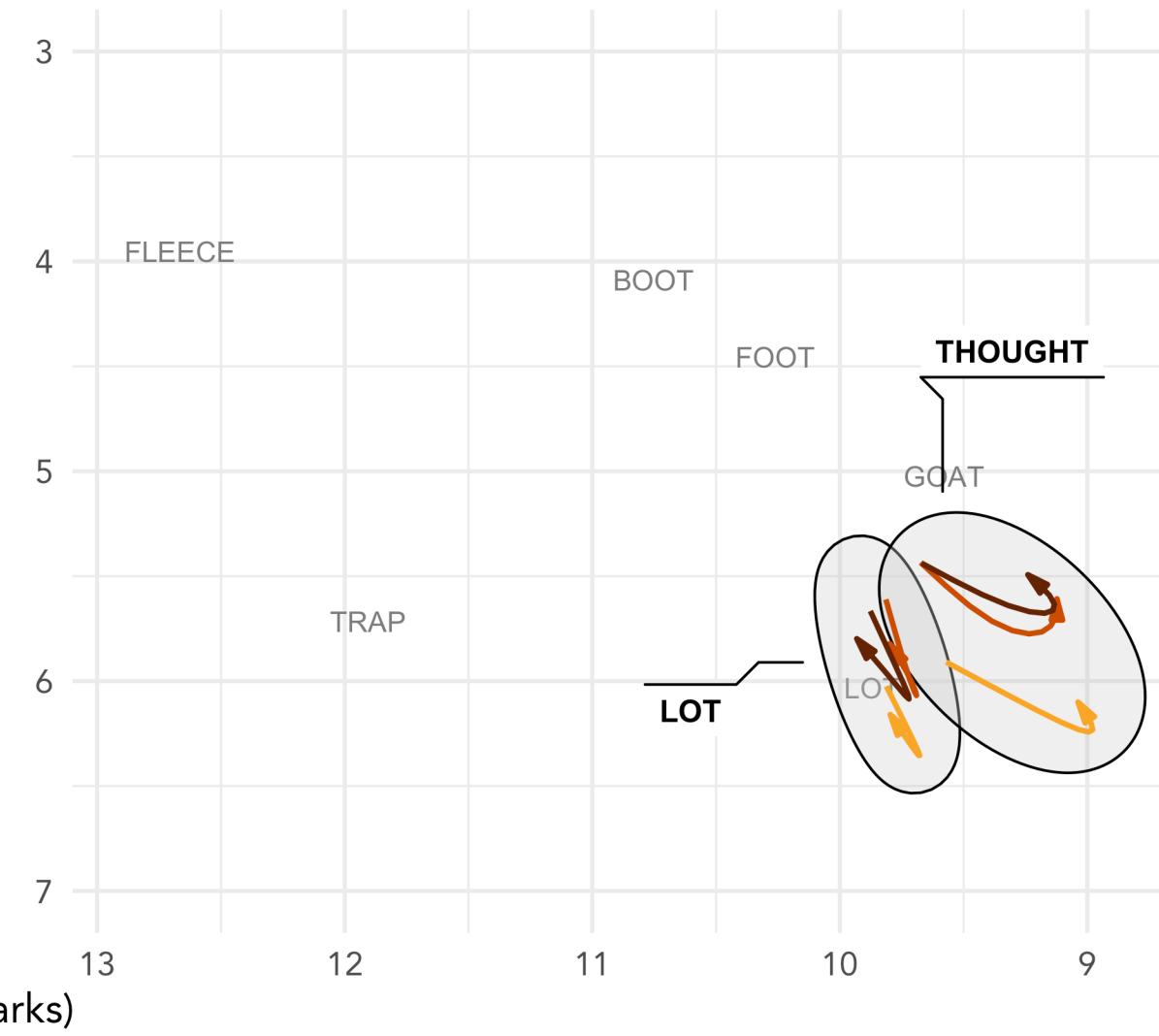
G.I. Generation  
1901–1927  
(n = 19)

Silent/Boom Generation  
1928–1965  
(n = 12)

## Women



## Men

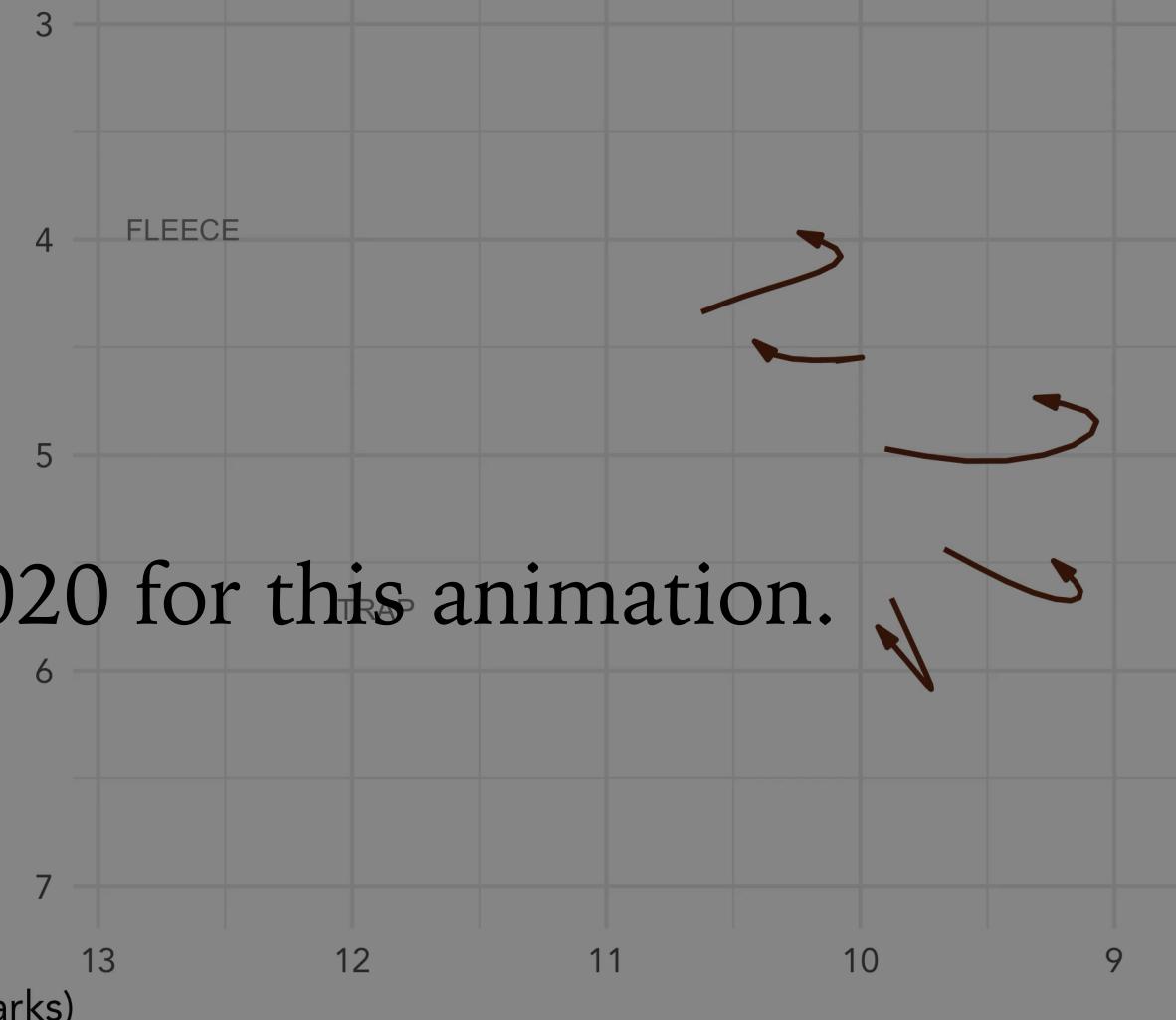


## Women

F1 (Barks)



## Men



Lost Generation  
1886–1900  
(n = 17)

G.I. Generation  
1901–1927  
(n = 19)

Silent/Boom Generation  
1928–1965  
(n = 12)

# Discussion & Conclusion

---

# Summary

---

Acoustic confirmation of impressionistic descriptions

- GOOSE-fronting is old; it was nearly complete by 1900 in these speakers.
  - Data show a completed change for women and a change in progress for men.
- GOAT-fronting is not yet apparent in this sample.
- GOAT-lowering appears to be in progress, and is later than GOOSE-fronting.
- FOOT does not front in parallel with GOOSE, but may parallel GOAT.
- THOUGHT is not clearly upgliding; perhaps closer to [aɒ] (Thomas 2005)
- LOT and THOUGHT have different trajectories and positions in the vowel space.

Within each vowel, we find relatively consistent trajectory shapes.

- Not an artifact of modeling: each vowel/gen/sex combo was fit independently.
- Within DASS, Southern US speakers appear to shift nucleus and glide in tandem.

# References

---

- Fridland, Valerie. 2001. "The Social Dimension of the Southern Vowel Shift: Gender, Age and Class." *Journal of Sociolinguistics* 5(2): 233–253.
- Fridland, Valerie. 2015. "The Spread of the Cot/Caught Merger in the Speech of Memphians: An Ethnolinguistic Marker?" In *New Perspectives on Language Variety in the South: Historical and Contemporary Approaches*, edited by Michael D. Picone and Catherine Evans Davies, 549–64. University of Alabama Press.
- Gahl, Susanne, and R. Harald Baayen. 2019. "Twenty-Eight Years of Vowels: Tracking Phonetic Variation through Young to Middle Age Adulthood." *Journal of Phonetics* 74: 42–54. <https://doi.org/10.1016/j.wocn.2019.02.001>.
- Irons, Terry Lynn. 2007. "On the Status of Low Back Vowels in Kentucky English: More Evidence of Merger." *Language Variation and Change* 19(2): 137–80. <https://doi.org/10.1017/S0954394507070056>.
- Kretzschmar Jr., William A., Paulina Bounds, Jacqueline Hettel, Lee Pederson, Ilkka Jusso, Lisa Lena Opas-Hänninen, and Tapio Seppänen. 2013. "The Digital Archive of Southern Speech (DASS)." *Southern Journal of Linguistics* 27(2): 17–38.
- Kurath, Hans, and Raven Ioor McDavid. 1961. *The Pronunciation of English in the Atlantic States; Based upon the Collections of the Linguistic Atlas of the Eastern United States. Studies in American English*, 3. Ann Arbor, University of Michigan Press.
- Labov, William. 1991. "The Three Dialects of English." In *New Ways of Analyzing Sound Change*, edited by Penelope Eckert, 1–44. San Diego: Academic Press.
- McAuliffe, Michael, Michaela Socolof, Sarah Mihuc, Michael Wagner, and Morgan Sonderegger. 2017. "Montreal Forced Aligner: Trainable Text-Speech Alignment Using Kaldi." *Proceedings of the 18th Conference of the International Speech Communication Association*.
- Olsen, Rachel, Michael Olsen, Joseph A. Stanley, Margaret E. L. Renwick, and William A. Kretzschmar Jr. 2007. "Methods for Transcription and Forced Alignment of a Legacy Speech Corpus." *Proceedings of Meetings on Acoustics* 30(1): 060001. <https://doi.org/10.1121/2.0000559>.
- Margaret E. L. Renwick & Joseph A. Stanley. Forthcoming. "Modeling dynamic trajectories of tense vs. lax vowels in the American South." *Journal of the Acoustical Society of America*.
- Rosenfelder, Ingrid, Josef Fruehwald, Keelan Evanini, Scott Seyfarth, Kyle Gorman, Hilary Prichard, and Jiahong Yuan. 2014. *FAVE (Forced Alignment and Vowel Extraction) Program Suite v1.2.2* (version v1.2.2 10.5281/zenodo.22281).
- Sóskuthy, Márton. 2017. "Generalised Additive Mixed Models for Dynamic Analysis in Linguistics: A Practical Introduction." Manuscript. University of York. <http://arxiv.org/abs/1703.05339>.
- Stanley, Joseph A. 2019. "Real Time Vowel Shifts in Georgia English." presented at the The 6th Annual Linguistics Conference at UGA, Athens, Georgia, October 4.
- Thomas, Erik R. 2005. "Rural White Southern Accents." In *Varieties of English: The Americas and the Caribbean*, edited by E. W. Schneider, 87–114. Berlin: Mouton de Gruyter.
- Thomas, Erik R. 2007. "Phonological and Phonetic Characteristics of African American Vernacular English." *Language and Linguistics Compass* 1(5): 450–75. <https://doi.org/10.1111/j.1749-818X.2007.00029.x>.
- Thomas, Erik R. and Elizabeth L. Coggshall. 2014. "Comparing Phonetic Characteristics of African American and European American Speech." *Linguistica Atlantica* 27: 112–116.
- Wood, Simon N. 2017. *Generalized Additive Models: An Introduction with R*. 2nd ed. Chapman and Hall/CRC. <https://doi.org/10.1201/9781420010404>.

Joey Stanley

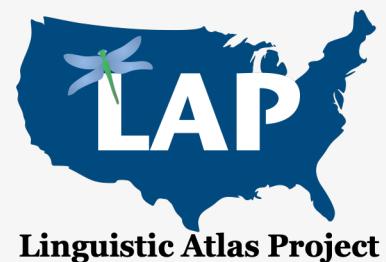
joeystan@uga.edu  
@joey\_stan

Margaret E. L. Renwick

mrenwick@uga.edu

Special thanks to Rachel Olsen and Katie Kuiper

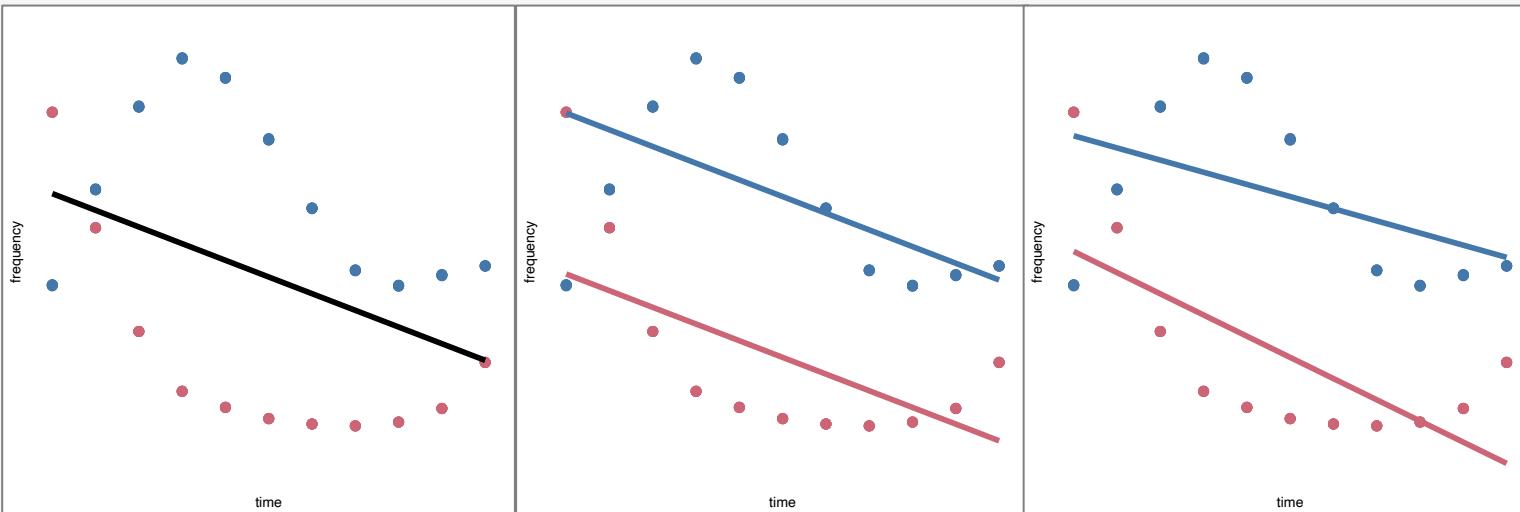
This slideshow available at  
[joeystanley.com/lsa2020](http://joeystanley.com/lsa2020)



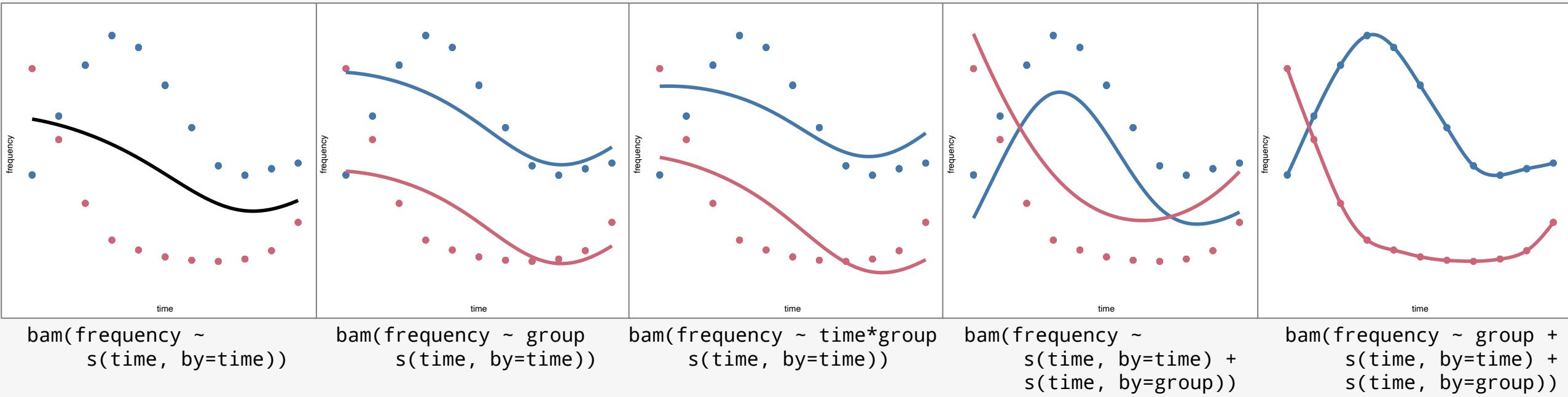
# Bonus Slides

---

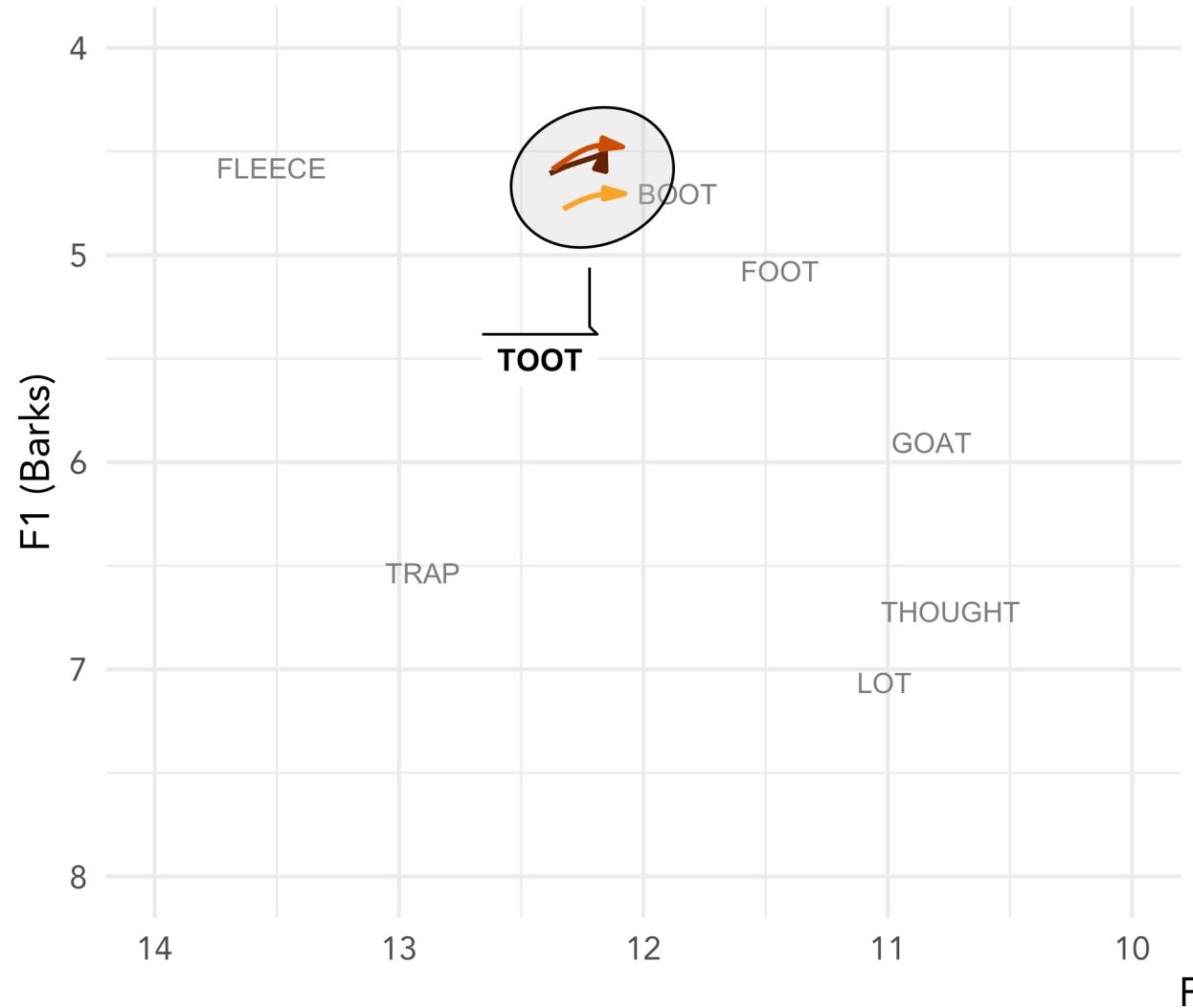
◀ Linear mixed-effects models



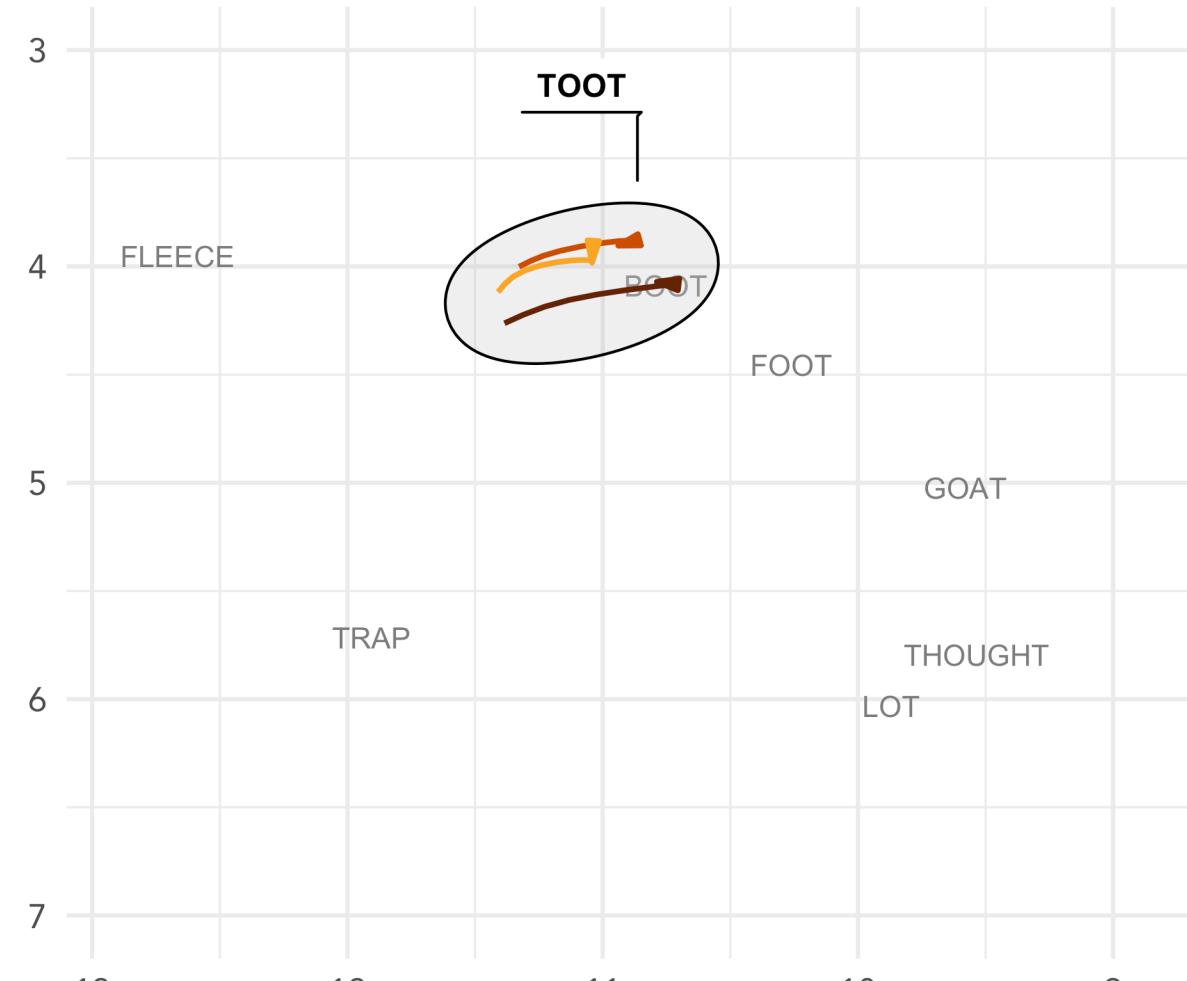
▼ Generalized additive mixed-effects models



## Women



## Men

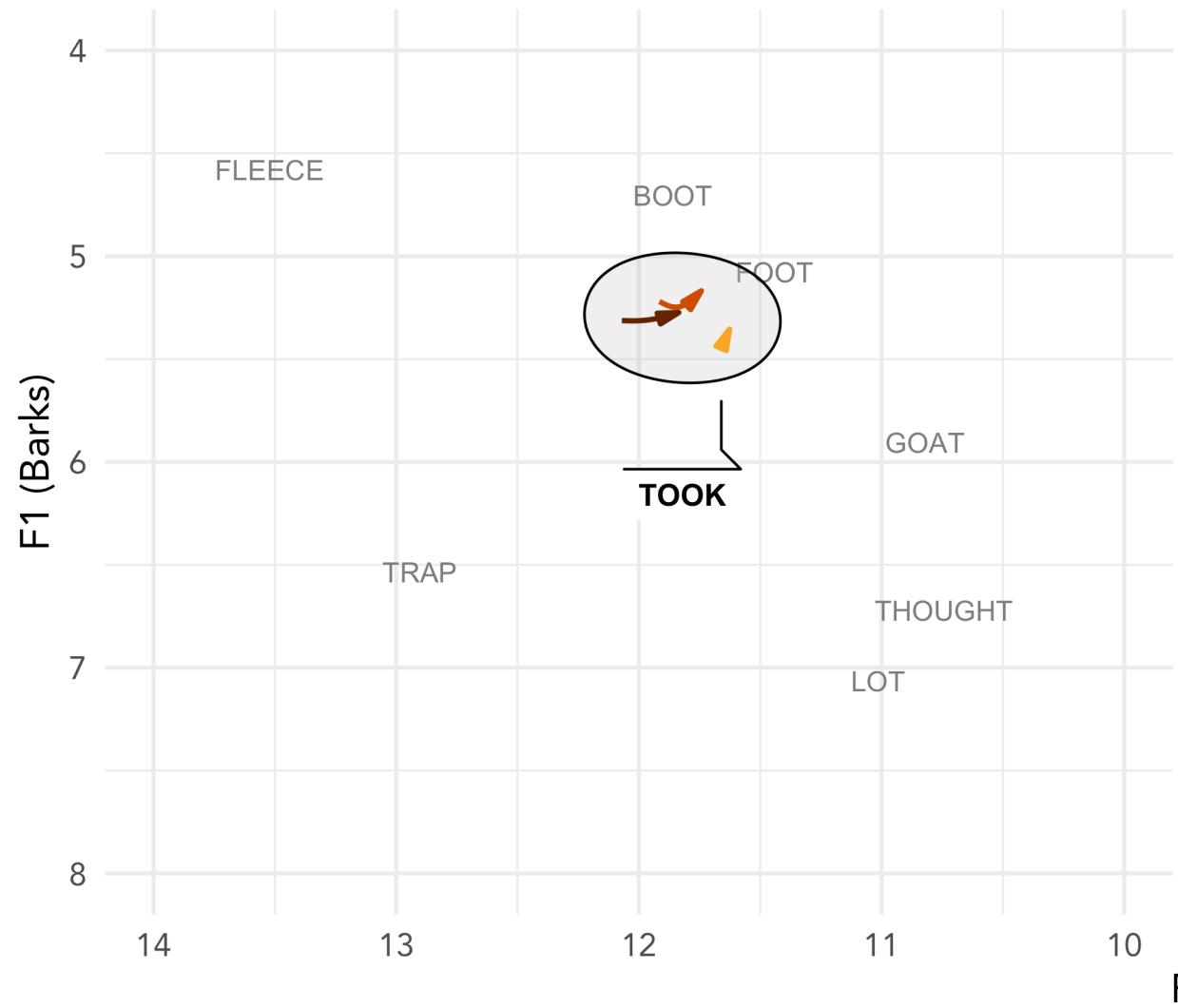


Lost Generation  
1886–1900  
(n = 17)

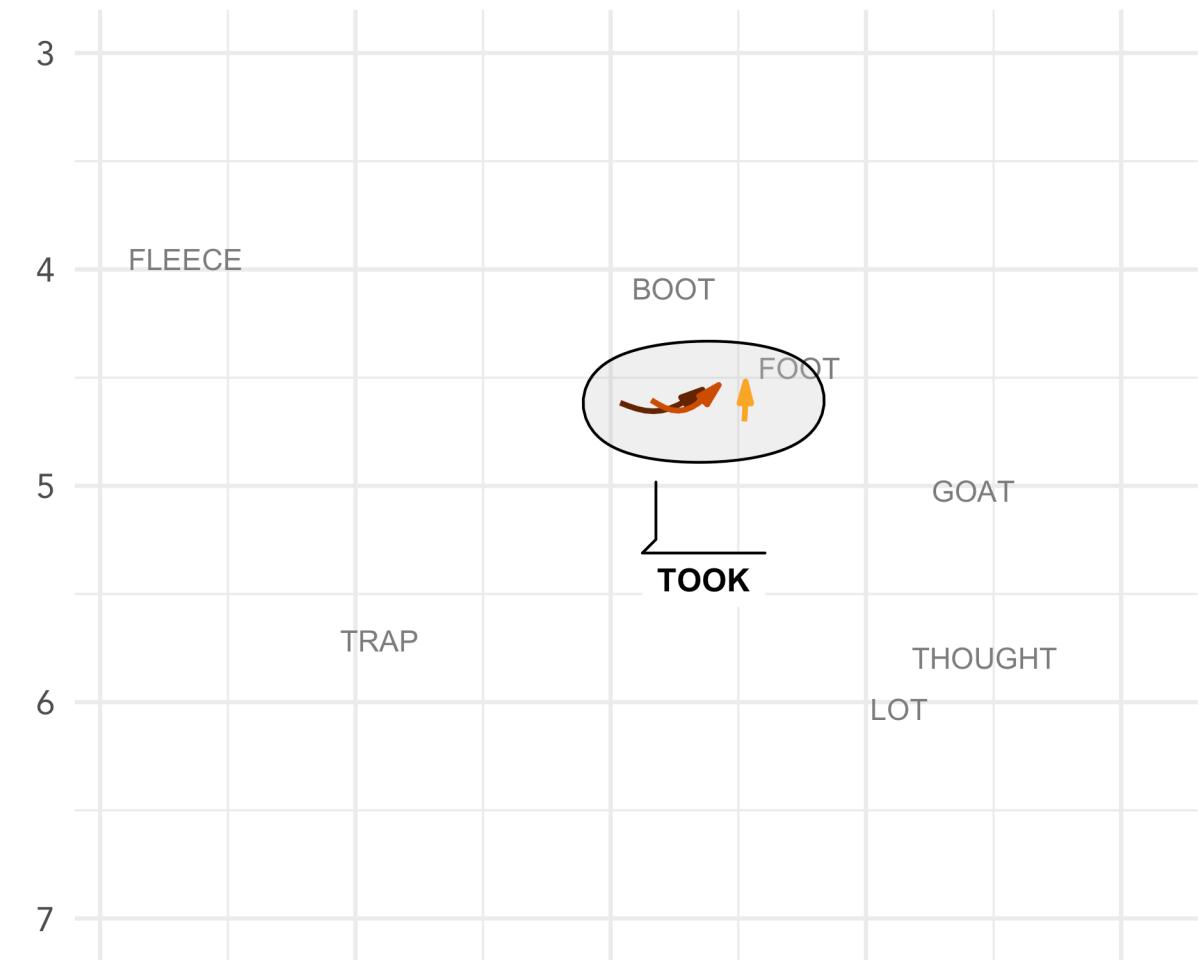
G.I. Generation  
1901–1927  
(n = 19)

Silent/Boomer Generation  
1928–1965  
(n = 12)

## Women



## Men



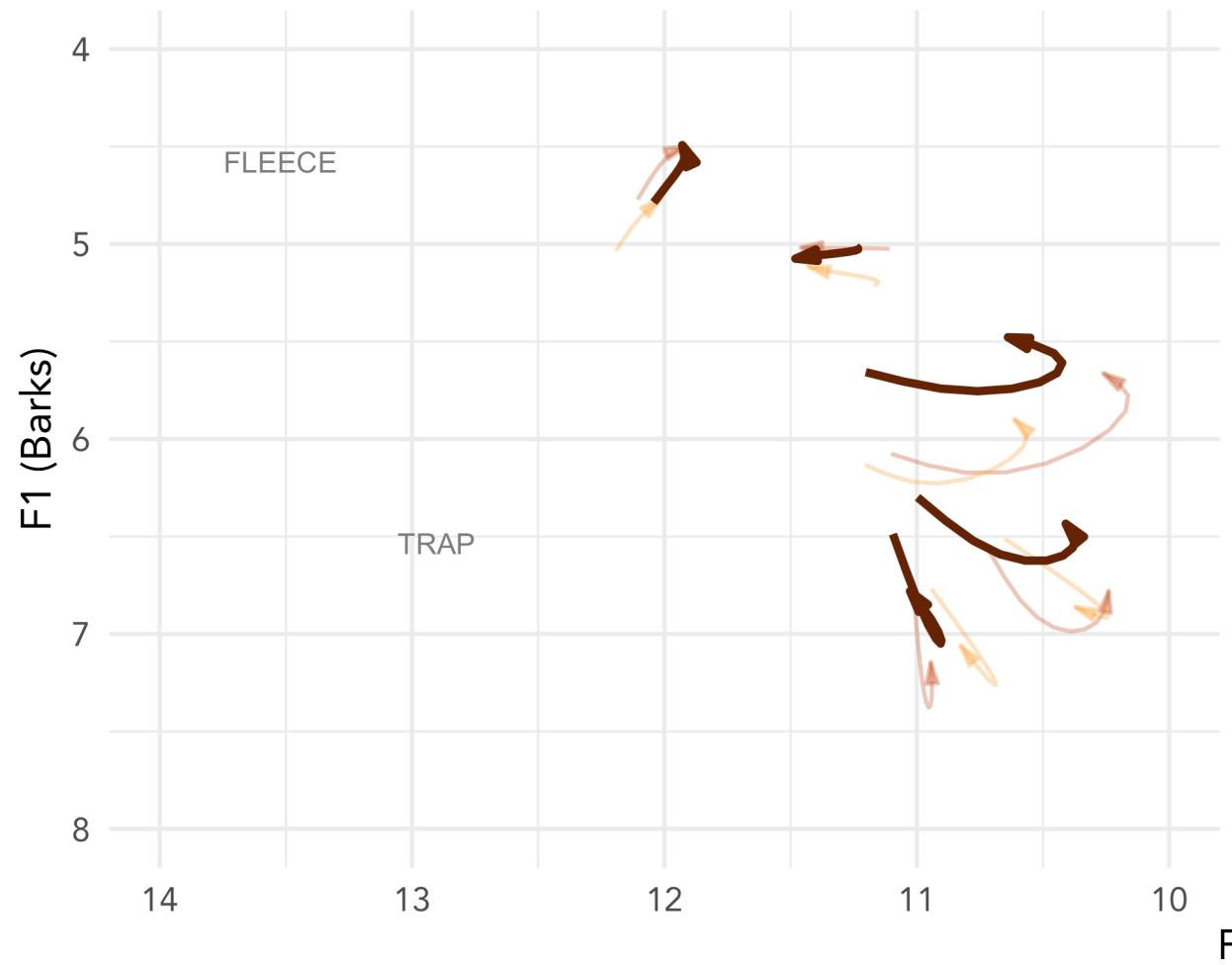
Lost Generation  
1886–1900  
(n = 17)

G.I. Generation  
1901–1927  
(n = 19)

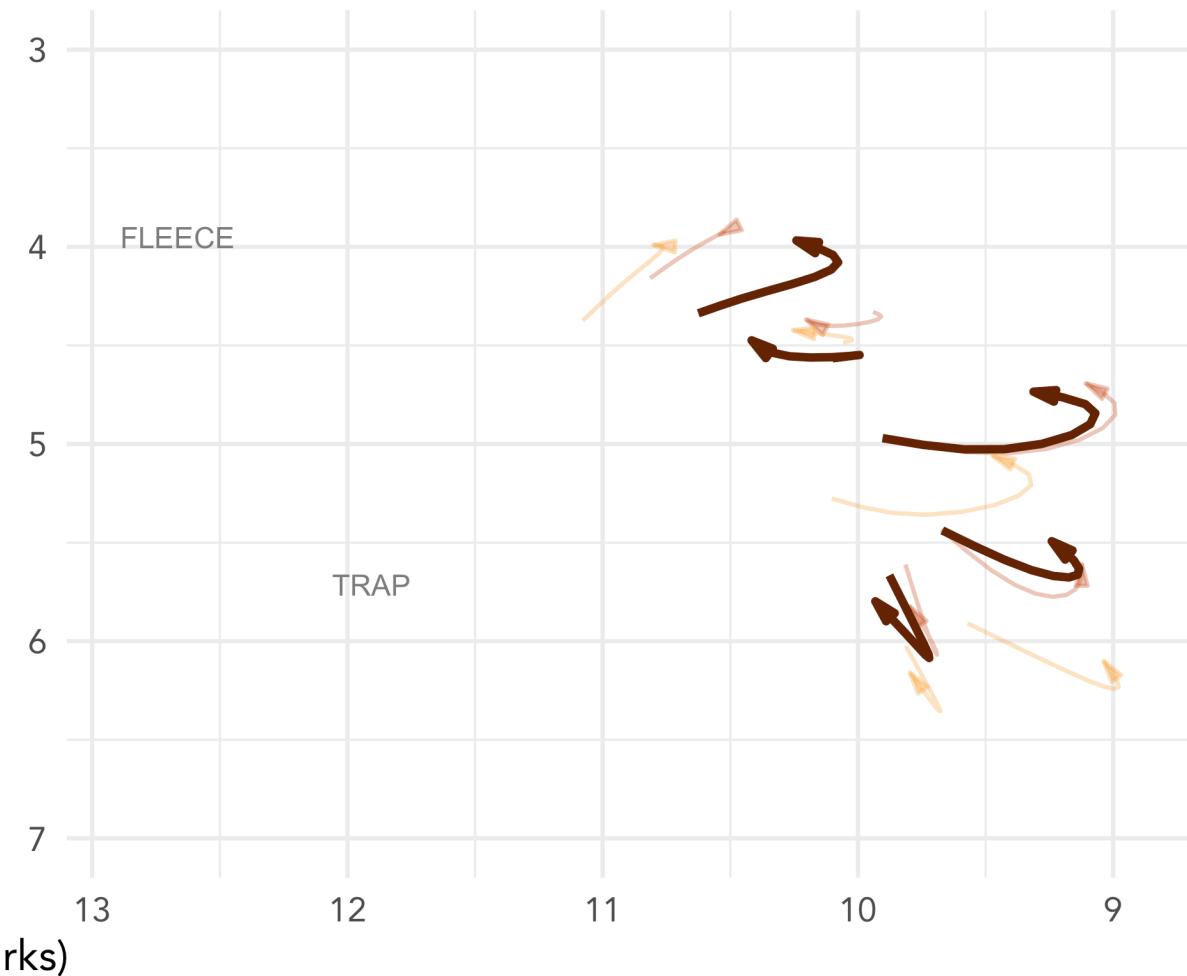
Silent/Boom Generation  
1928–1965  
(n = 12)

# Lost Generation (1886–1900)

Women



Men



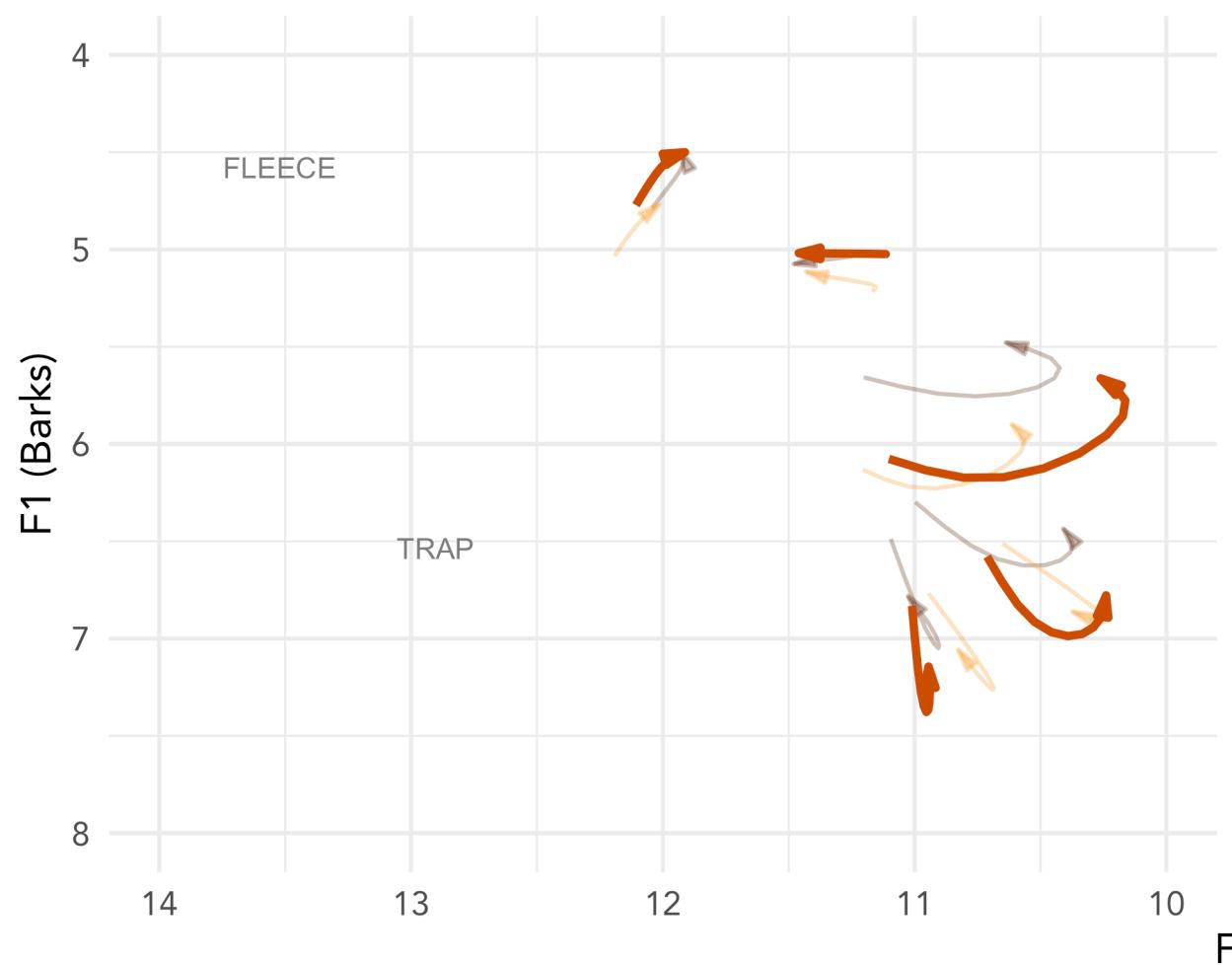
Lost Generation  
1886–1900  
(n = 17)

G.I. Generation  
1901–1927  
(n = 19)

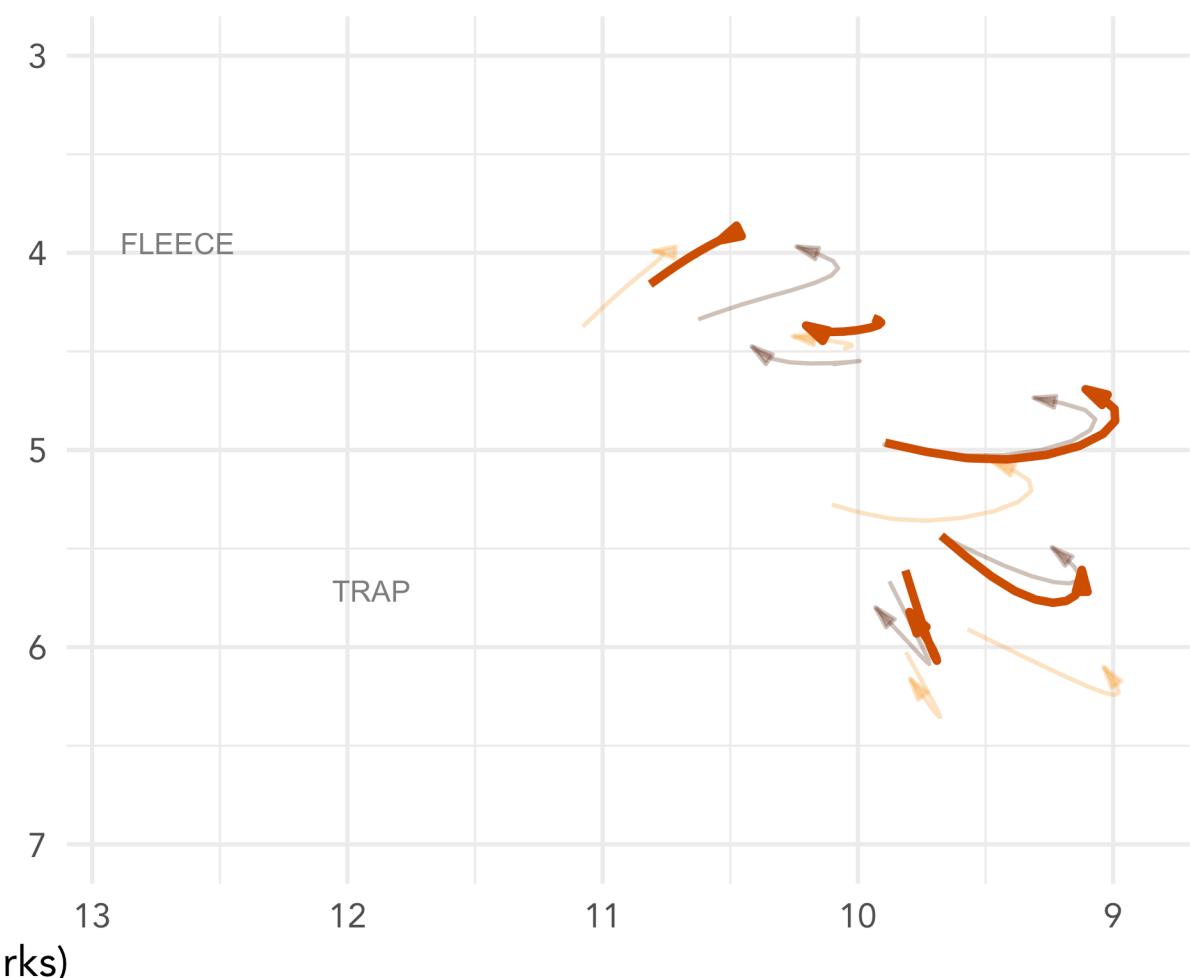
Silent/Boom Generation  
1928–1965  
(n = 12)

# G.I. Generation (1901–1927)

Women



Men



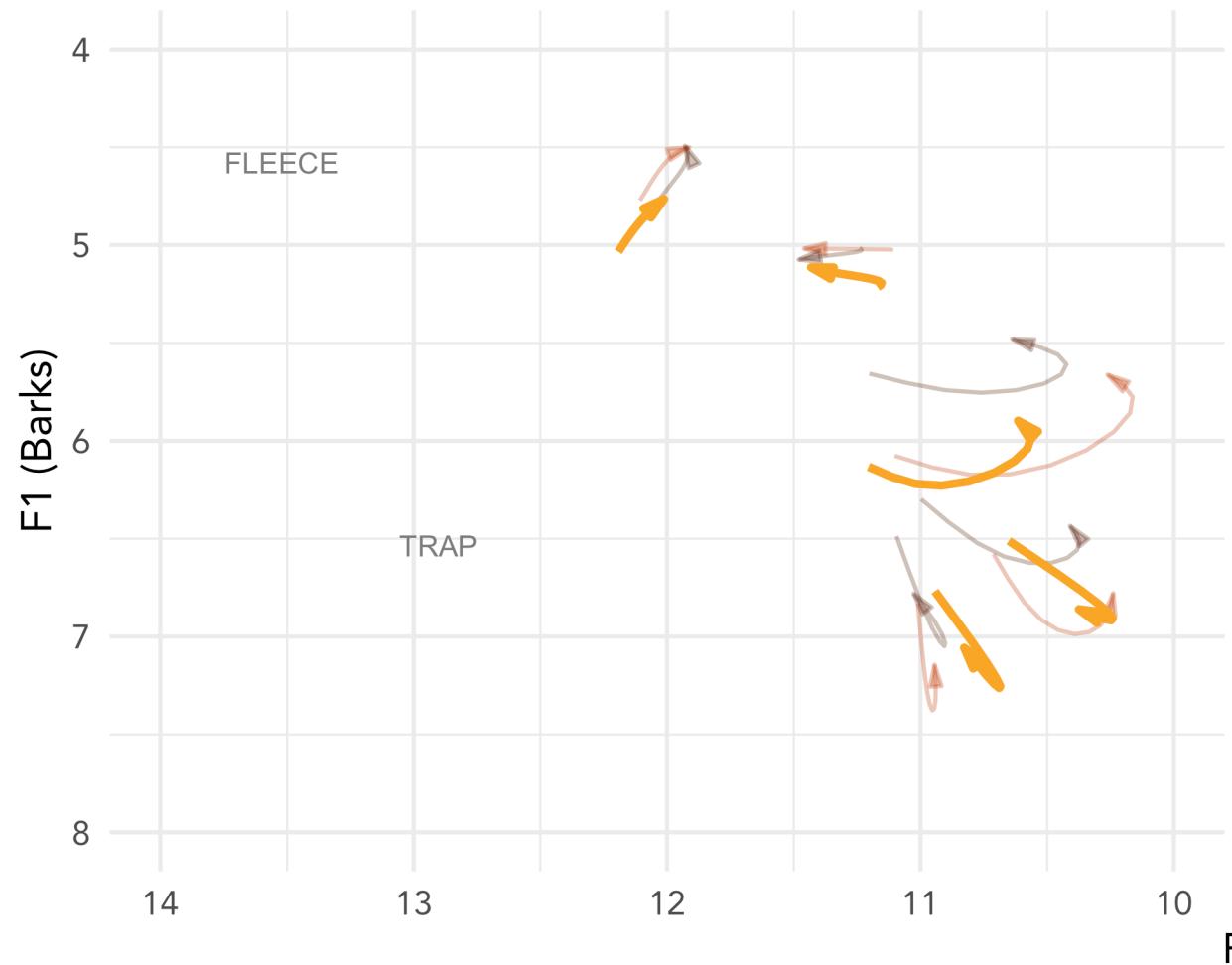
Lost Generation  
1886–1900  
(n = 17)

G.I. Generation  
1901–1927  
(n = 19)

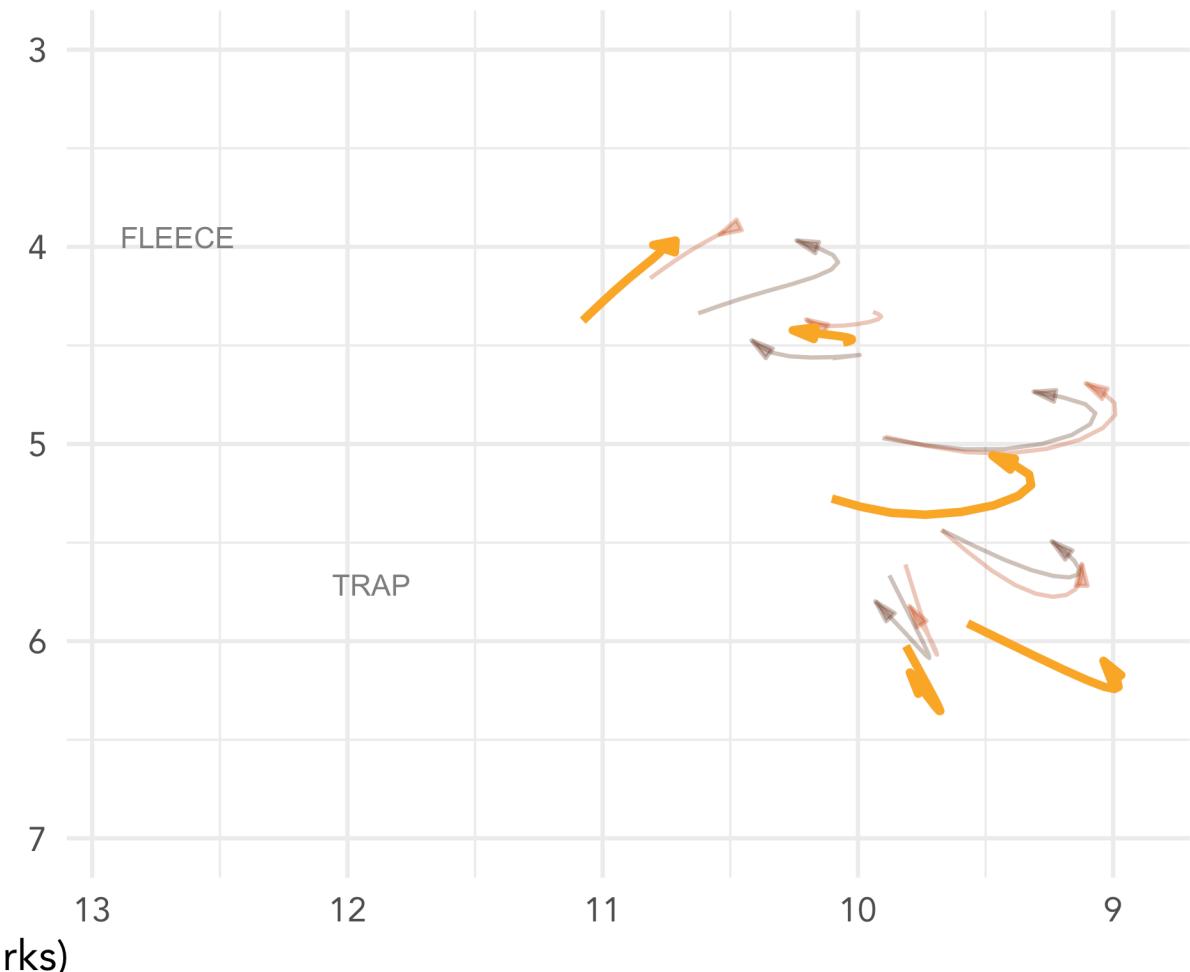
Silent/Boomer Generation  
1928–1965  
(n = 12)

# Silent/Boom Generation (1928–1965)

Women



Men



Lost Generation  
1886–1900

(n = 17)

G.I.

Generation

(n = 19)

Silent/Boom Generation  
1928–1965

(n = 12)