

# A [ʃ]triking change in Manchester English

UKLVC12

4 September 2019

George Bailey

*University of York*

Stephen Nichols

*University of Manchester*

Maciej Baranowski

*University of Manchester*

Danielle Turton

*Lancaster University*

# WHAT IS S-RETRACTION?

**S-retraction:** a process which turns /s/ into a more [ʃ]-like sound

- attested in /st/ clusters in various positions:

word-initially

e.g. [ʃ]treet

word-medially

e.g. di[ʃ]trict

word-finally

e.g. cla[ʃ] trip



# WHAT IS S-RETRACTION?

**S-retraction:** a process which turns /s/ into a more [ʃ]-like sound

- attested in /st/ clusters in various positions:

word-initially

e.g. [ʃ]treet

word-medially

e.g. di[ʃ]trict

word-finally

e.g. cla[ʃ] trip



like a — a [ʃ]tray  
hair on my — my  
clothing

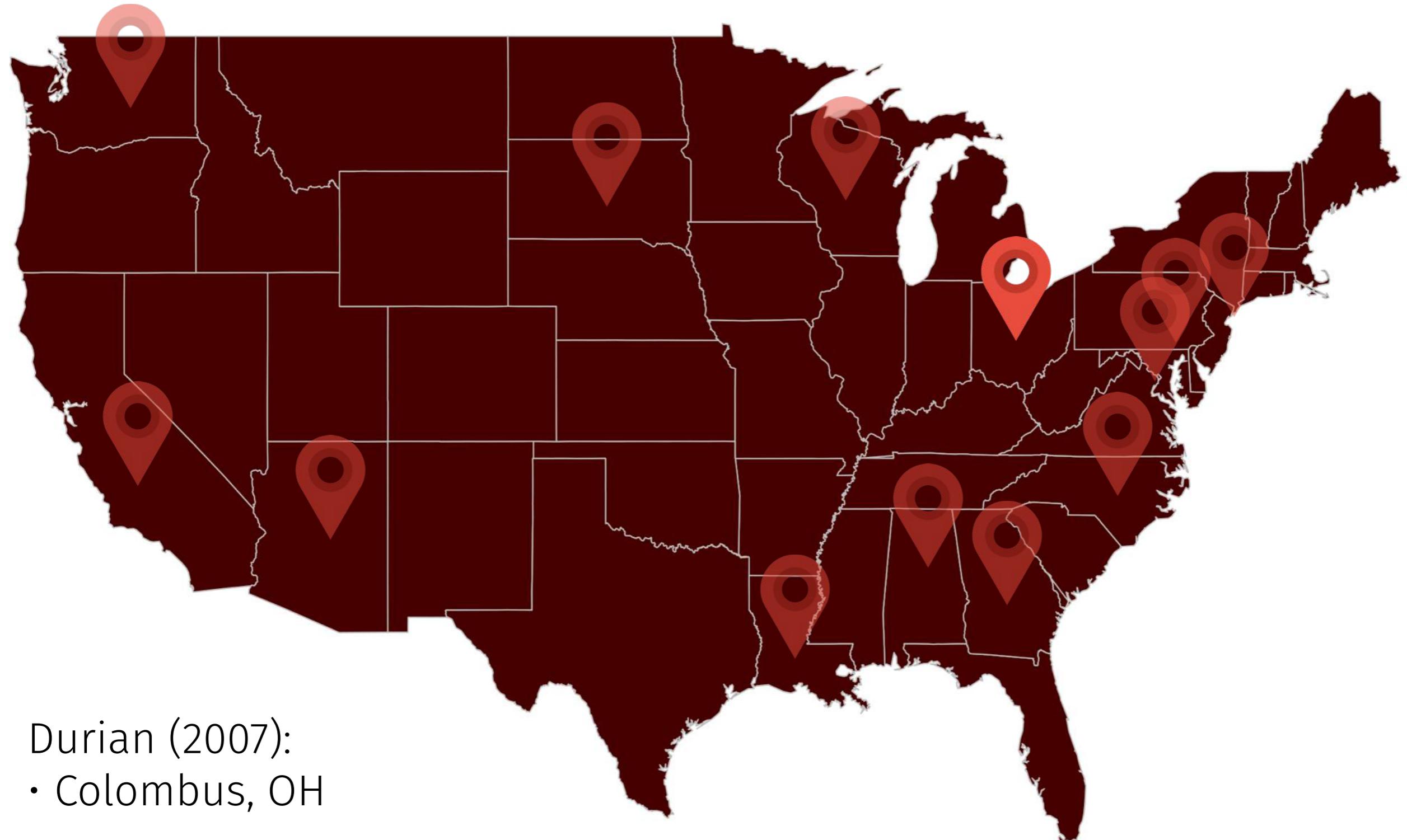
[s]

[ʃ]

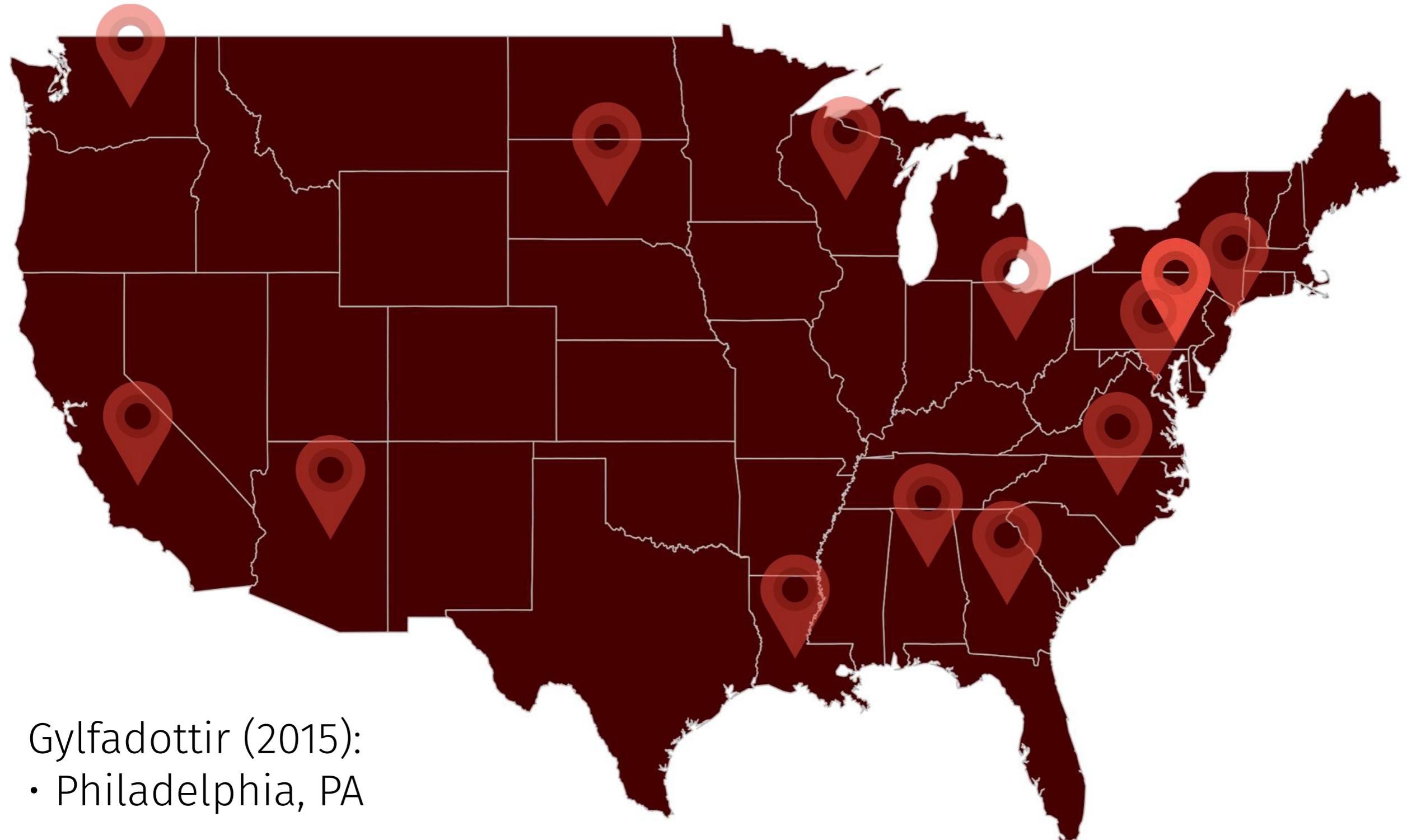
# WHAT IS S-RETRACTION?

2019	Individual differences and sound change actuation: evidence from imitation and perception of English /str/	Stevens & Loakes
2019	Large-scale acoustic analysis of dialectal and social factors in English /s/-retraction.	Stuart-Smith et al.
2019	Associating the origin and spread of sound change using agent-based modelling applied to /s/-retraction in English.	Stevens, Harrington & Schiel
2019	Sound change and coarticulatory variability involving English /ɹ/.	Smith et al.
2019	Listeners' social attributes influence sensitivity to coarticulation in the perception of sibilants in nonce words.	Phillips & Resnick
2018	Back to Bins- a mixed-methods reevaluation of categorization in sociophonetics.	Ahlers
2018	Revealing covert articulation in s-retraction	Nichols & Bailey
2018	A midsagittal ultrasound tongue imaging study to investigate the degree of /s/-retraction in /stɹ/ onset clusters in British English	Wilson
2017	Social and Structural Constraints on a Phonetically-Motivated Change in Progress: (str) Retraction in Raleigh, NC	Wilbanks
2017	In situ perspectives on retraction – Austinites on Troublemaker Shtreet	Ahlers & Bergs
2017	A corpus and articulatory study of covert articulatory variation and its phonological consequences in Raleigh, NC English	Mielke, Smith & Fox
2016	Sibilants and ethnic diversity: A sociophonetic study of palatalized /s/ in STR clusters among Hispanic, White, and African-American speakers of Texas and Pittsburgh English	Hinrichs et al.
2016	The phonetic origins of s-retraction: Acoustic and perceptual evidence from Australian English	Stevens & Harrington
2016	An Apparent Time Study of (str) Retraction and /tɹ/ - /dɹ/ Affrication in Raleigh, NC English	Magloughlin & Wilbanks
2016	Phonological and prosodic conditioning of /s/-retraction in American English	Phillips
2015	Shtreets of Philadelphia: An Acoustic Study of /str/-retraction in a Naturalistic Speech Corpus	Gylfadottir
2013	STR-palatalisation in Edinburgh accent: A sociophonetic study of a sound change in progress	Sollgan
2011	Variability in American English s-retraction suggests a solution to the actuation problem	Baker, Archangeli & Mielke
2011	Acoustic analysis of a sound change in progress: The consonant cluster /stɹ/ in English	Rutter
2010	Variability and homogeneity in American English /ɹ/ allophony and /s/ retraction	Mielke, Baker & Archangeli
2009	Street or shtreet? Investigating (str-) palatalisation in Colchester English	Bass
2007	Getting [ʃ]tronger Every Day?: More on Urbanization and the Socio-geographic Diffusion of (str) in Columbus, OH	Durian
2003	/s/-retraction in the ViC corpus	Armstrong
2000	/str/ → /ʃtr/: Assimilation at a distance?	Lawrence
1995	A case of distant assimilation: /str/ → /ʃtr/	Shapiro

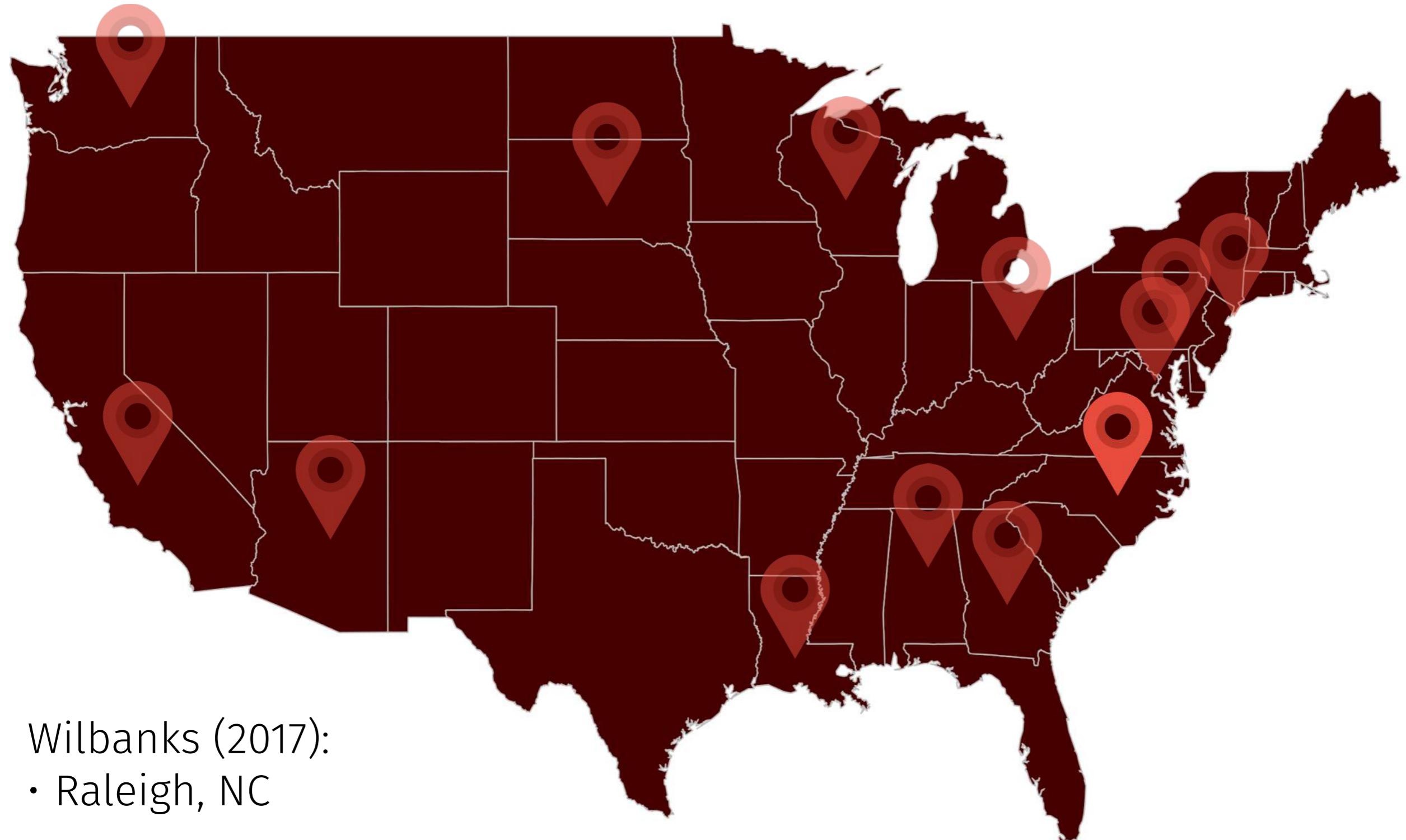
# GEOGRAPHIC SPREAD



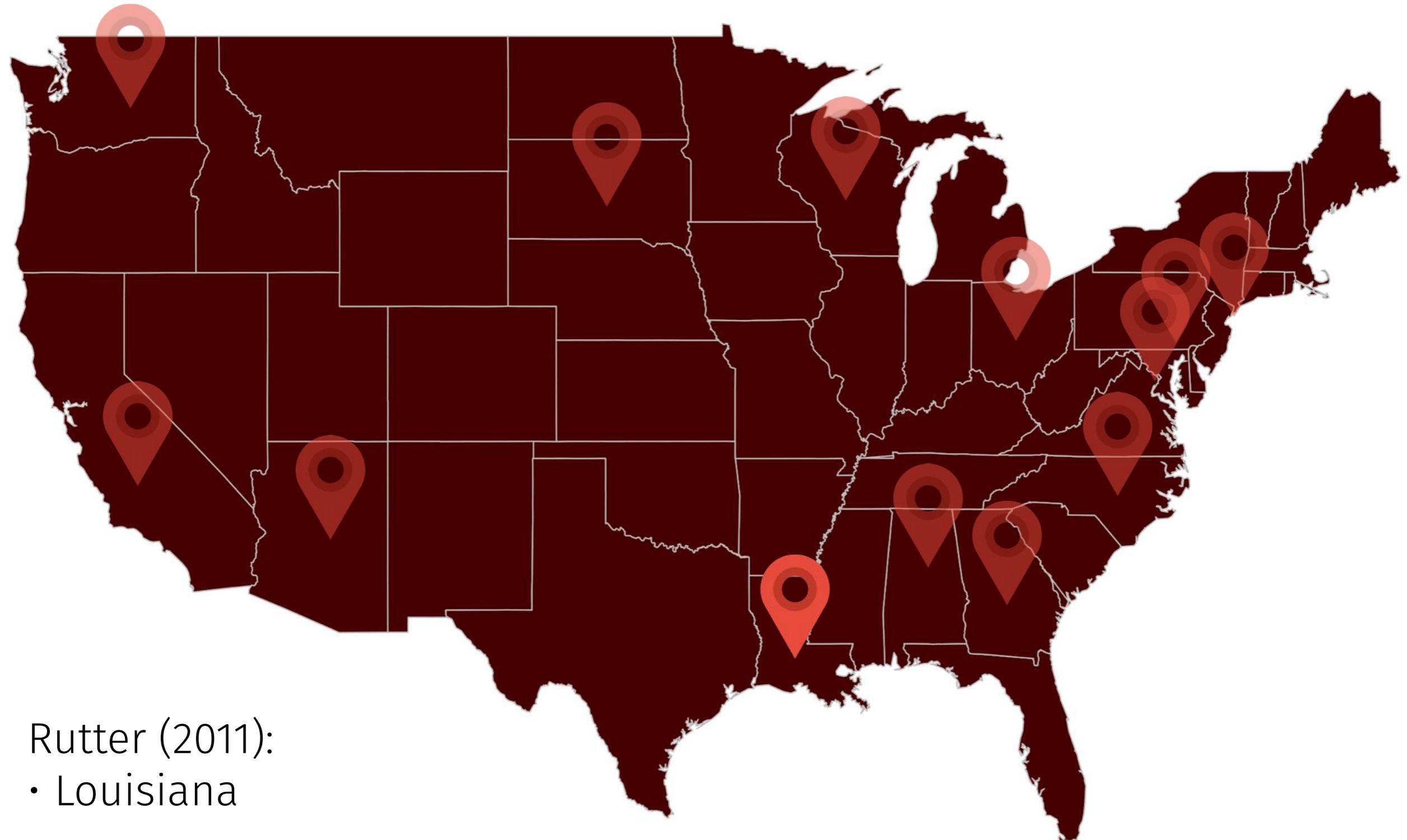
# GEOGRAPHIC SPREAD



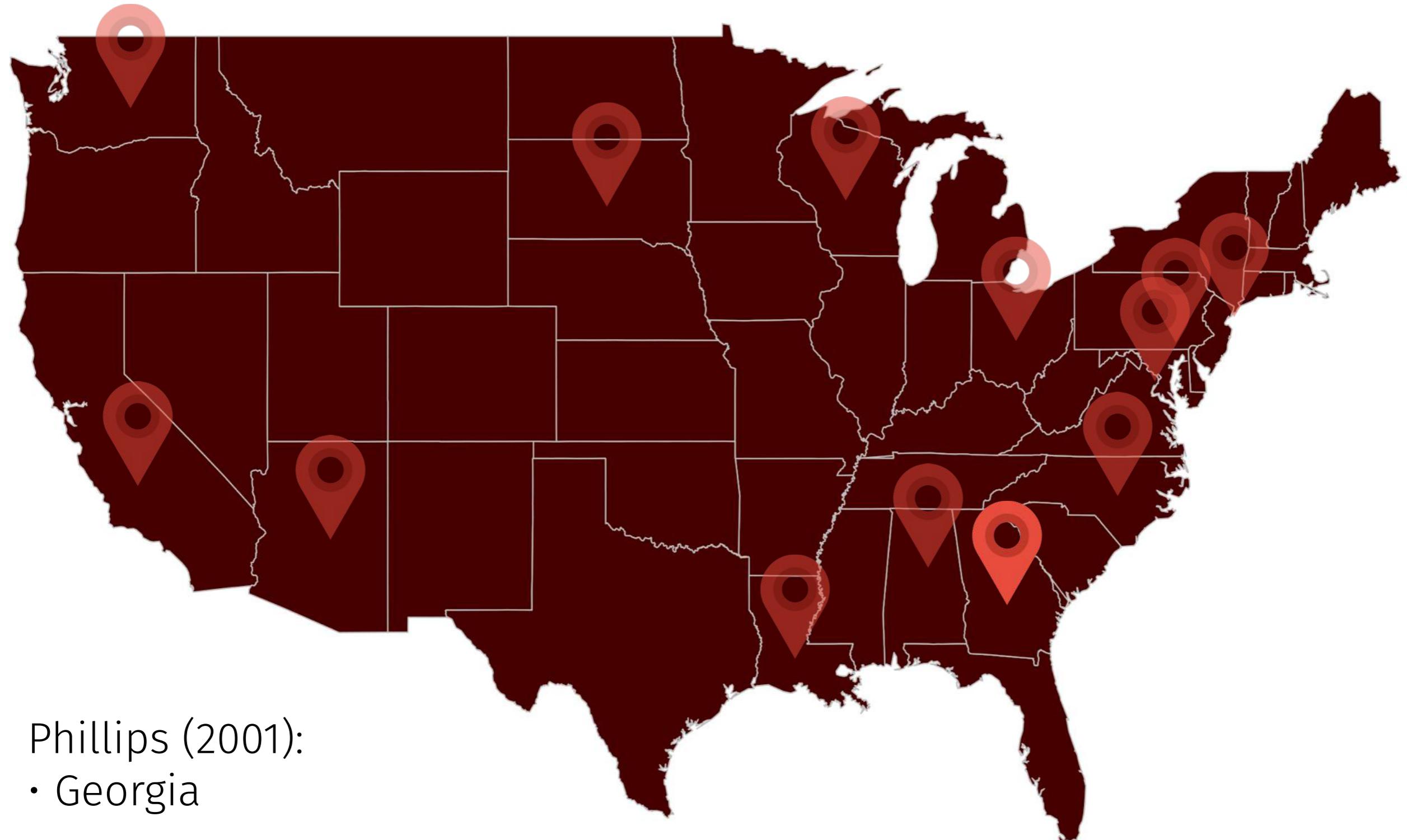
# GEOGRAPHIC SPREAD



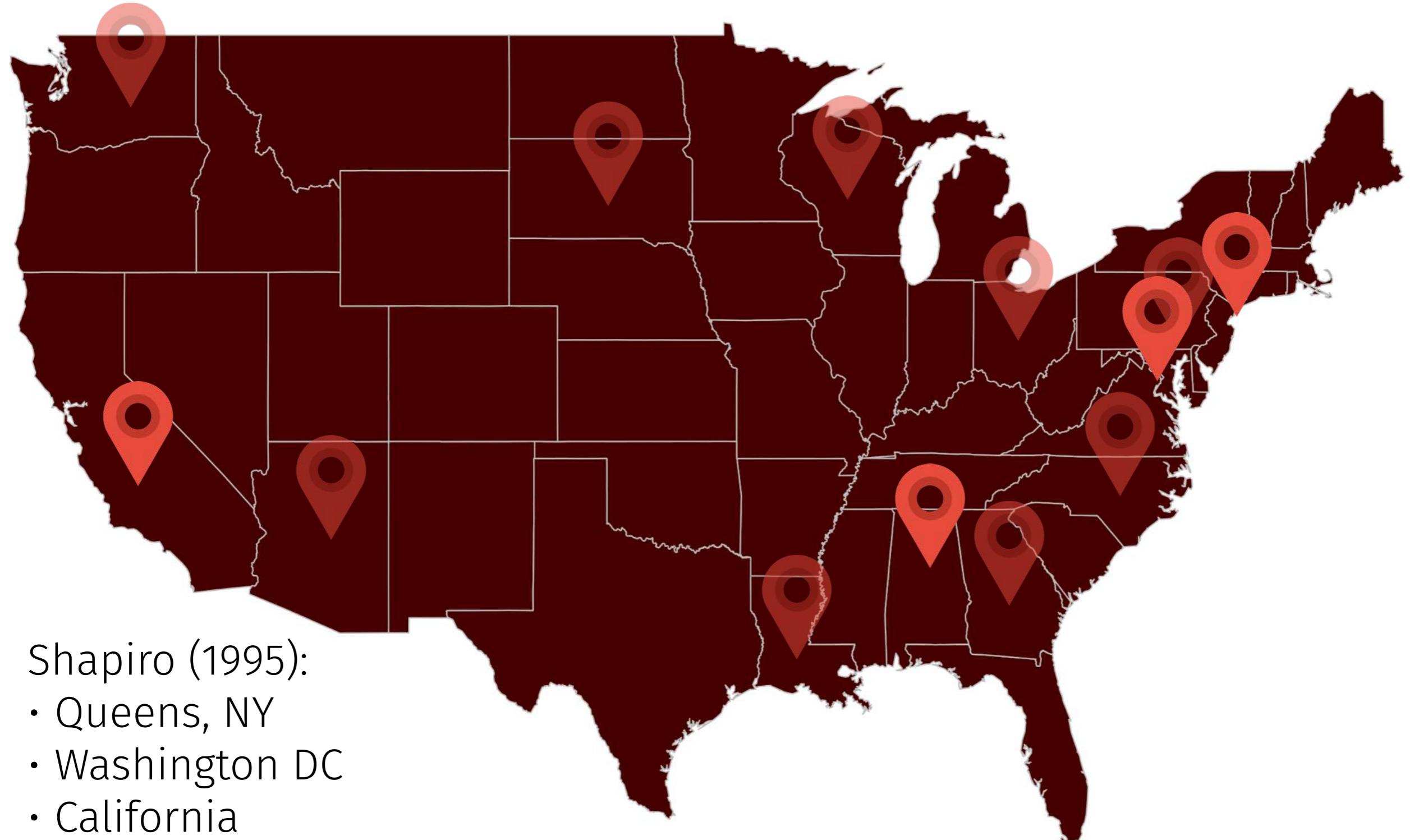
# GEOGRAPHIC SPREAD



# GEOGRAPHIC SPREAD



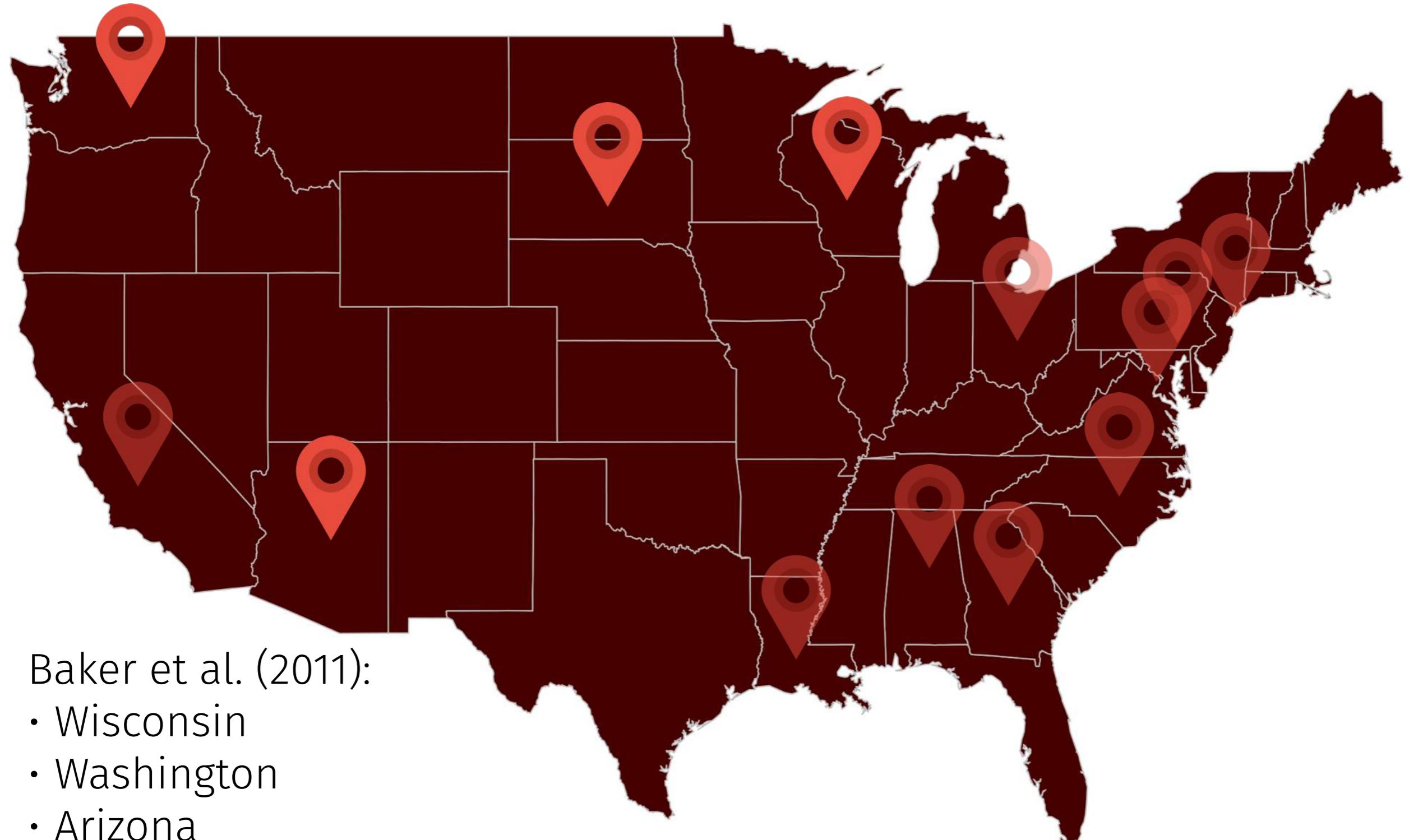
# GEOGRAPHIC SPREAD



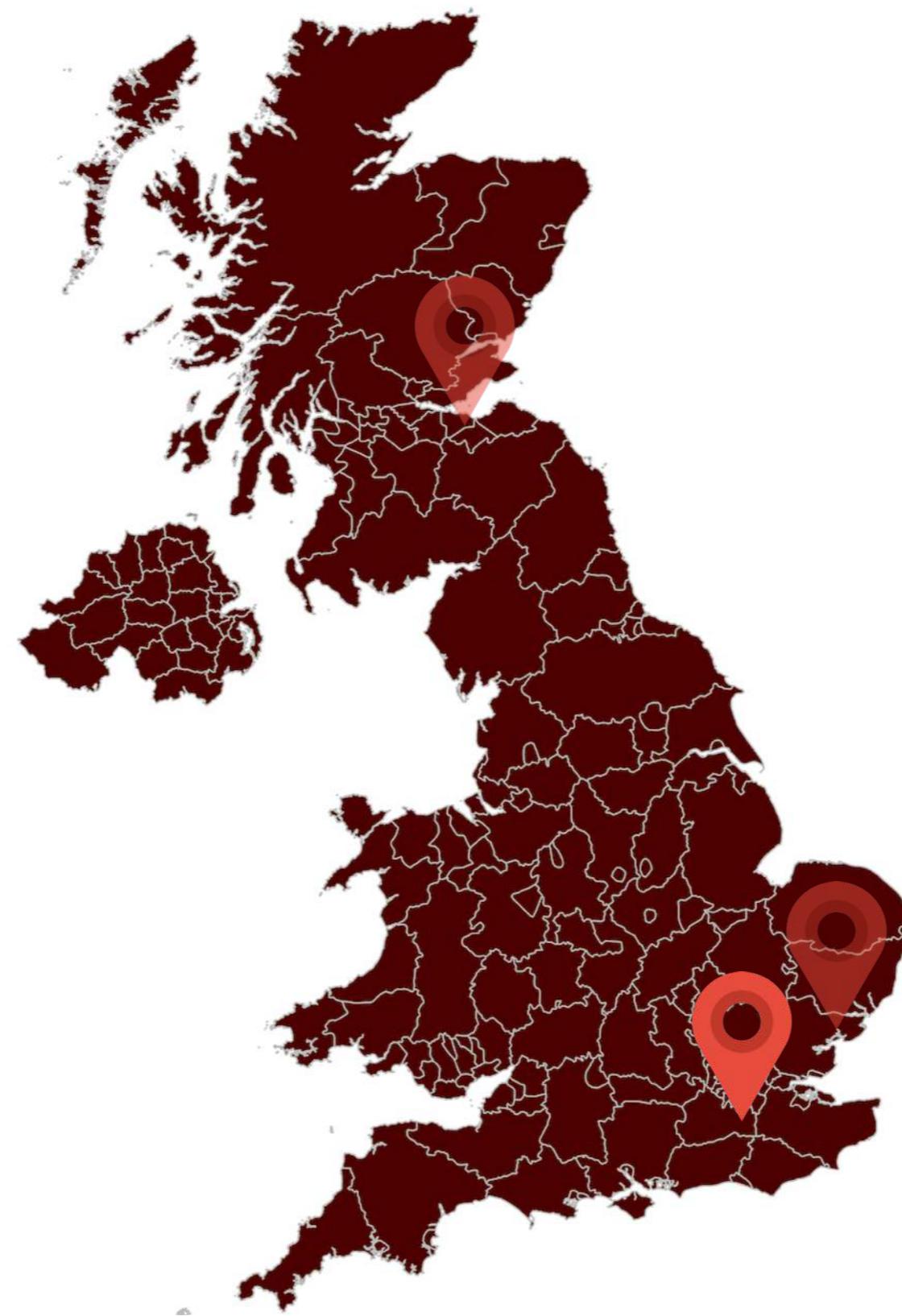
Shapiro (1995):

- Queens, NY
- Washington DC
- California
- Birmingham, AL

# GEOGRAPHIC SPREAD

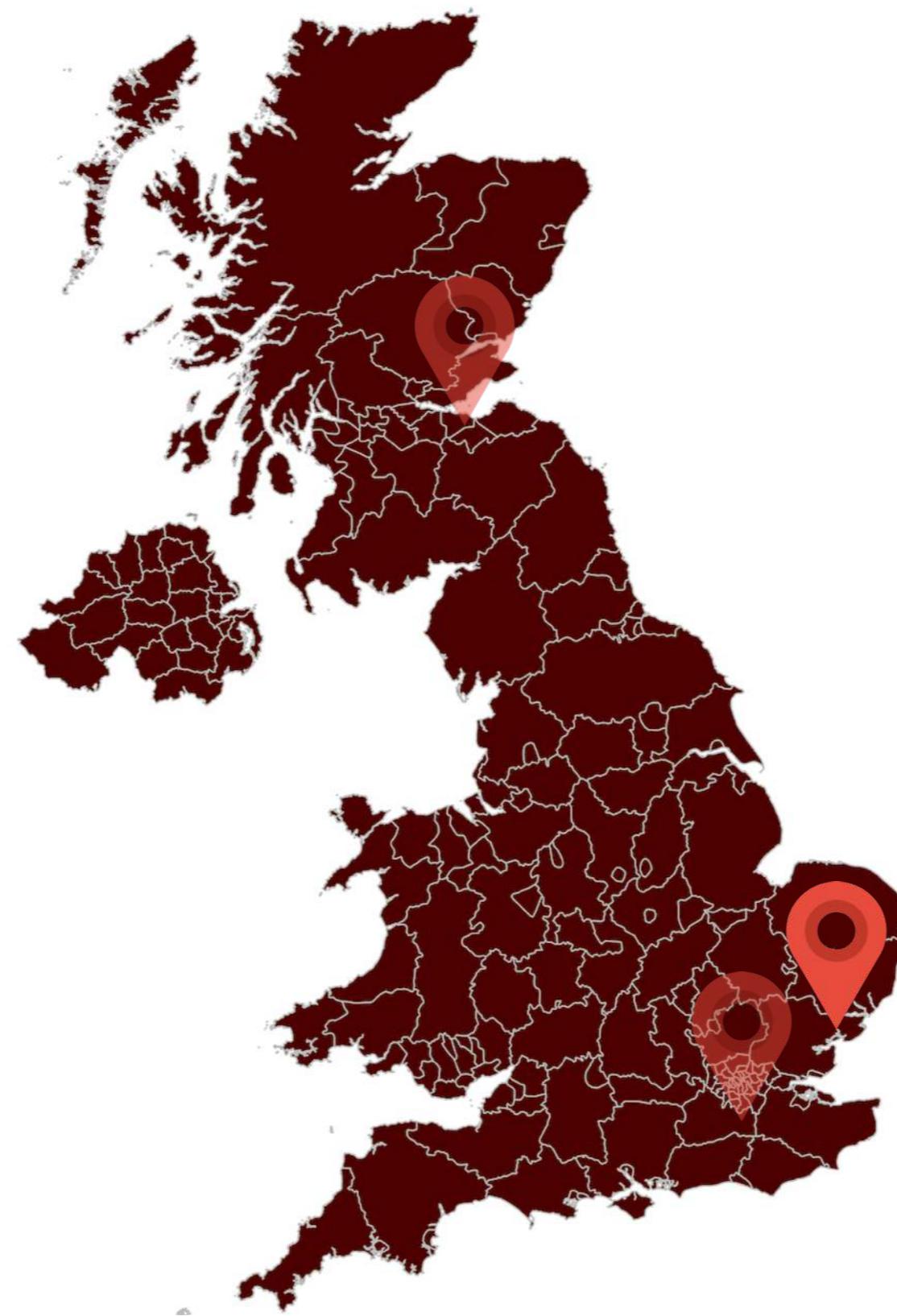


# GEOGRAPHIC SPREAD



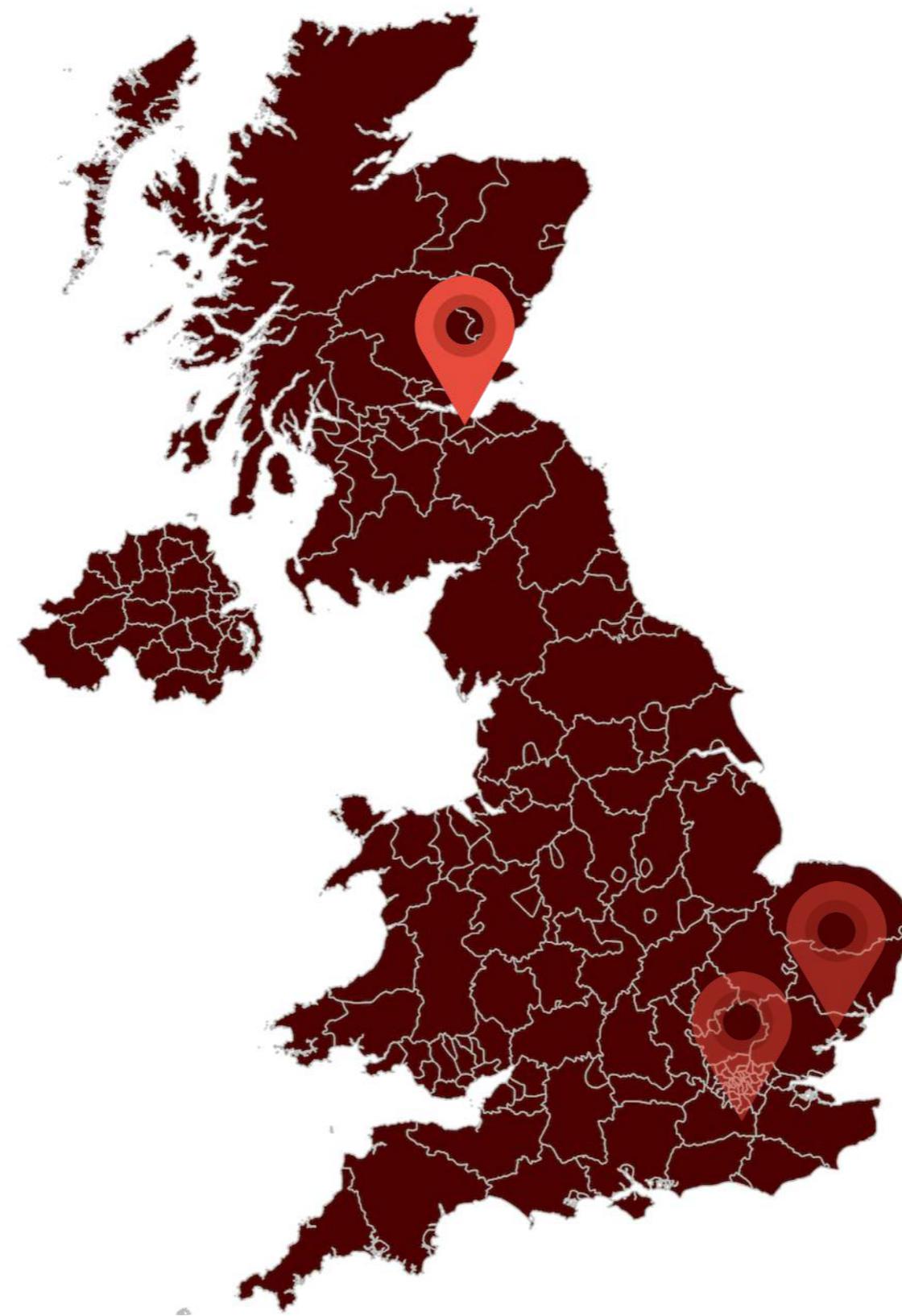
Altendorf (2003):  
• Estuary English

# GEOGRAPHIC SPREAD



Bass (2009):  
• Colchester

# GEOGRAPHIC SPREAD



Sollgan (2013):  
• Edinburgh

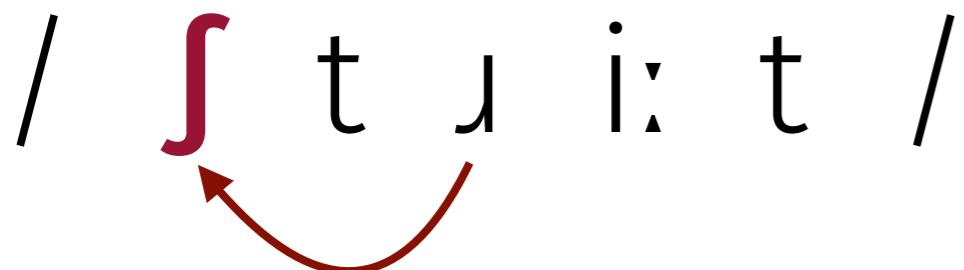
# GEOGRAPHIC SPREAD



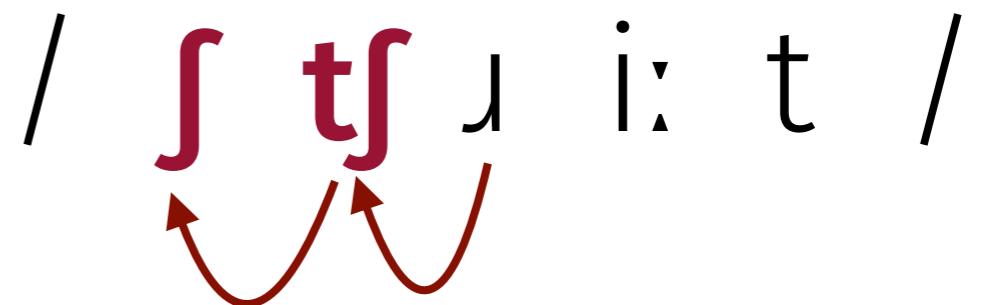
This study:  
**Manchester**  
**English**

# PHONETIC MOTIVATIONS

Two competing accounts:



- /s/ retracts far less in /st/ clusters, e.g. *steep* (Shapiro 1995)



- /t/ is always affricated when /s/ is retracted in /stʃ/ (Lawrence 2000)

Coarticulatory bias towards retraction in other /sCtʃ/ clusters  
(Baker et al. 2011)

- Pre-/tʃ/ affrication of /t/ is widespread in varieties of English (Cruttenden 2014:189-92)

- Inter-speaker variation in the extent of this phonetic bias  
**“suggests a solution to the actuation problem”** (Baker et al. 2011)

# PHONETIC MOTIVATIONS

Two competing accounts:

/ *ʃ t ɹ i: t /*

/ *ʃ tʃ ɹ i: t /*

**“It may prove difficult to tease apart the effects of contact with affricated /t/ and variably-articulated /ɹ/ [...] and isolate a single underlying cause...”**

Wilbanks (2017: 302)

We can gain insight into this unresolved issue by looking at British English:

- **/stj/** - e.g. *stupid, student* - affrication but no rhotic

Which of the two competing accounts finds the most empirical support in BrE?

# METHODOLOGY

# DATA COLLECTION

- Sociolinguistic interviews with 131 speakers born and raised in Greater Manchester
  - ESRC funded project on Manchester English – interviews conducted by local fieldworkers and students
- **Birth years** spanning almost a century, from 1907 to 2001
- **Socioeconomic status** determined based on **occupation** (3 levels: working class, middle class, upper middle class) and **education** (see Baranowski & Turton 2018)
- ~85,000 tokens of sibilants across all environments, measured using Centre of Gravity (Jongman et al. 2000)

# DATA PROCESSING AND ANALYSIS

## Cleaning:

- Downsampled to 22kHz
- High-pass filtered at 750Hz
- Removed tokens where spectral peak or CoG < 2400Hz
- Removed outliers ( $1.5 \times \text{IQR}$ )

## Analysis:

- Mixed-effects linear regression using `lme4` (Bates et al. 2011)
- Random intercept of **word** and random by-**speaker** slope of **cluster type**

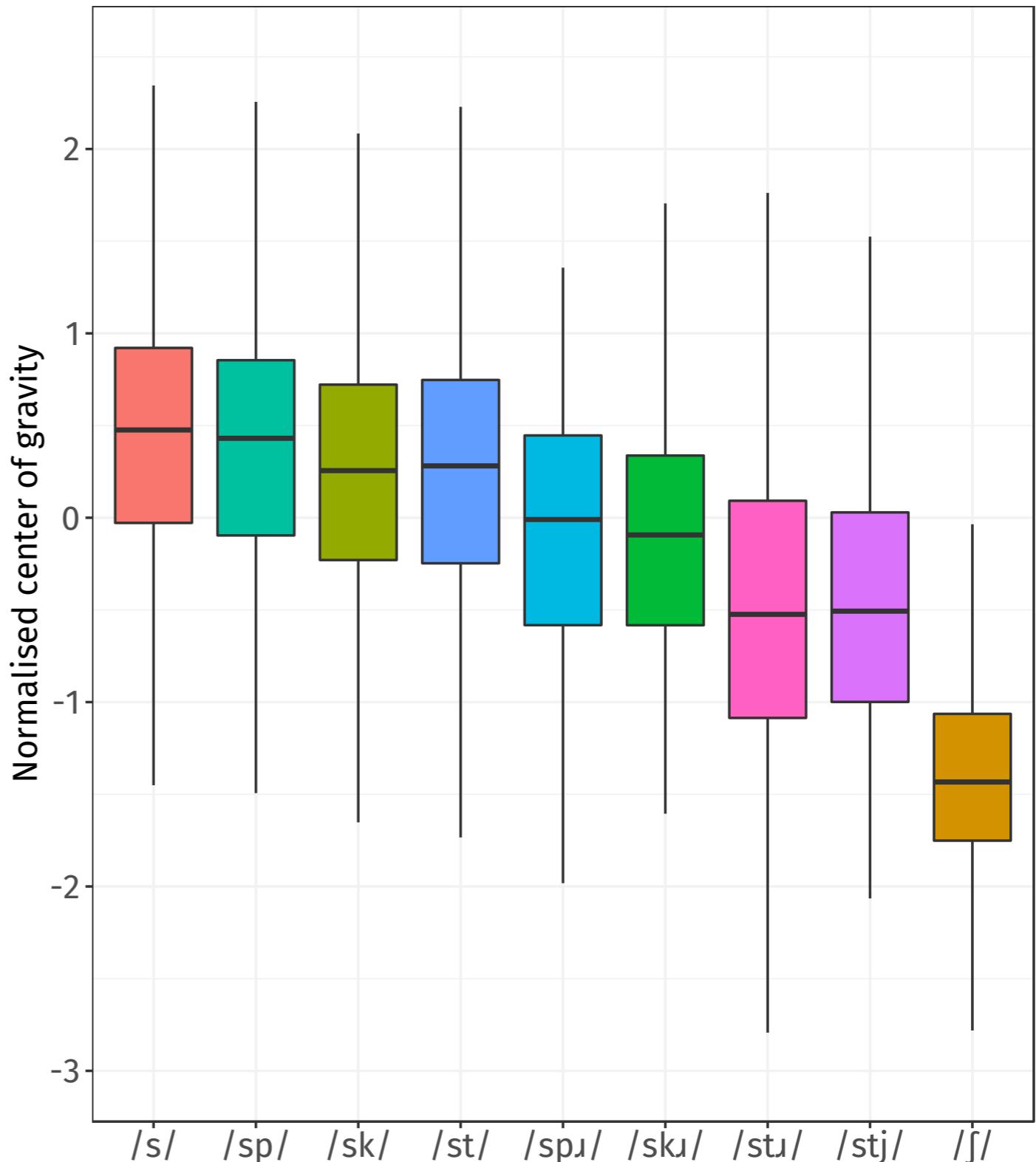
## Processing:

- Normalised into z-scores
- **Word frequency** counts taken from SUBTLEX-UK corpus (van Heuven 2014)
- Extracted **duration** of each sibilant
- **Position** in word and phrase (initial vs. medial)
- Extracted **following vowel** (to investigate effect of rounding)

# RESULTS

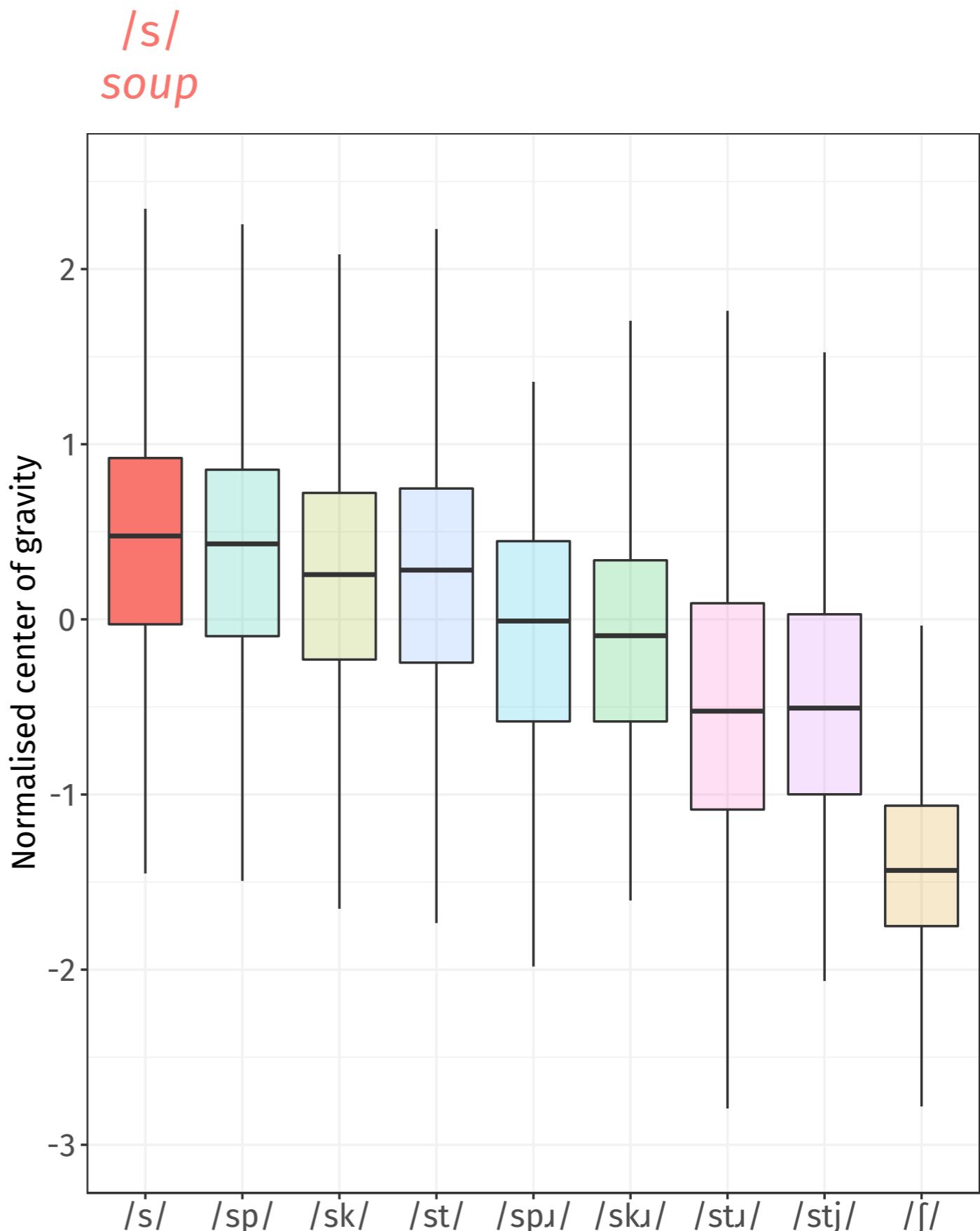
# ALL ONSET TYPES

- Hierarchy of retraction contexts as attested elsewhere (e.g. Baker et al. 2011)
- /ɹ/ causes some low-level retraction even in the absence of affrication, e.g. /spɹ/, /skɹ/
- First quantitative evidence of retraction in /stɹ/ - e.g. *student*, *stupid* etc.



# ALL ONSET TYPES

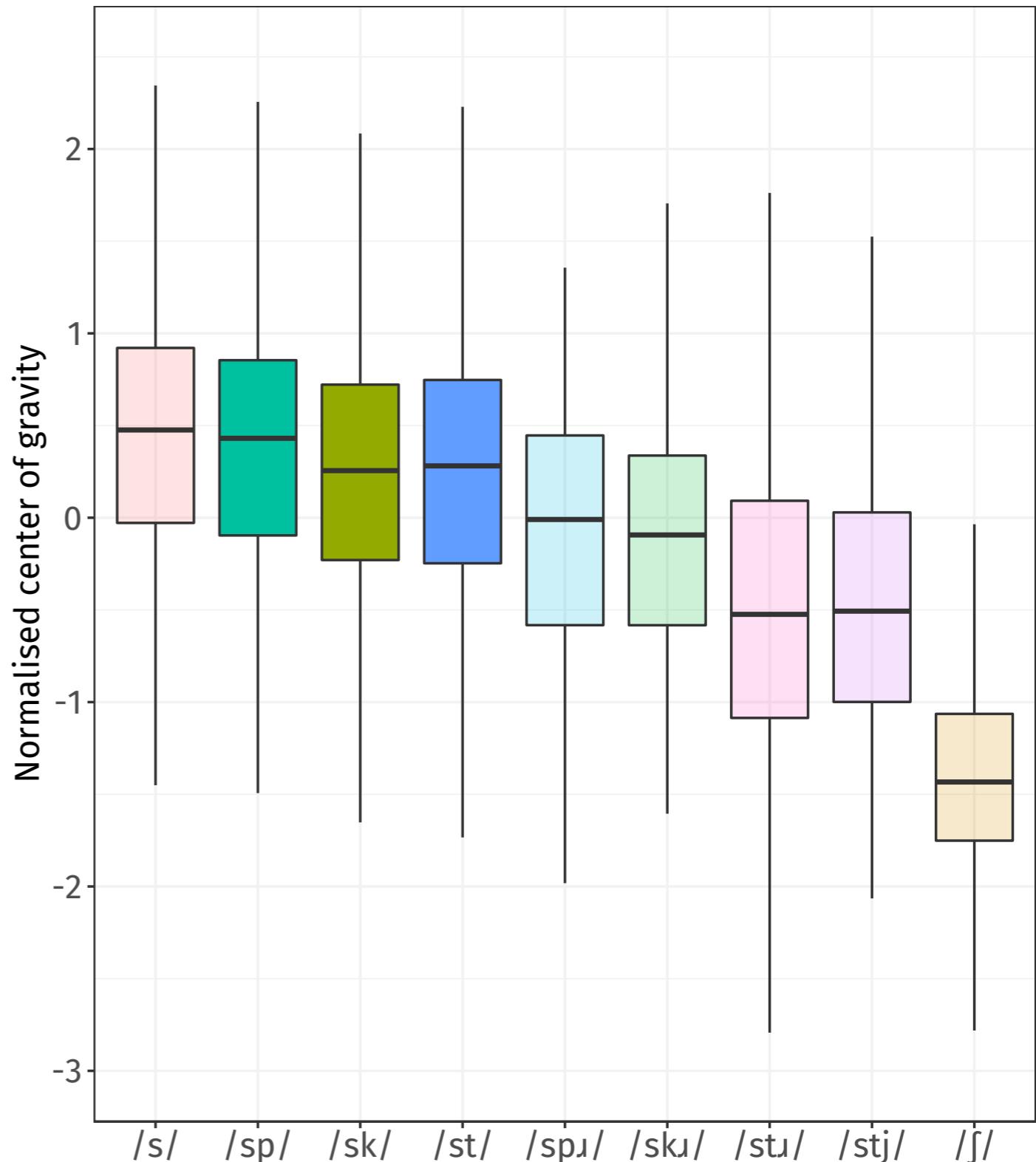
- Hierarchy of retraction contexts as attested elsewhere (e.g. Baker et al. 2011)
- /ɹ/ causes some **low-level retraction** even in the absence of affrication, e.g. /spɹ/, /skɹ/
- First quantitative evidence of **retraction in /stɹ/** - e.g. *student*, *stupid* etc.



# ALL ONSET TYPES

- Hierarchy of retraction contexts as attested elsewhere (e.g. Baker et al. 2011)
- /ɹ/ causes some **low-level retraction** even in the absence of affrication, e.g. /spɹ/, /skɹ/
- First quantitative evidence of **retraction** in /stɹ/ - e.g. *student*, *stupid* etc.

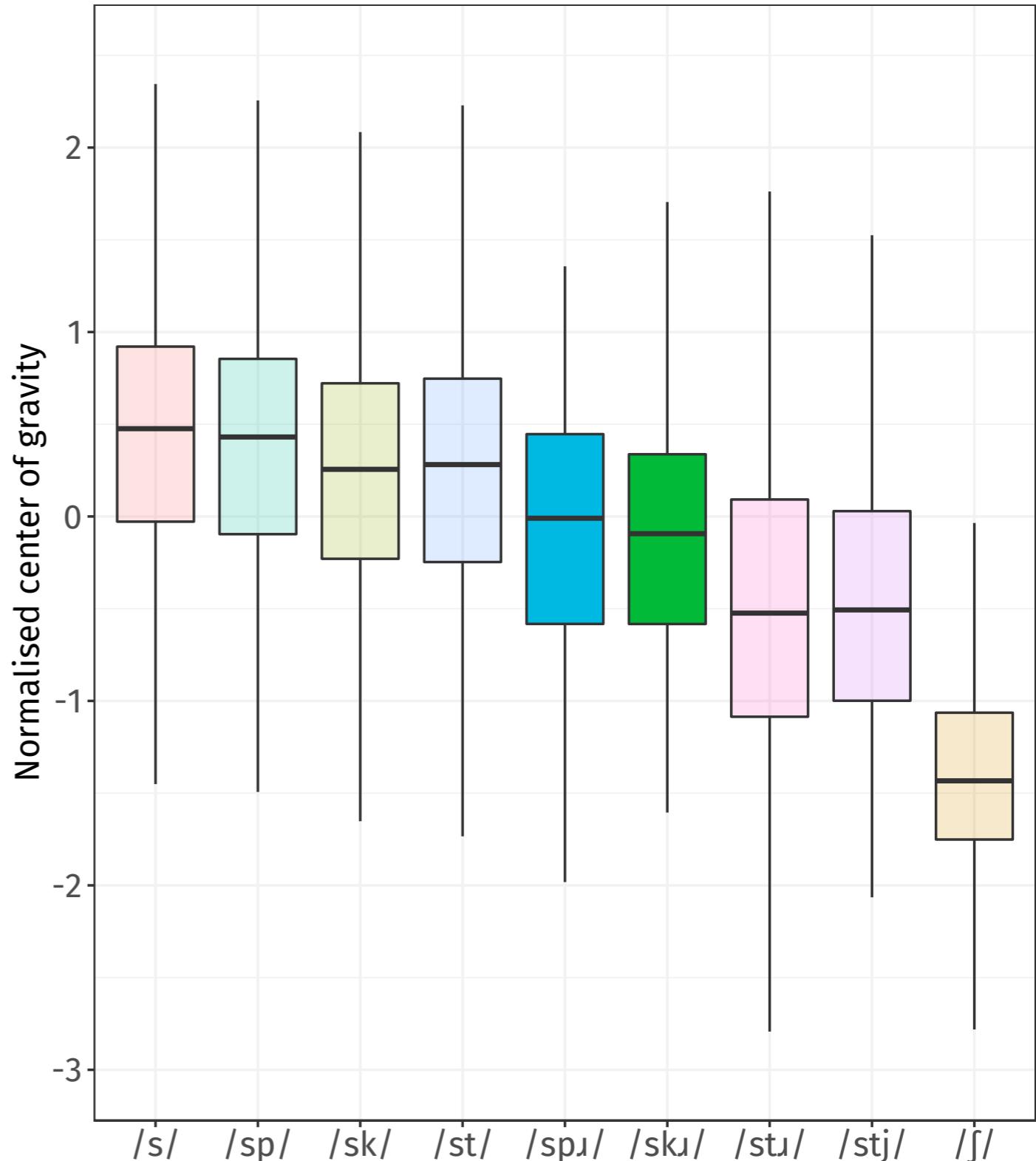
/sp/   /sk/   /st/  
*spook* *school* *stoop*



# ALL ONSET TYPES

- Hierarchy of retraction contexts as attested elsewhere (e.g. Baker et al. 2011)
- /ɹ/ causes some **low-level retraction** even in the absence of affrication, e.g. /spr/, /sku/
- First quantitative evidence of **retraction** in /stj/ - e.g. *student*, *stupid* etc.

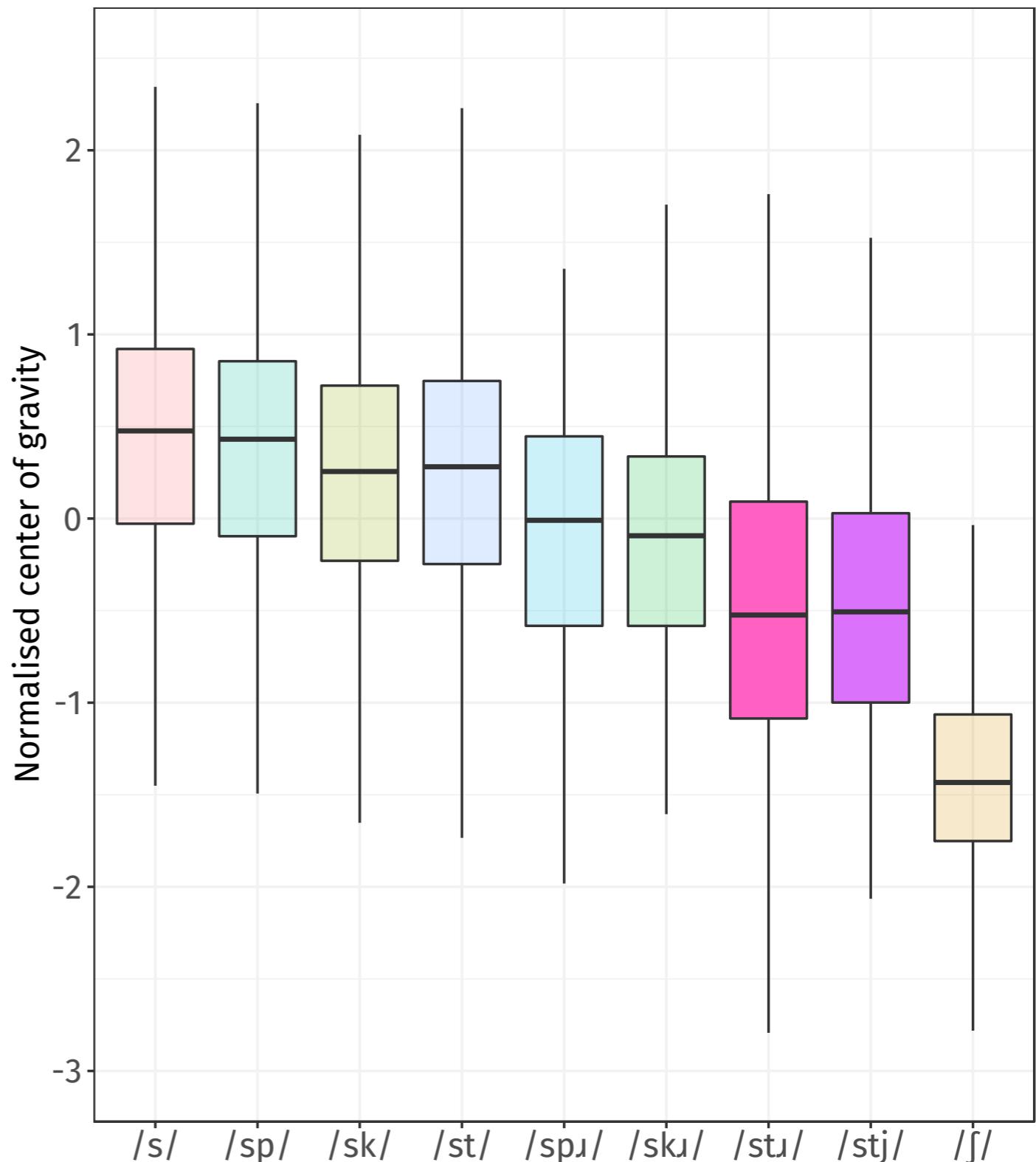
/spr/ /sku/  
*spruce* *screw*



# ALL ONSET TYPES

- Hierarchy of retraction contexts as attested elsewhere (e.g. Baker et al. 2011)
- /ɹ/ causes some **low-level retraction** even in the absence of affrication, e.g. /spɹ/, /skɹ/
- First quantitative evidence of **retraction in /stj/** - e.g. *student*, *stupid* etc.

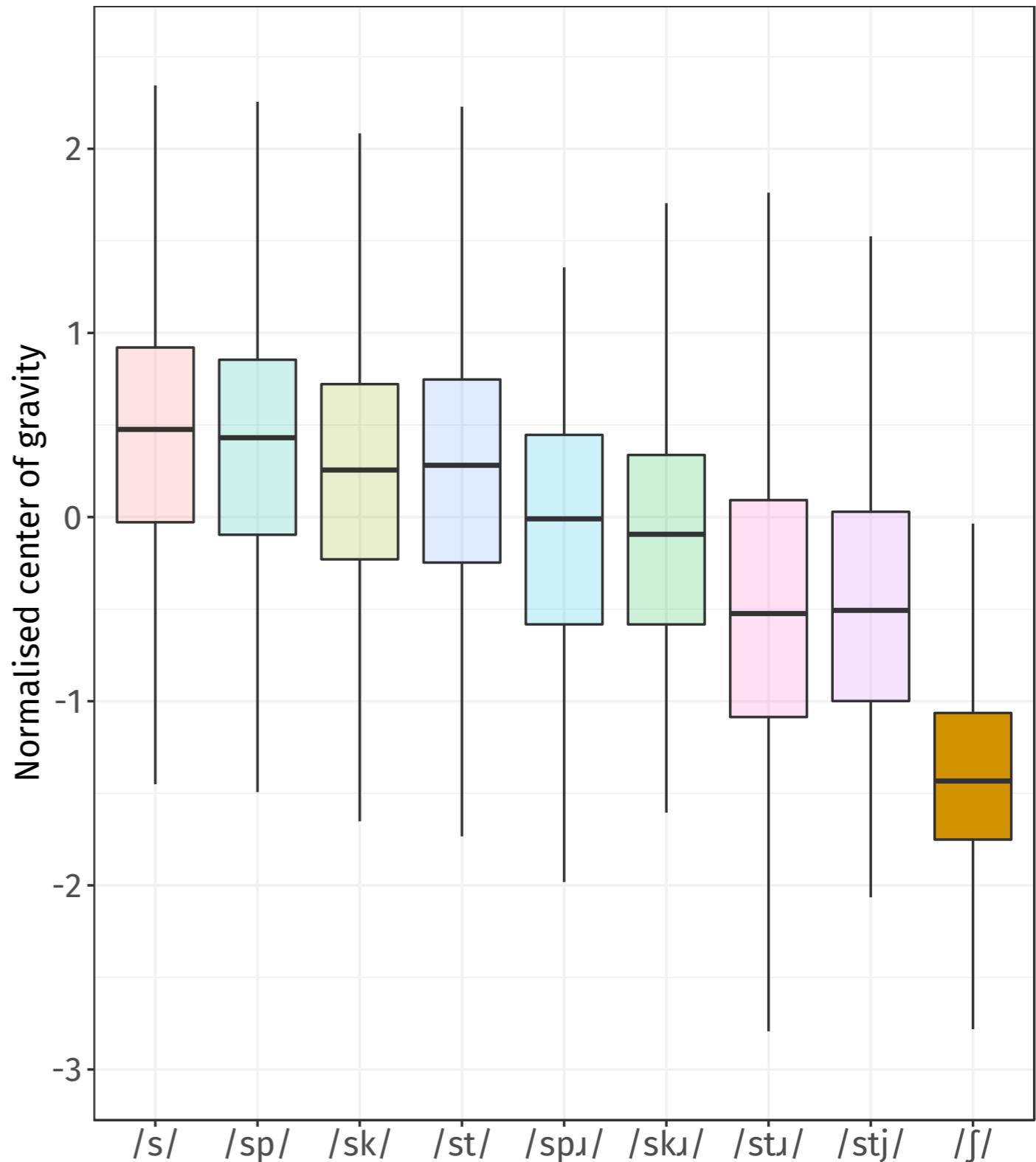
/stɹ/ /stʃ/  
*strewn student*



# ALL ONSET TYPES

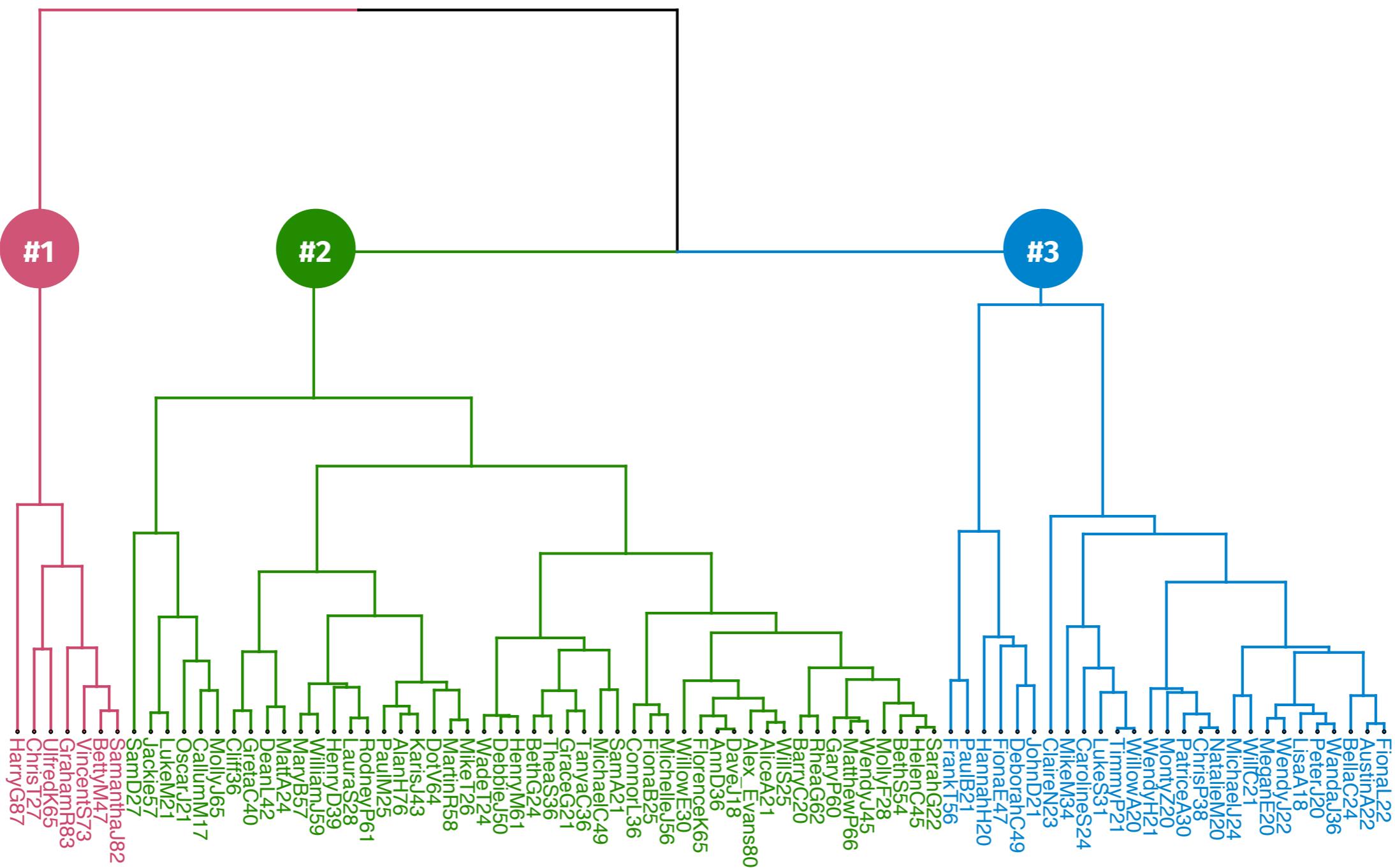
/ʃ/  
shoe

- Hierarchy of retraction contexts as attested elsewhere (e.g. Baker et al. 2011)
- /ɹ/ causes some **low-level retraction** even in the absence of affrication, e.g. /spɹ/, /skɹ/
- First quantitative evidence of **retraction in /stɹ/** - e.g. *student*, *stupid* etc.



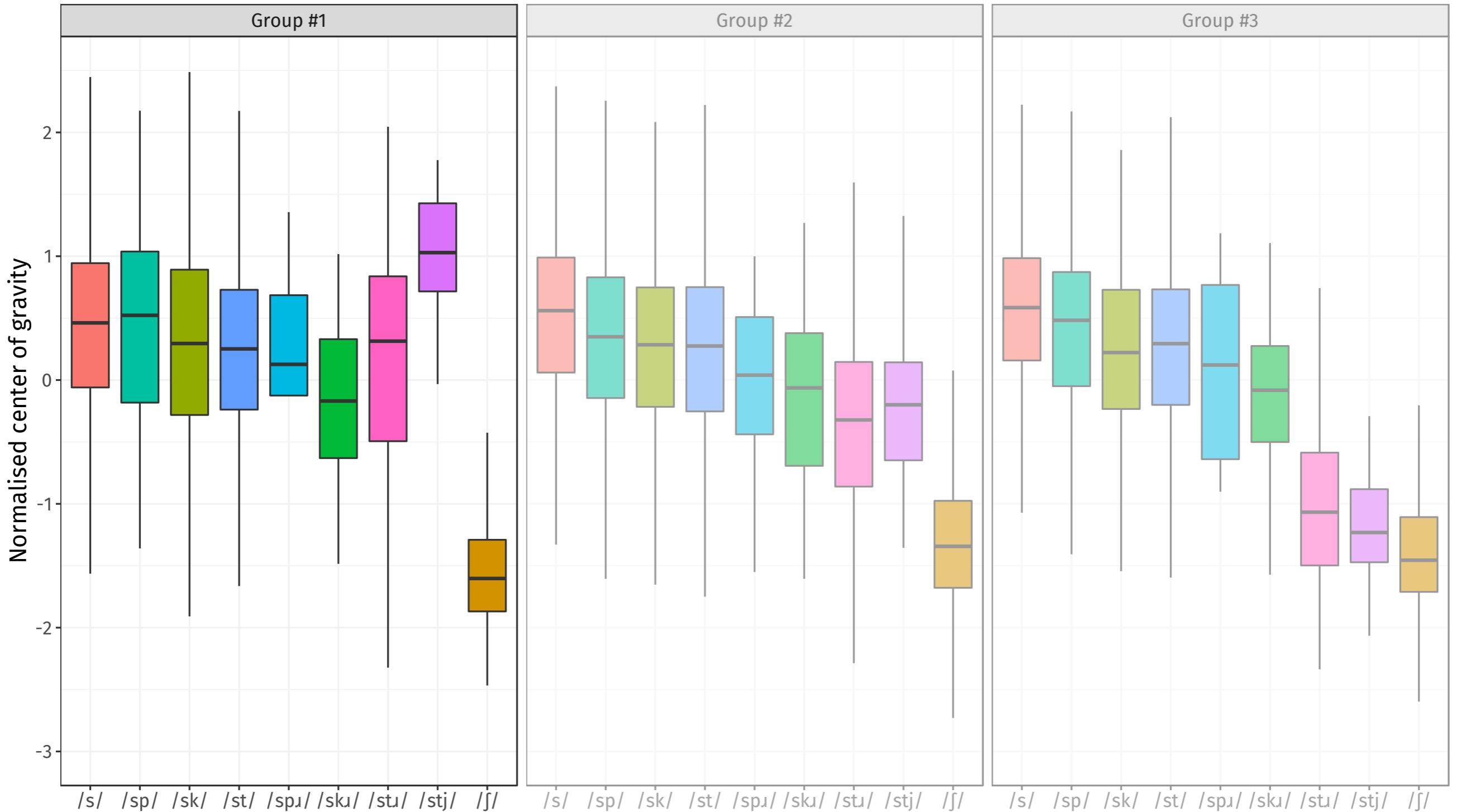
# CLUSTER ANALYSIS

- **Hierarchical cluster analysis** - objectively groups speakers based on distribution of CoG values across environments



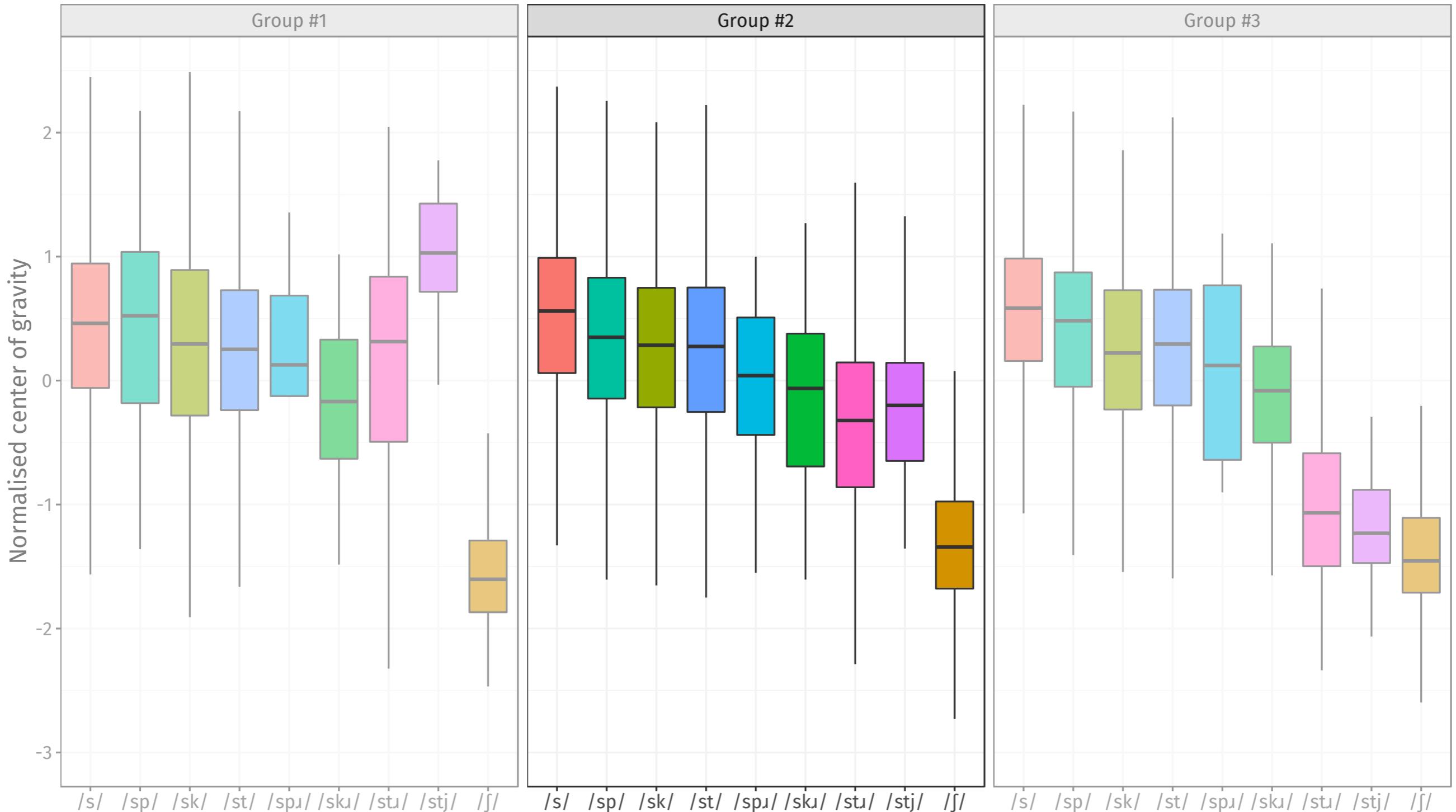
# CLUSTER ANALYSIS

## Group #1 - no pattern of retraction



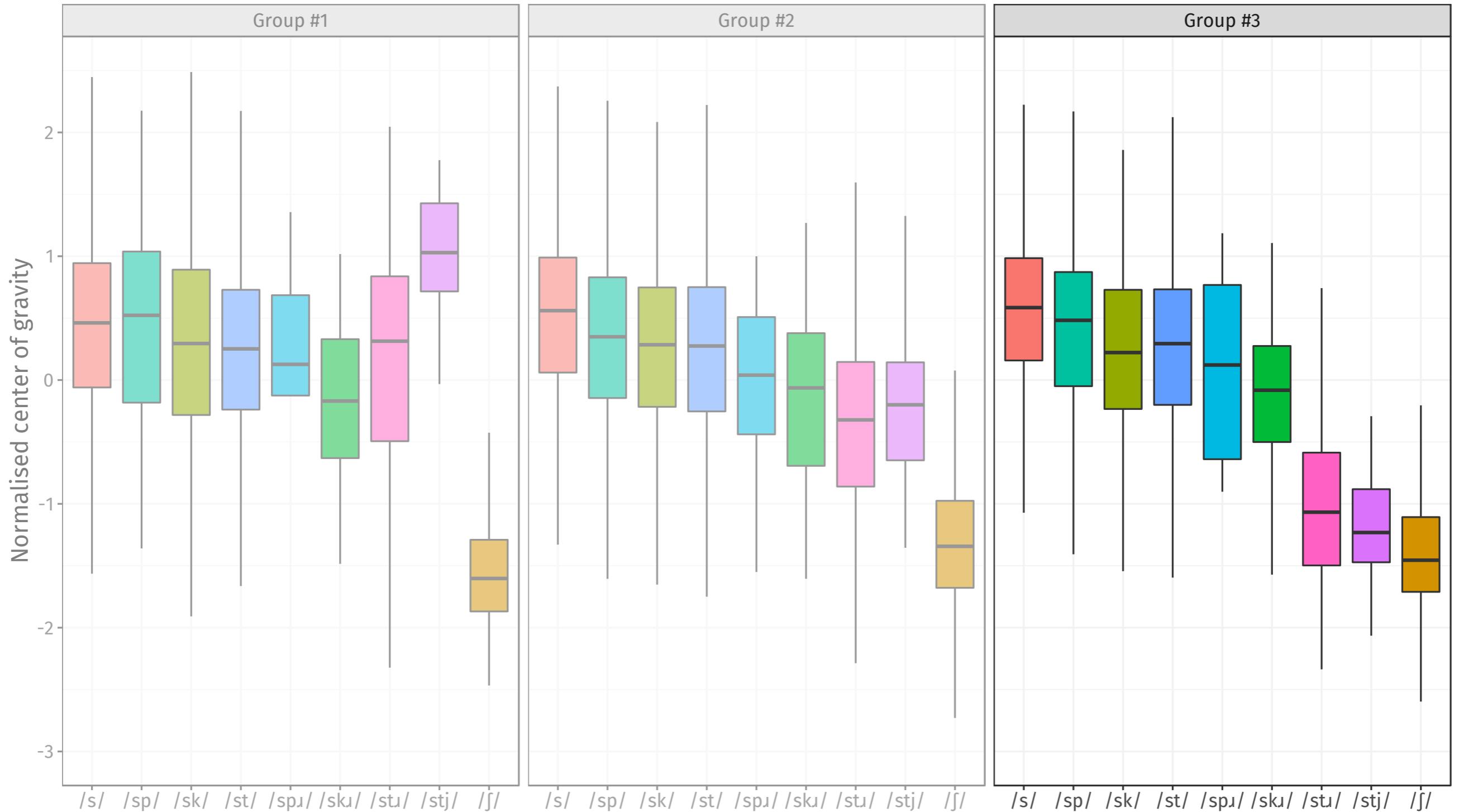
# CLUSTER ANALYSIS

## Group #2 - emerging pattern of retraction



# CLUSTER ANALYSIS

Group #3 - /stu/ and /stj/ approaching /ʃ/



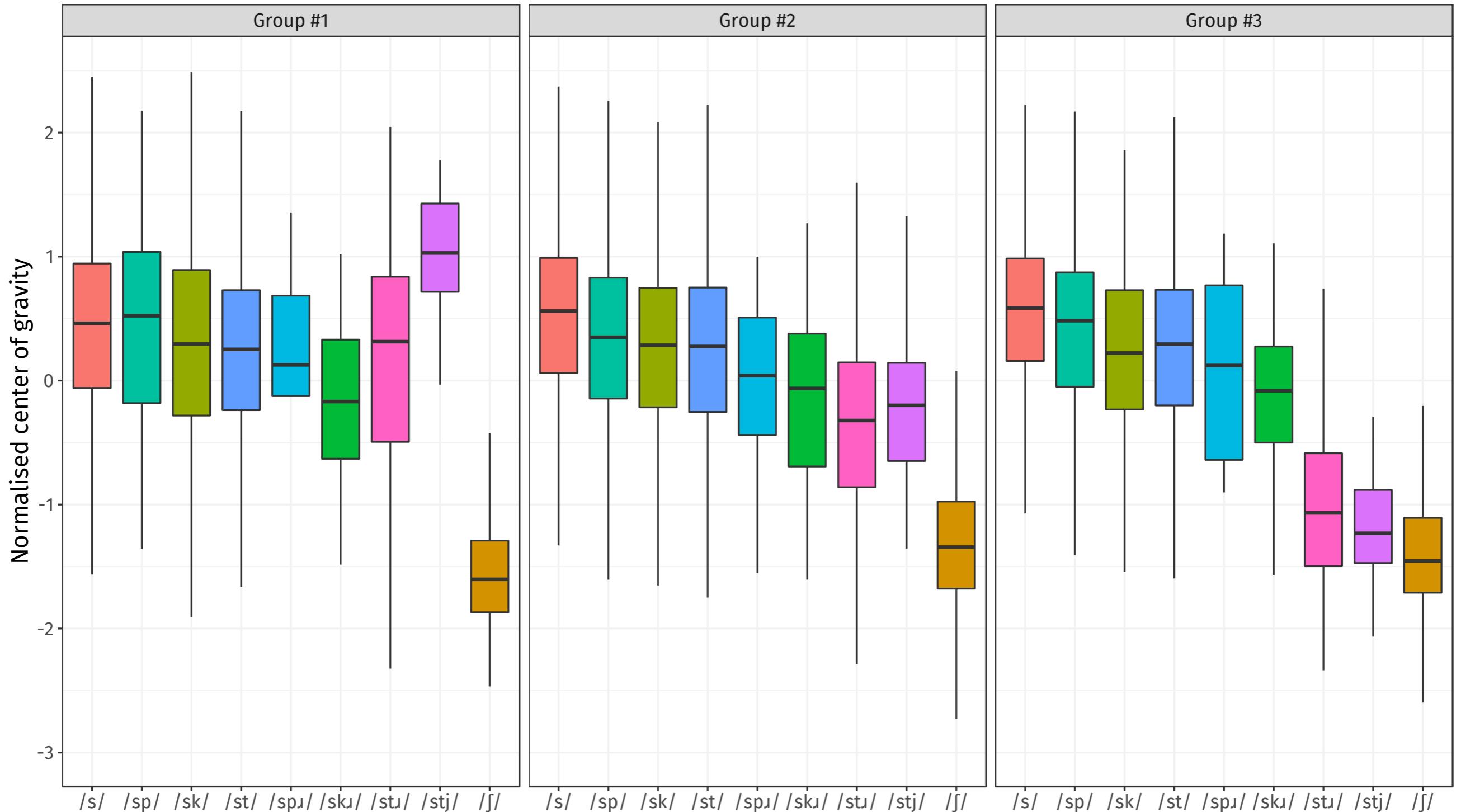
# CLUSTER ANALYSIS

Average date of birth:

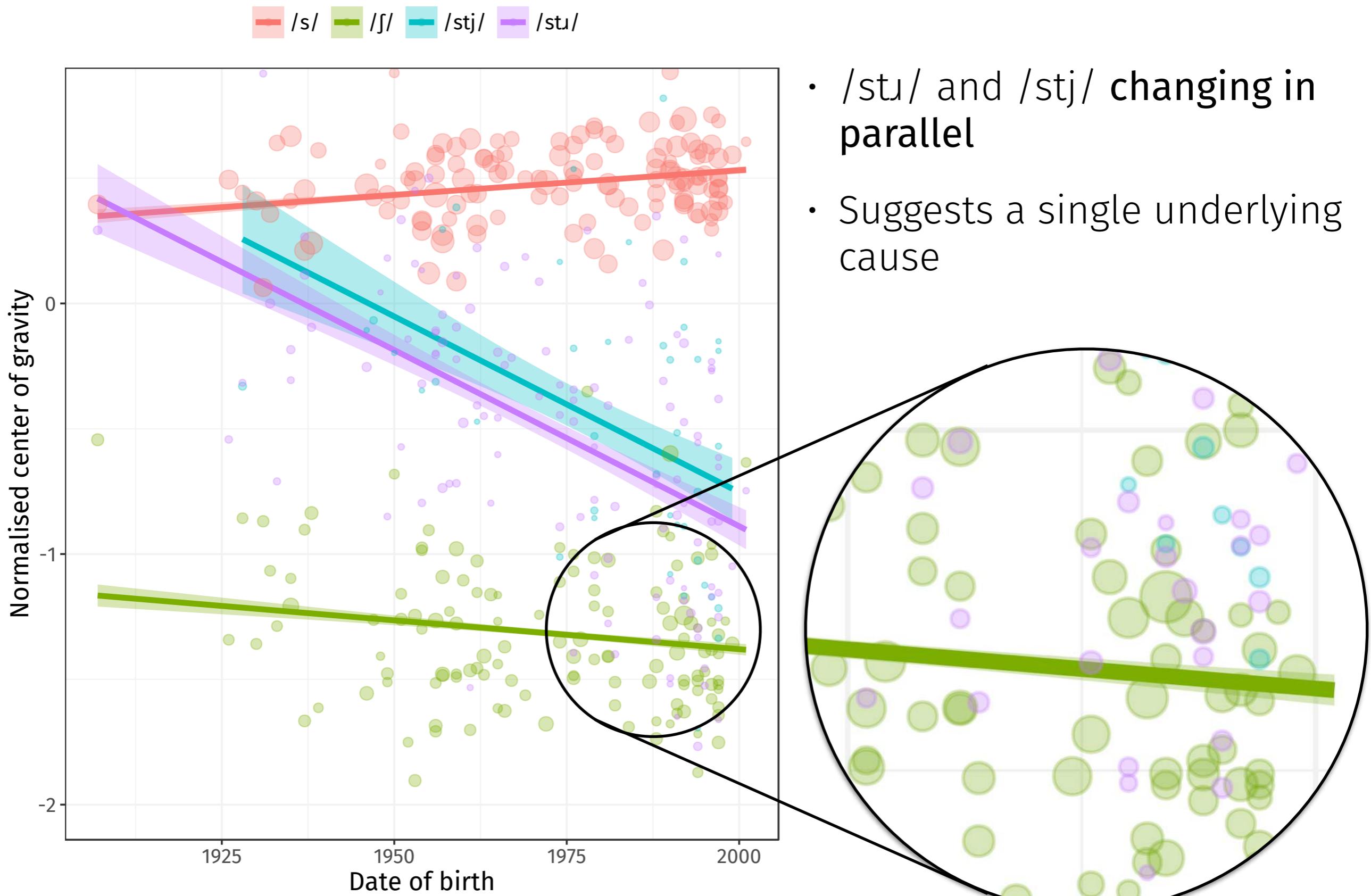
1937

1976

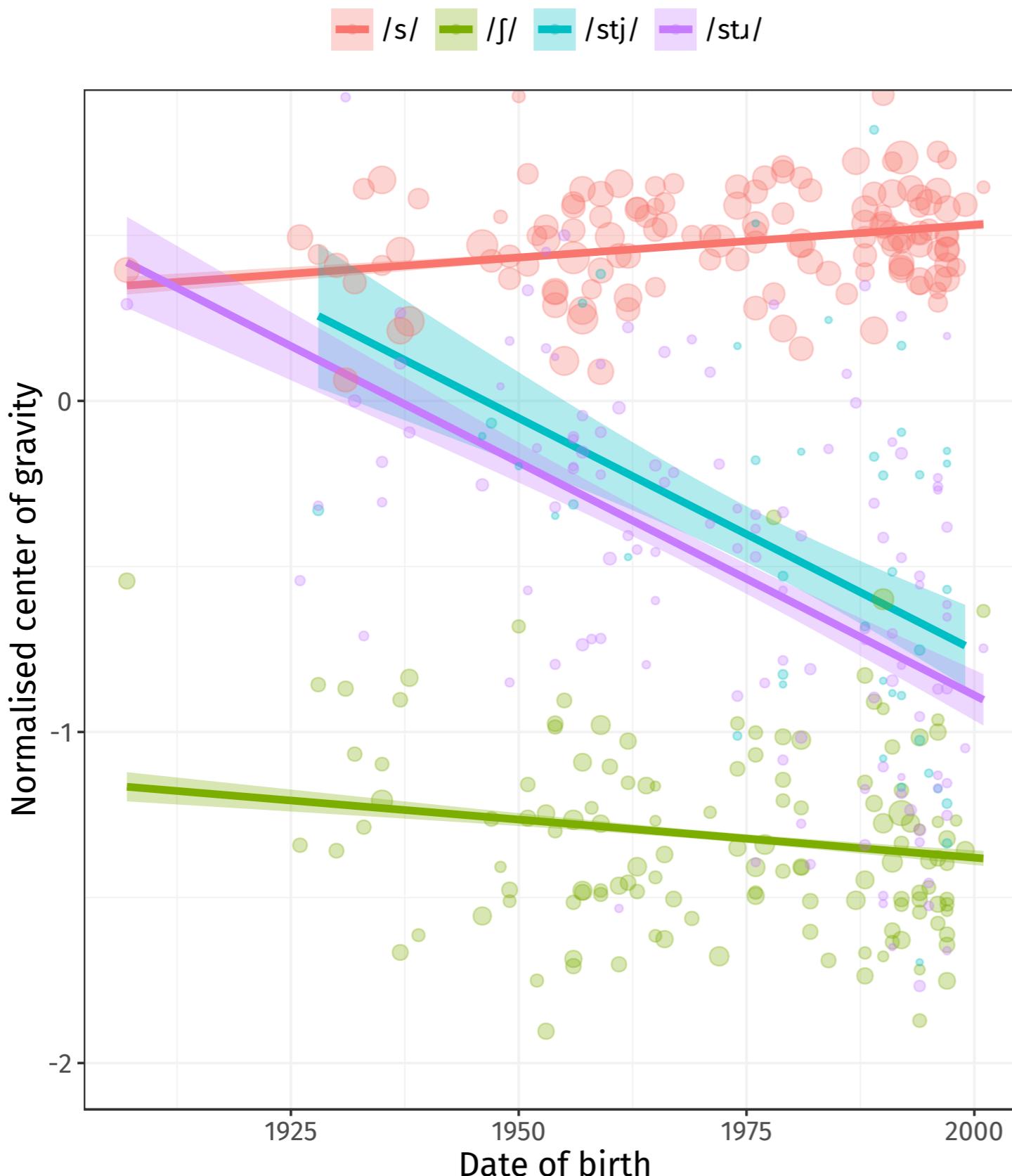
1991



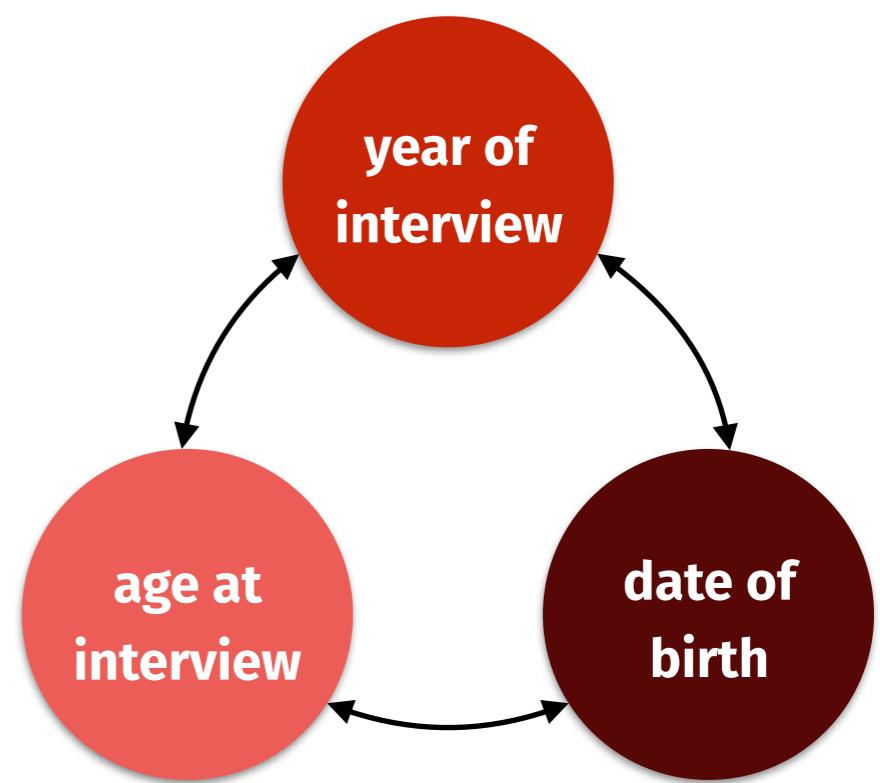
# APPARENT TIME CHANGE #1



# APPARENT TIME CHANGE #2

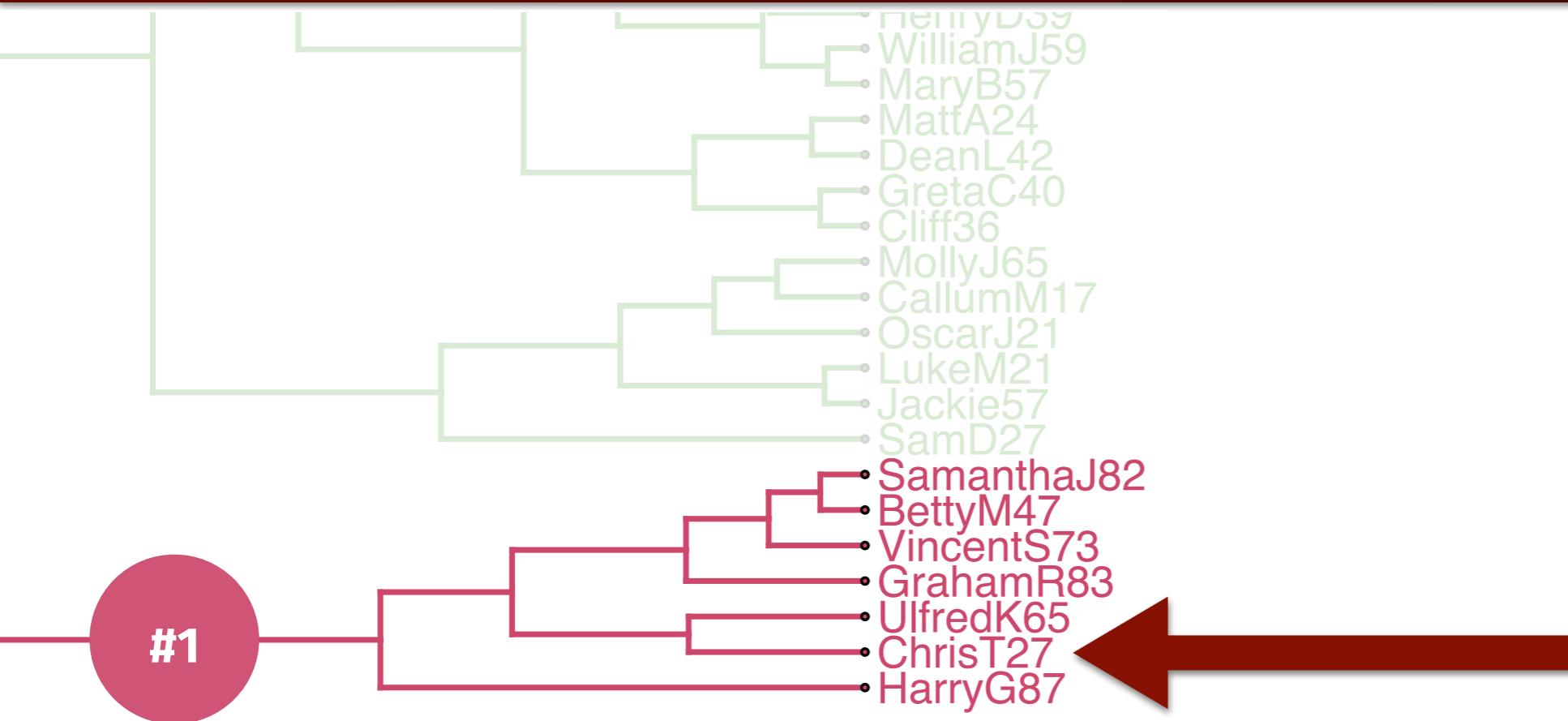


- Pre-vocalic /s/ and /ʃ/ also correlate with date of birth
- Wider fricative space for younger speakers
  - apparent time change?
  - age-graded variation?



see Fruehwald (2017) - Generations, lifespans, and the zeitgeist

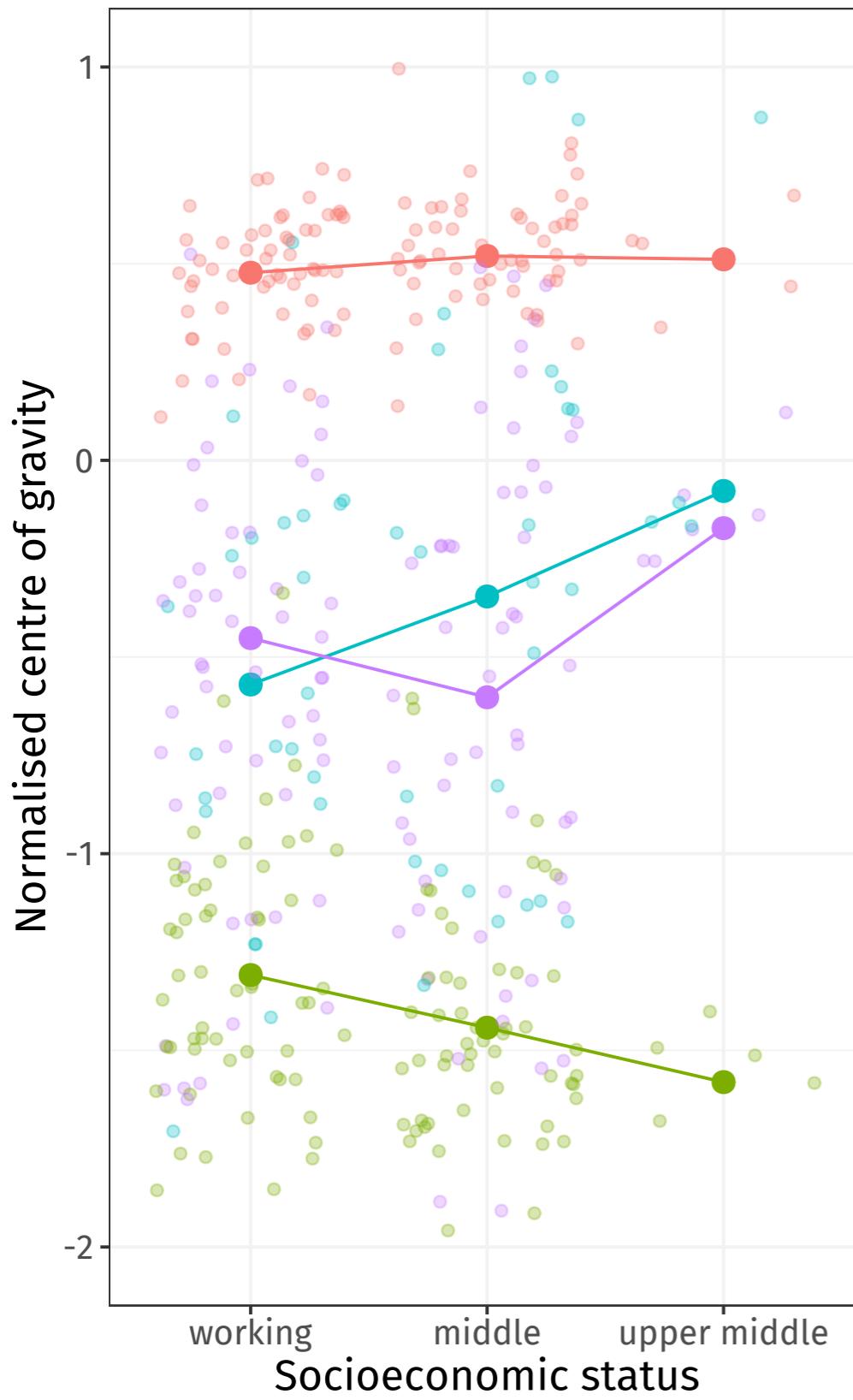
# CLUSTER ANALYSIS



What's a 27 year-old doing in group #1?

# SOCIOECONOMIC STATUS

● /s/ ● /ʃ/ ● /stj/ ● /stu/



- Based on occupation - found to be best measure of social class in this community (Baranowski & Turton 2018)
  - ▶ Suggestion that highest social class is conservative (but  $p = 0.18$ )
- Education tells a similar story, and significant difference between highest and lowest group (but lots of missing data)
- Calls for complementary work on indexical meaning of /s/-retraction (see e.g. Phillips & Resnick 2019)

# SOCIAL EVALUATION?

- To what extent are speakers aware of this variation? Is it subject to metalinguistic commentary? If so, how is it evaluated?



my pet peeve is “shtreet” (street). I’ve noticed recently that a lot of speakers are adding these sounds.



People that pronounce it SHtreet. There is no h in the word street.



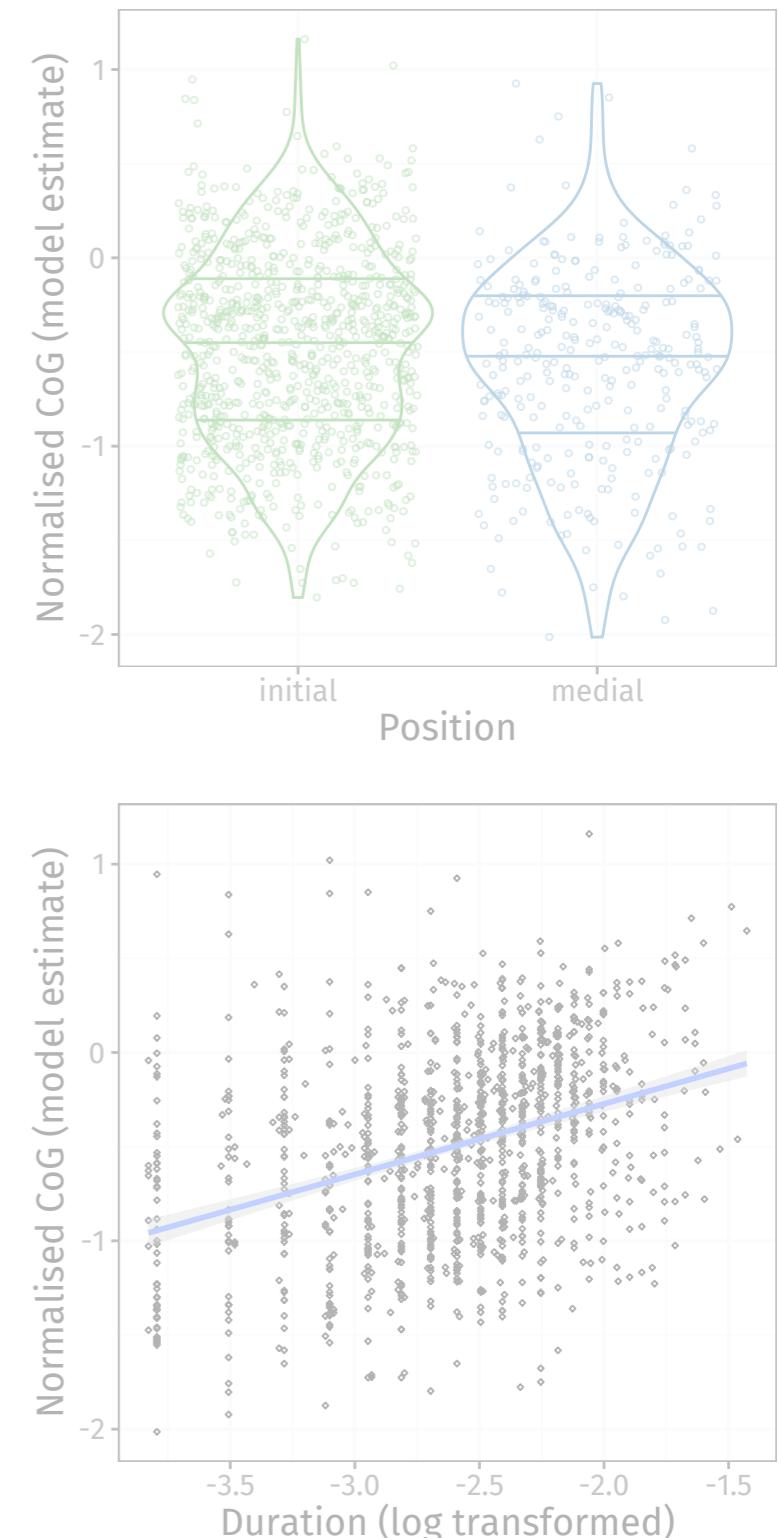
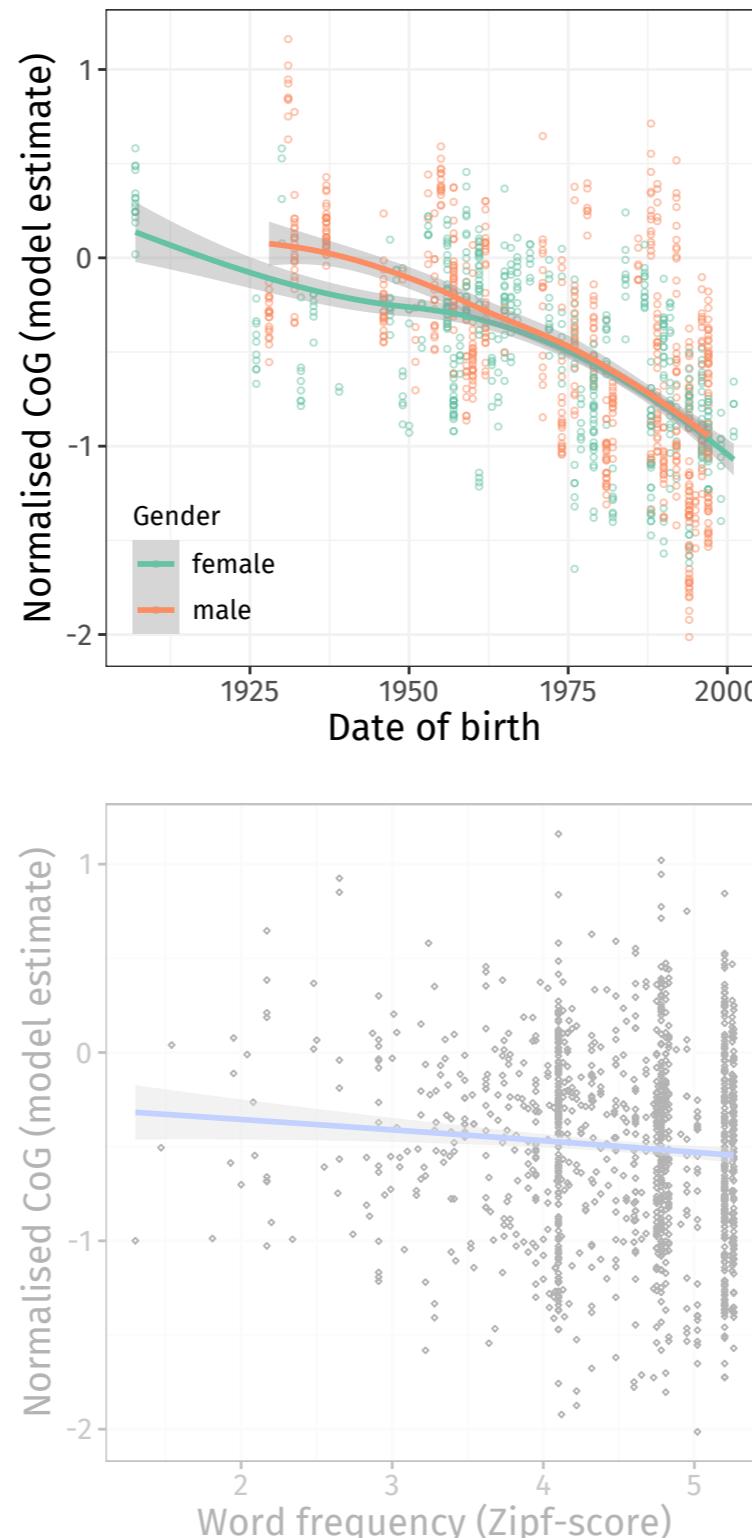
It makes me apoplectic when the “st” sound gets an “h” added to it like: shtreet, or shtrong or shtraight! Those are not proper words people! Even announcers do it! Stop! Just STOP!

# OTHER FACTORS

- Other significant predictors from the model:

- **gender**: male speakers lagging behind female speakers ( $\beta = 0.233, p = 0.01$ )
- **position**: retraction more advanced in word-medial position ( $\beta = -0.169, p = 0.002$ )
- **frequency**: higher frequency words leading ( $\beta = -0.068, p = 0.028$ )
- **duration**: longer sibilants less retracted ( $\beta = 0.121, p < 0.001$ )

(not sig: social class, vowel, cluster type)

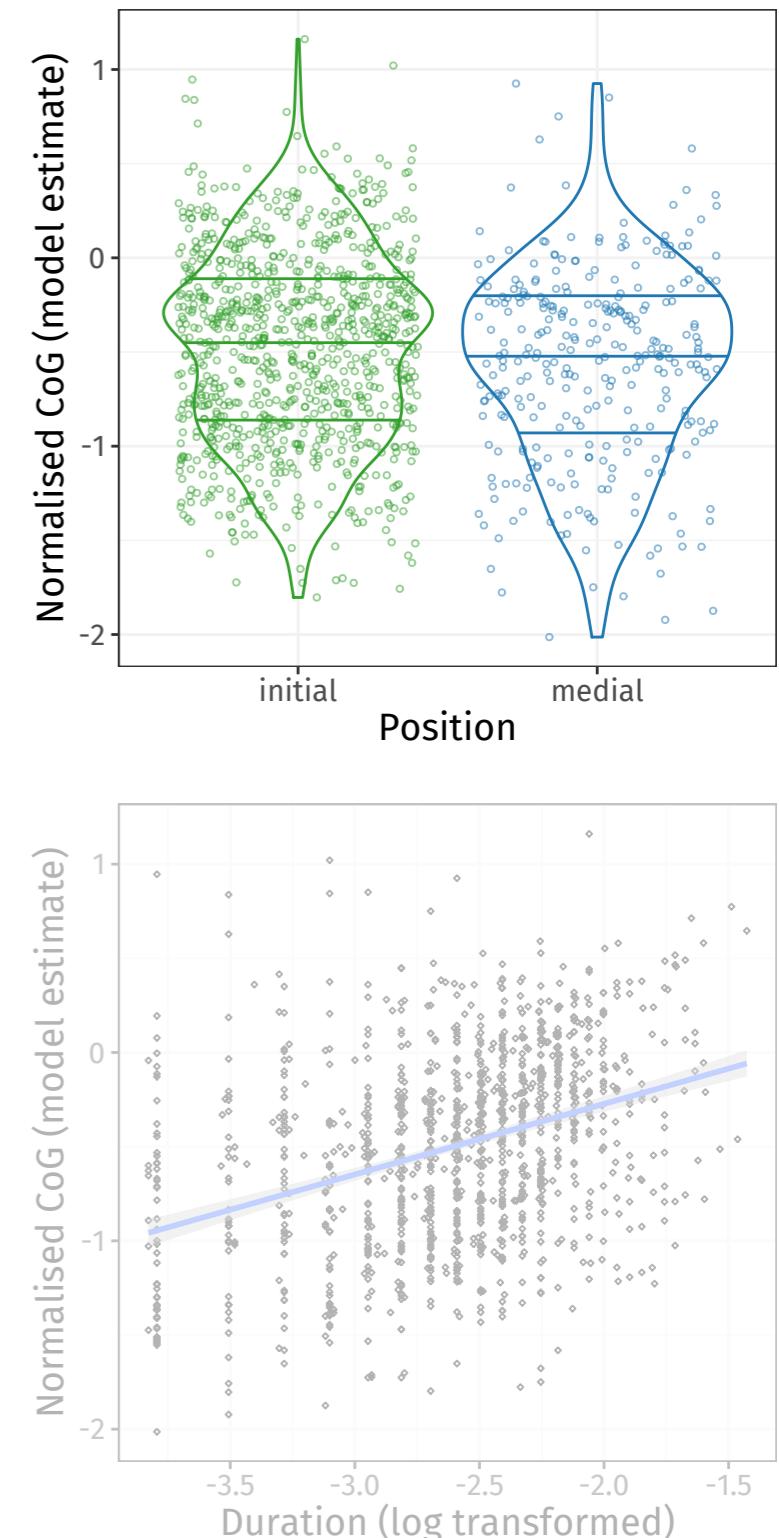
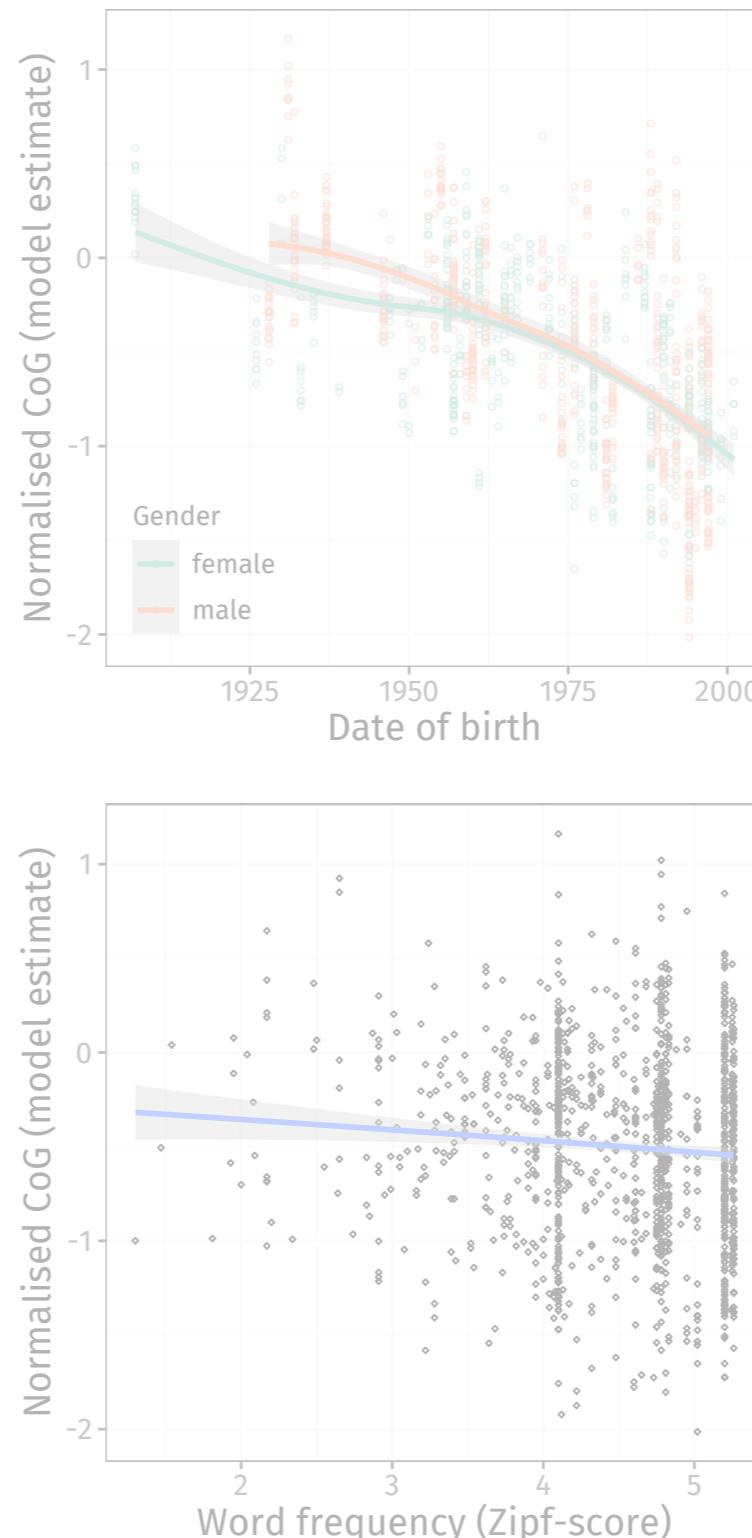


# OTHER FACTORS

- Other significant predictors from the model:

- **gender:** male speakers lagging behind female speakers ( $\beta = 0.233, p = 0.01$ )
- **position:** retraction more advanced in word-medial position ( $\beta = -0.169, p = 0.002$ )
- **frequency:** higher frequency words leading ( $\beta = -0.068, p = 0.028$ )
- **duration:** longer sibilants less retracted ( $\beta = 0.121, p < 0.001$ )

(not sig: social class, vowel, cluster type)

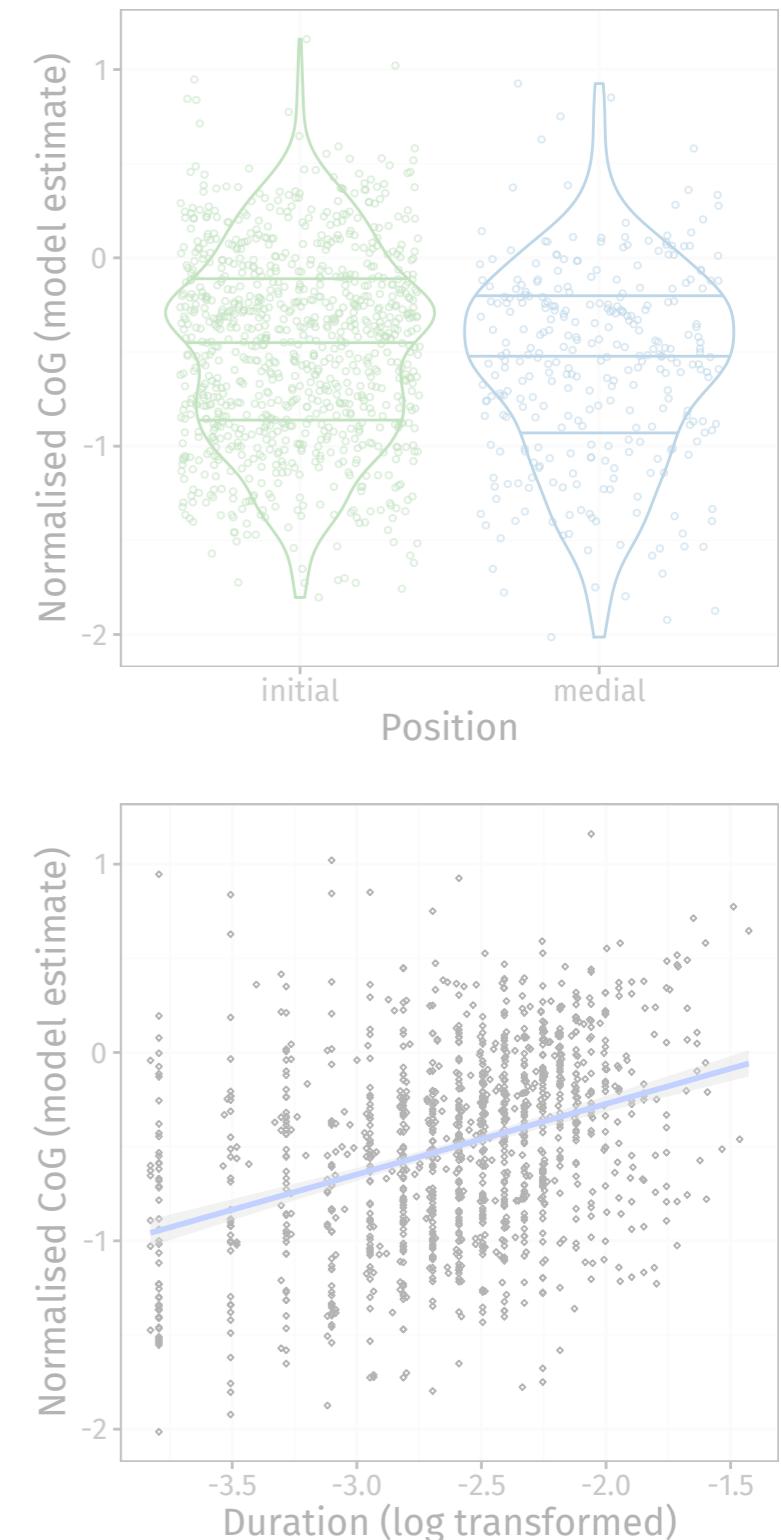
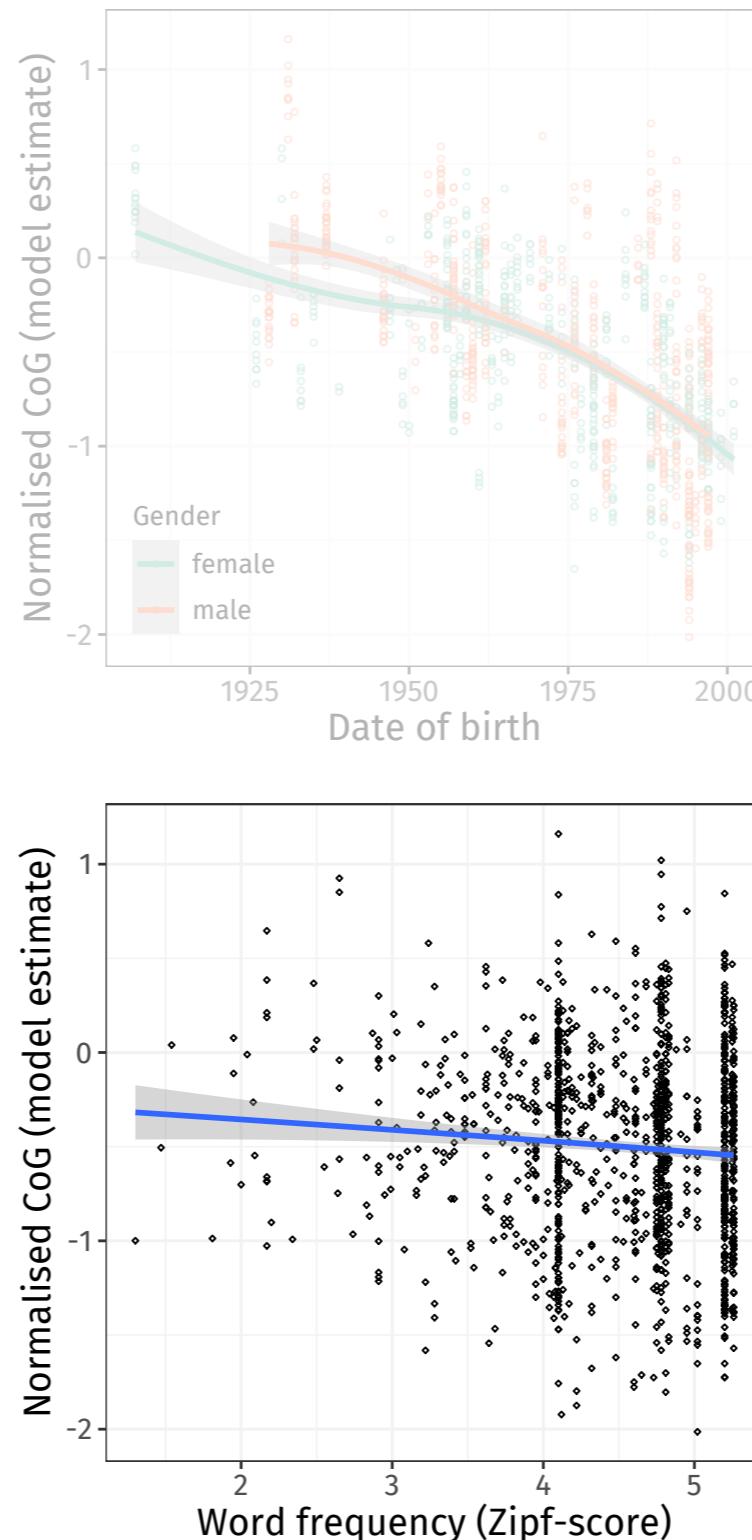


# OTHER FACTORS

- Other significant predictors from the model:

- **gender:** male speakers lagging behind female speakers ( $\beta = 0.233, p = 0.01$ )
- **position:** retraction more advanced in word-medial position ( $\beta = -0.169, p = 0.002$ )
- **frequency:** higher frequency words leading ( $\beta = -0.068, p = 0.028$ )
- **duration:** longer sibilants less retracted ( $\beta = 0.121, p < 0.001$ )

(not sig: social class, vowel, cluster type)

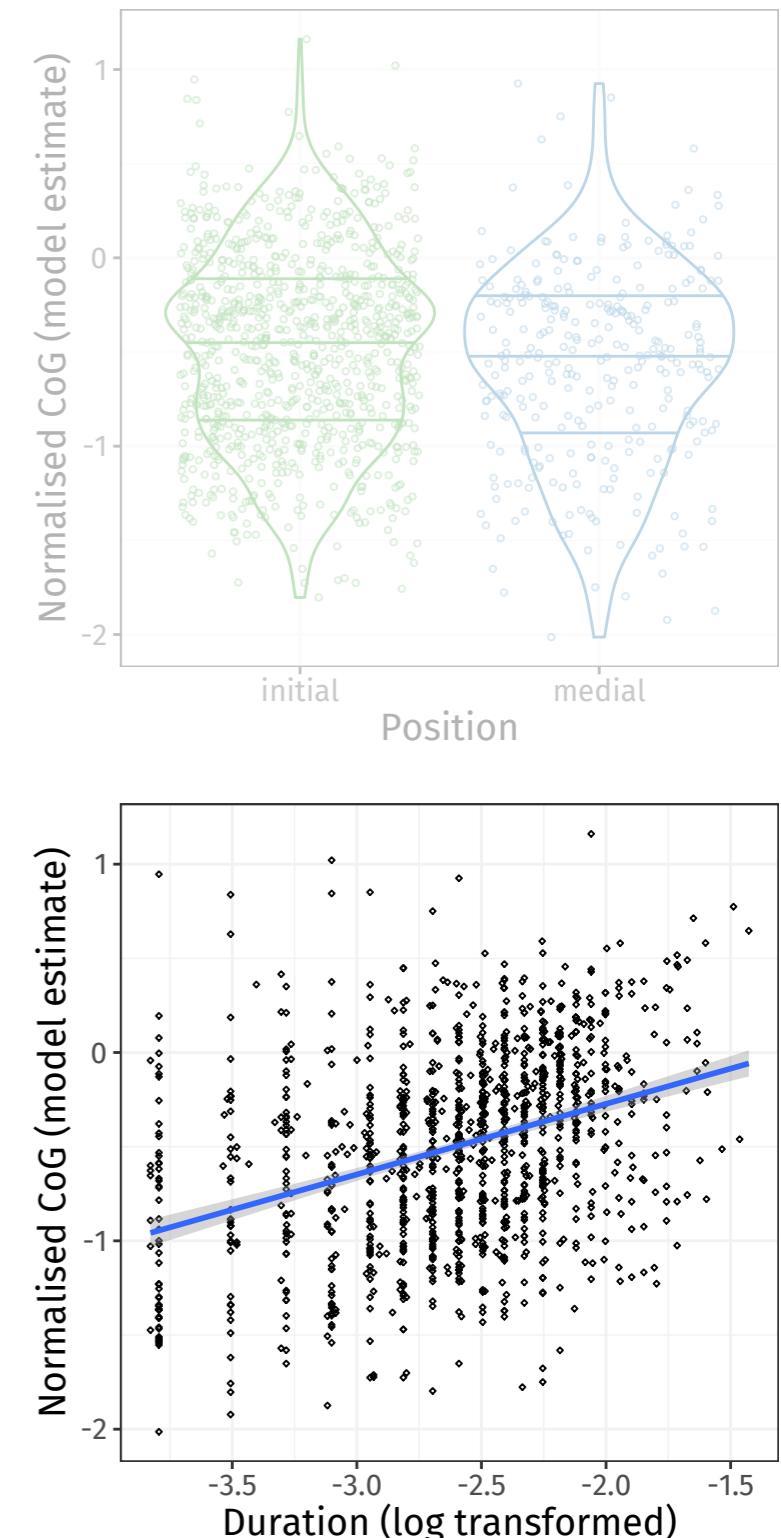
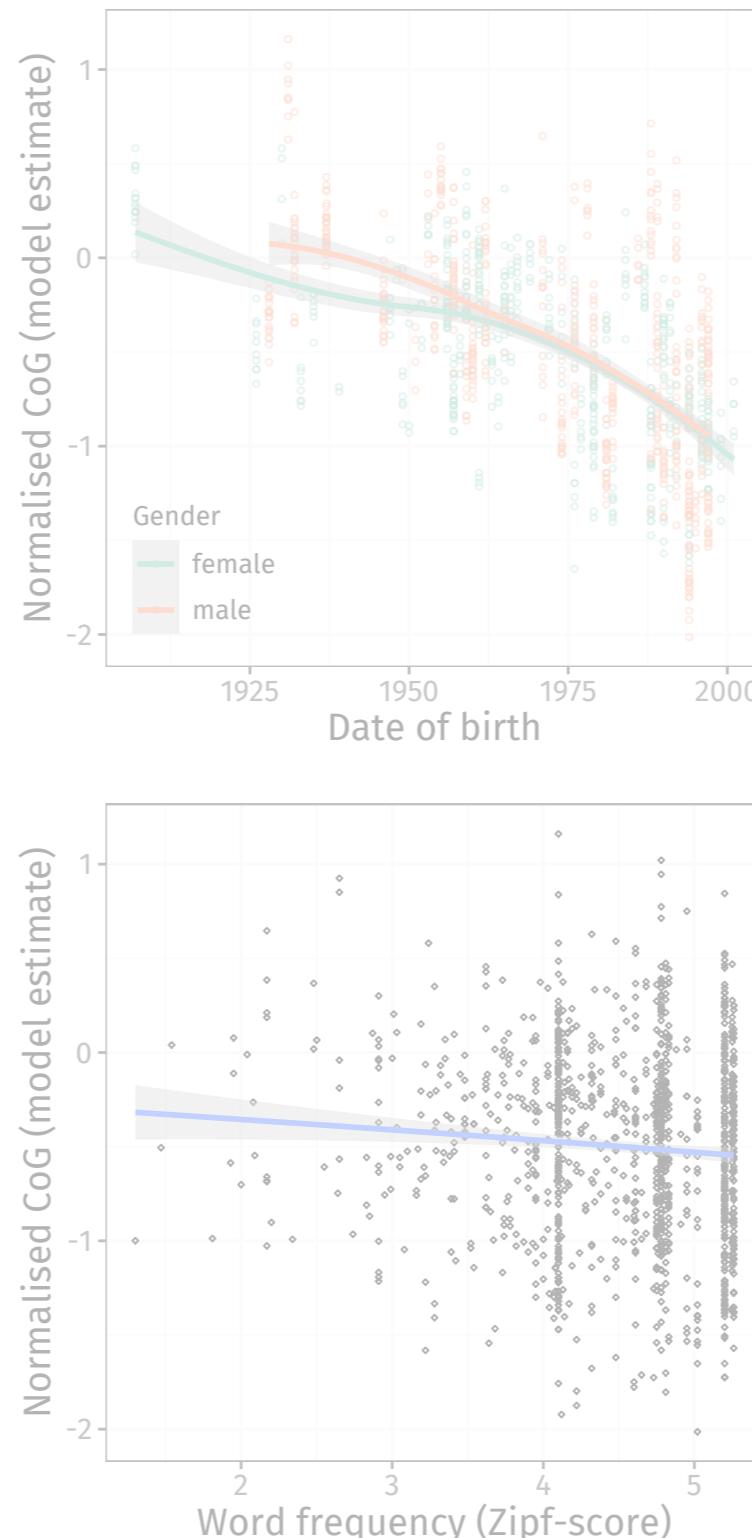


# OTHER FACTORS

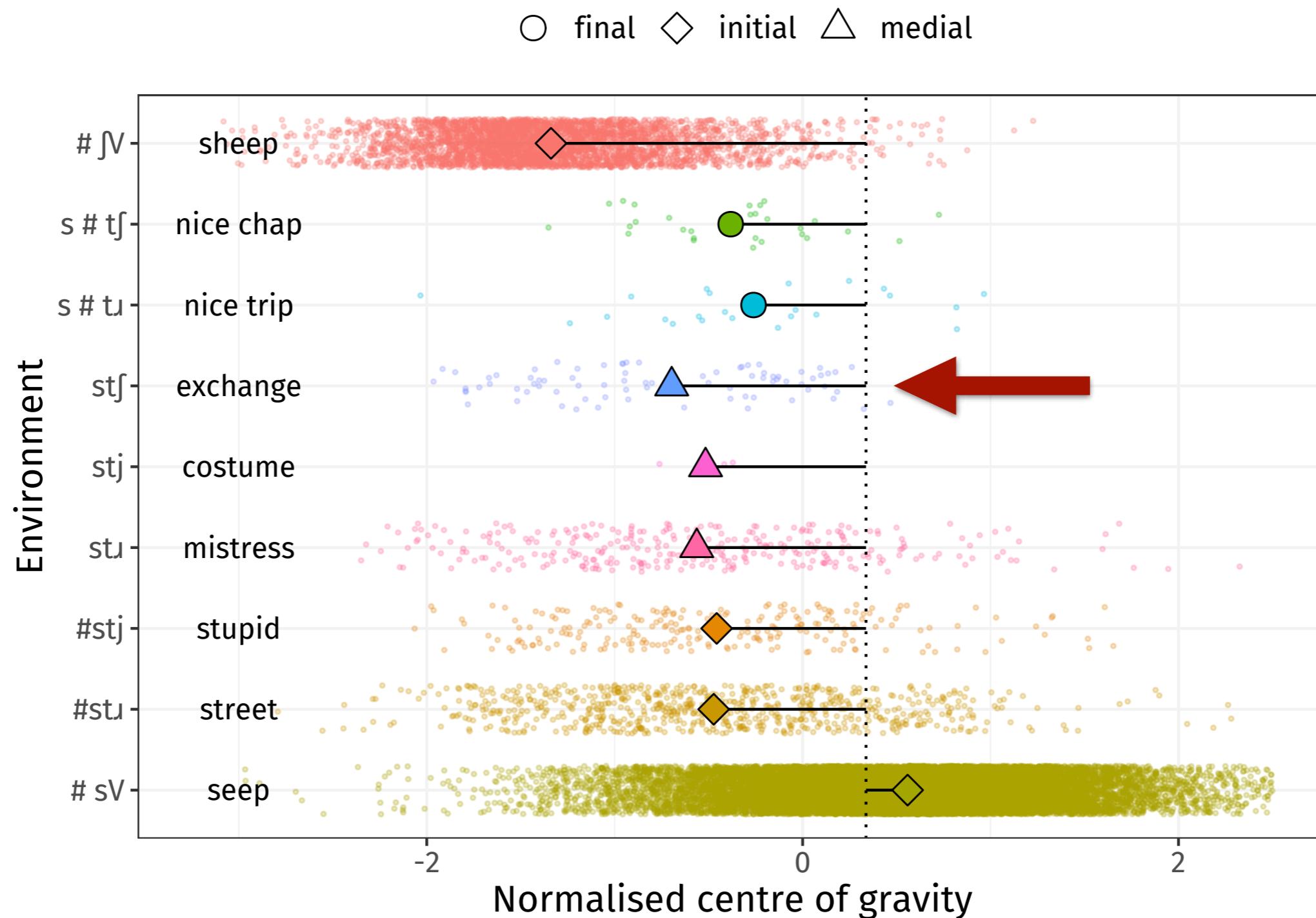
- Other significant predictors from the model:

- **gender:** male speakers lagging behind female speakers ( $\beta = 0.233, p = 0.01$ )
- **position:** retraction more advanced in word-medial position ( $\beta = -0.169, p = 0.002$ )
- **frequency:** higher frequency words leading ( $\beta = -0.068, p = 0.028$ )
- **duration:** longer sibilants less retracted ( $\beta = 0.121, p < 0.001$ )

(not sig: social class, vowel, cluster type)



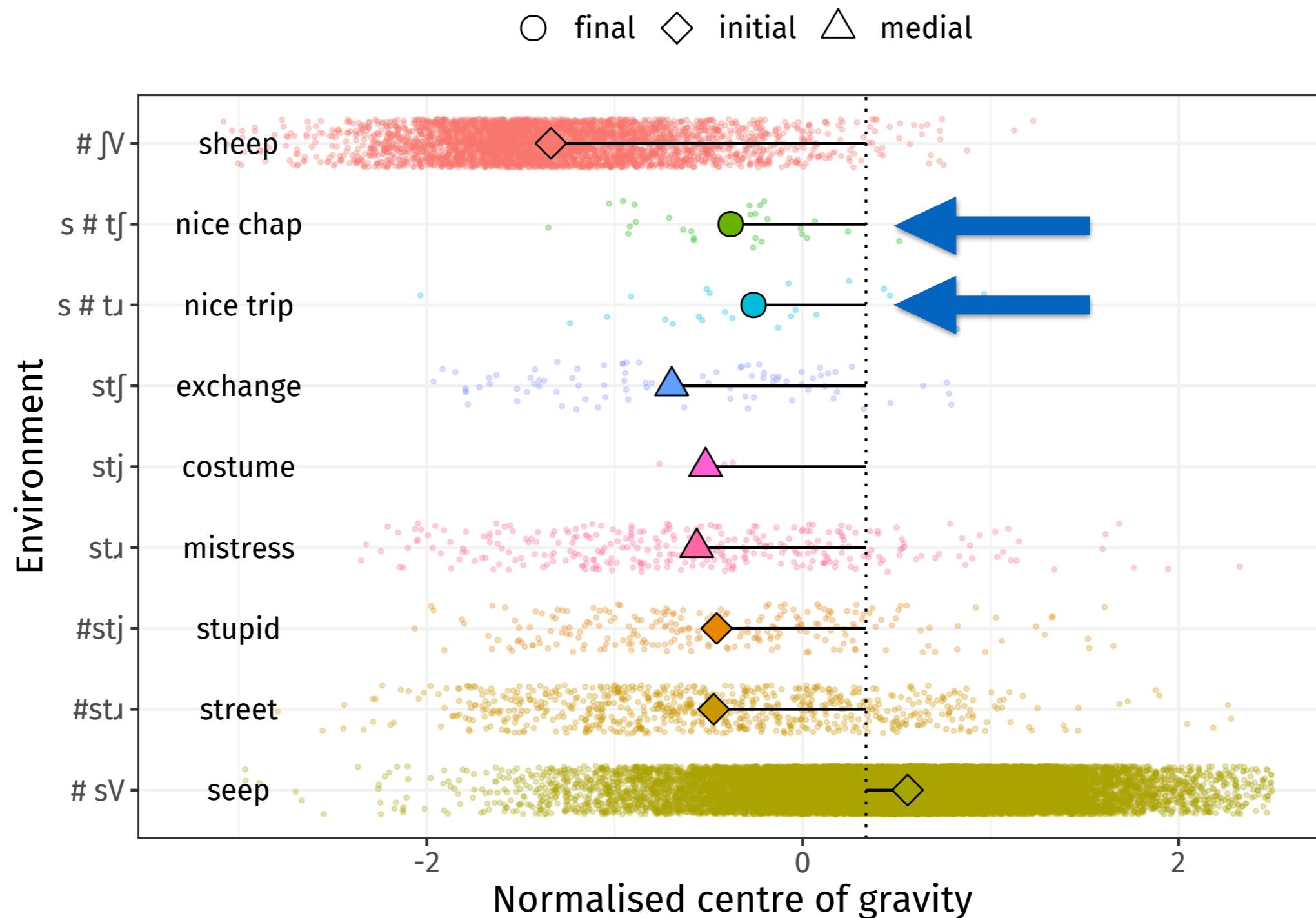
# OTHER ENVIRONMENTS



**Evidence of s-retraction before an affricate, even in the absence of /χ/ or /j/**

Also applies across word boundaries (but to a lesser extent, see Zsiga 1995)

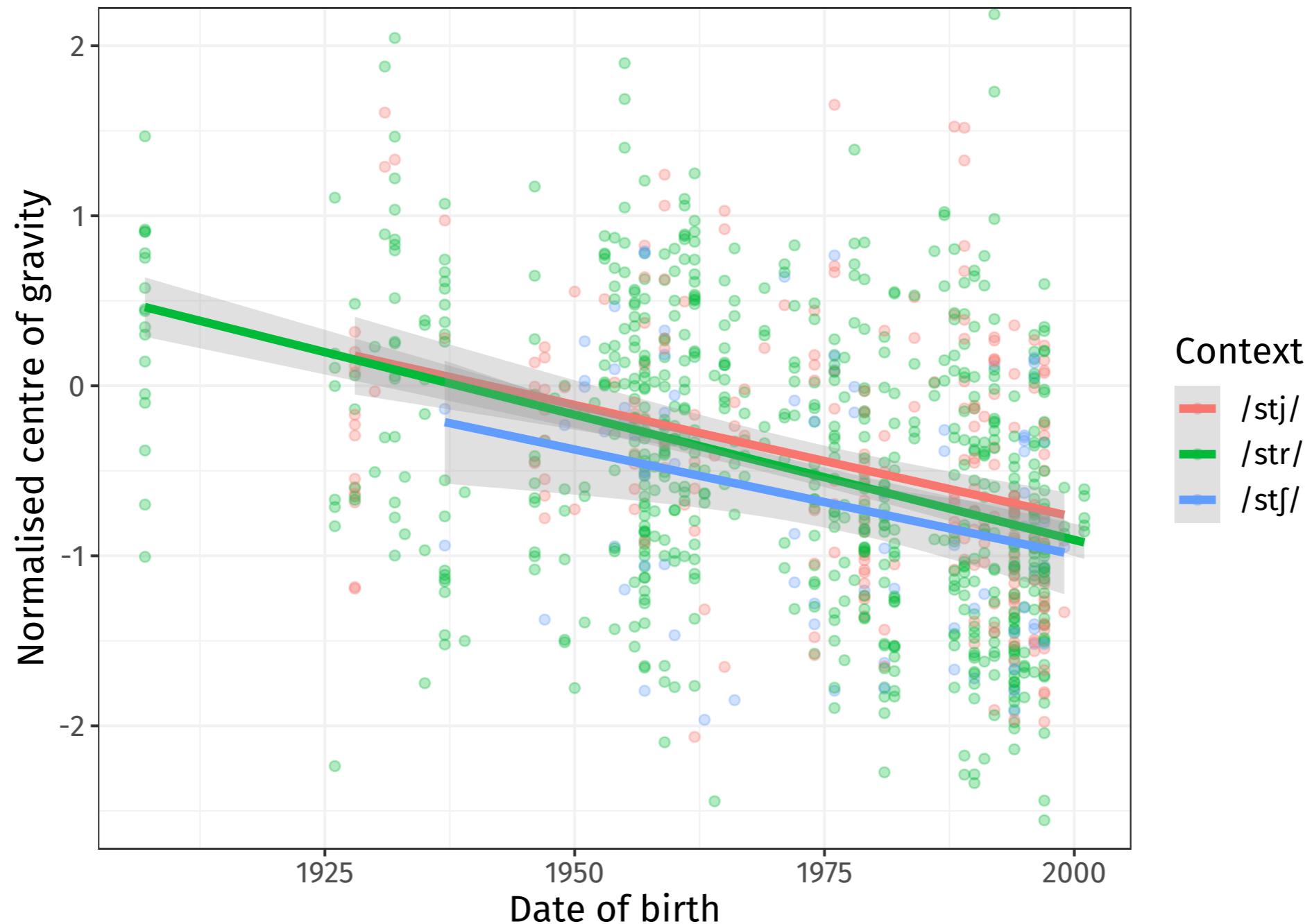
# OTHER ENVIRONMENTS



Evidence of s-retraction before an affricate, even in the absence of /ʃ/ or /tʃ/

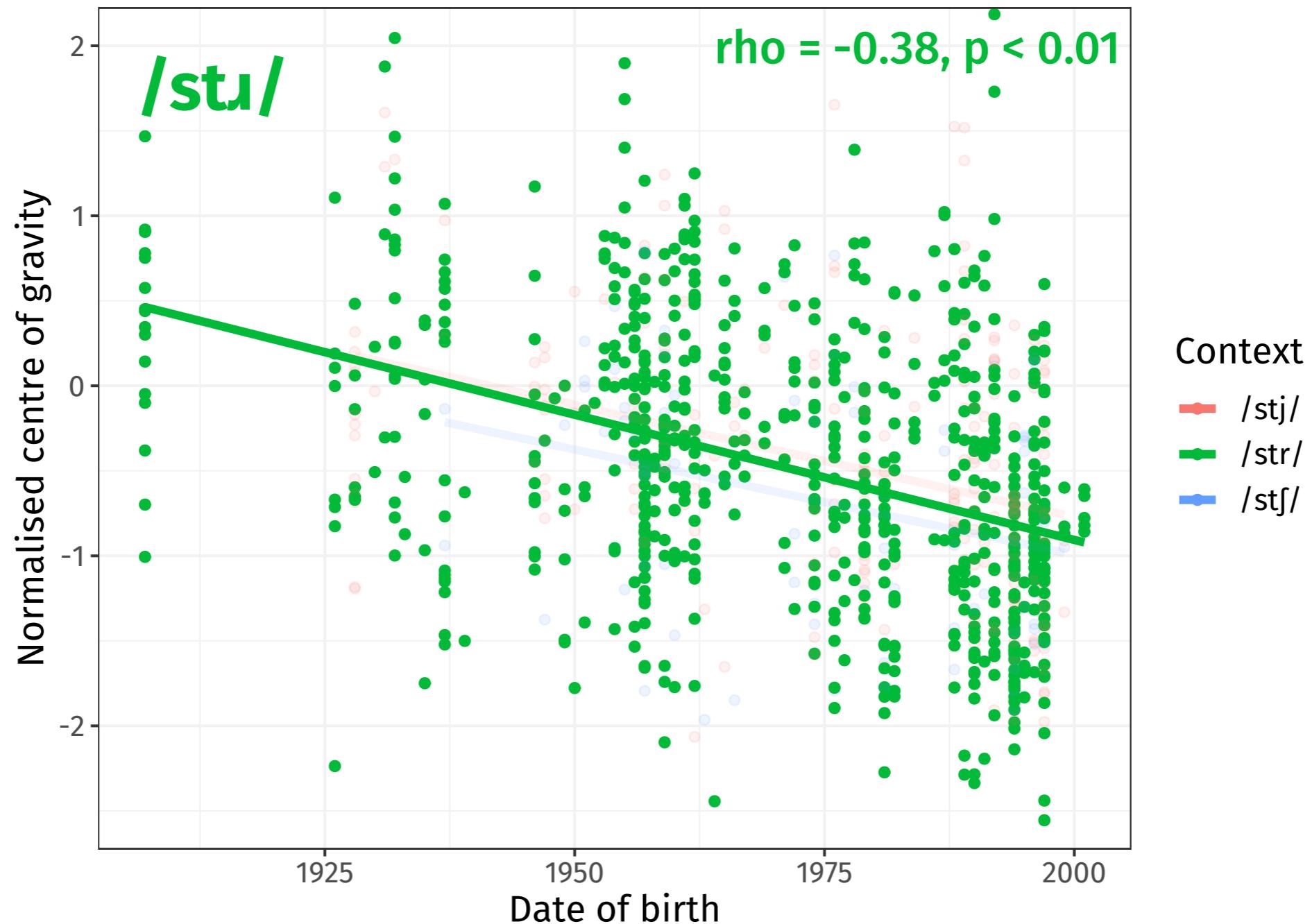
**Also applies across word boundaries (but to a lesser extent)**

# OTHER ENVIRONMENTS



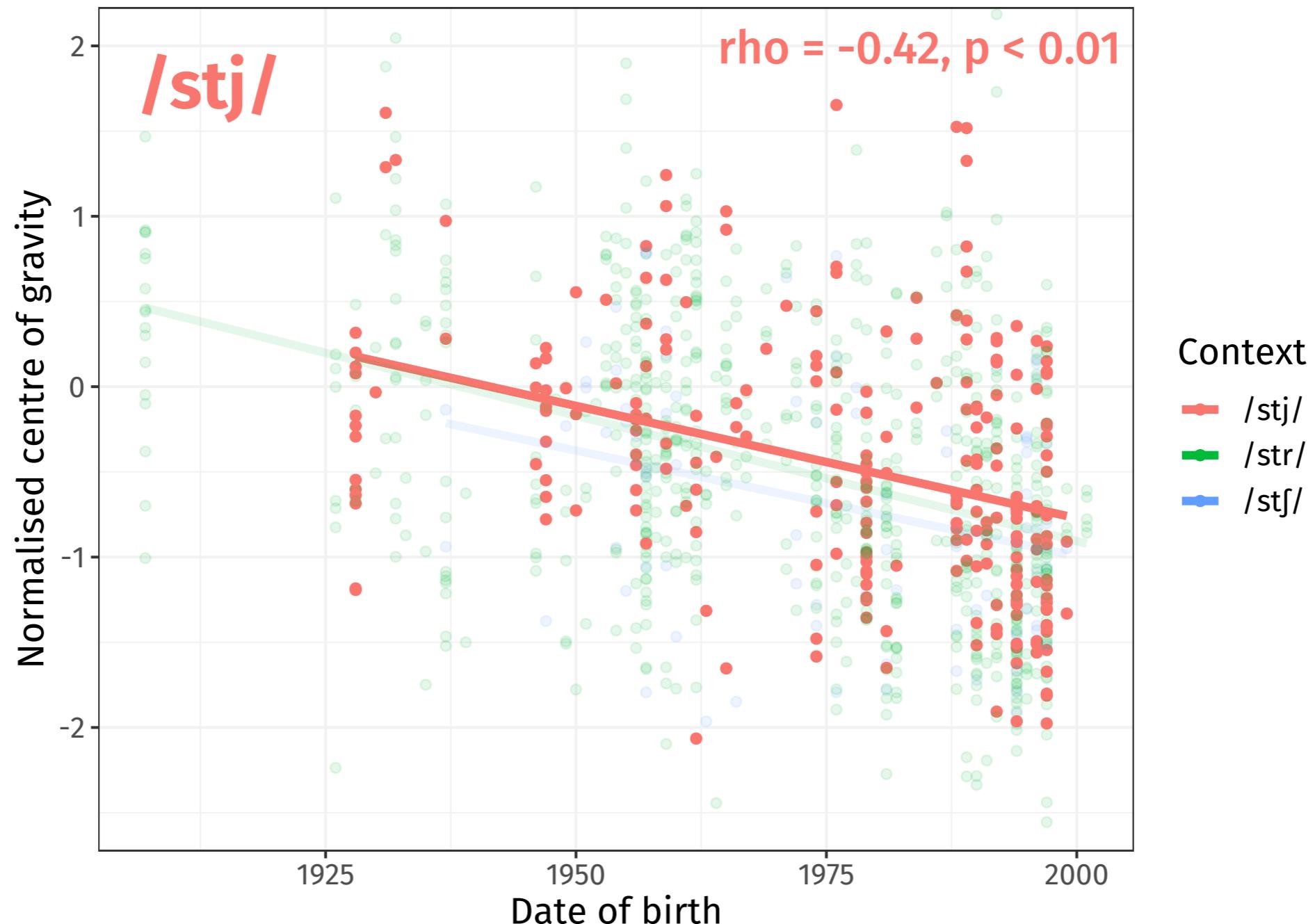
/stʃ/ (e.g. exchange) also involved in apparent-time change

# OTHER ENVIRONMENTS

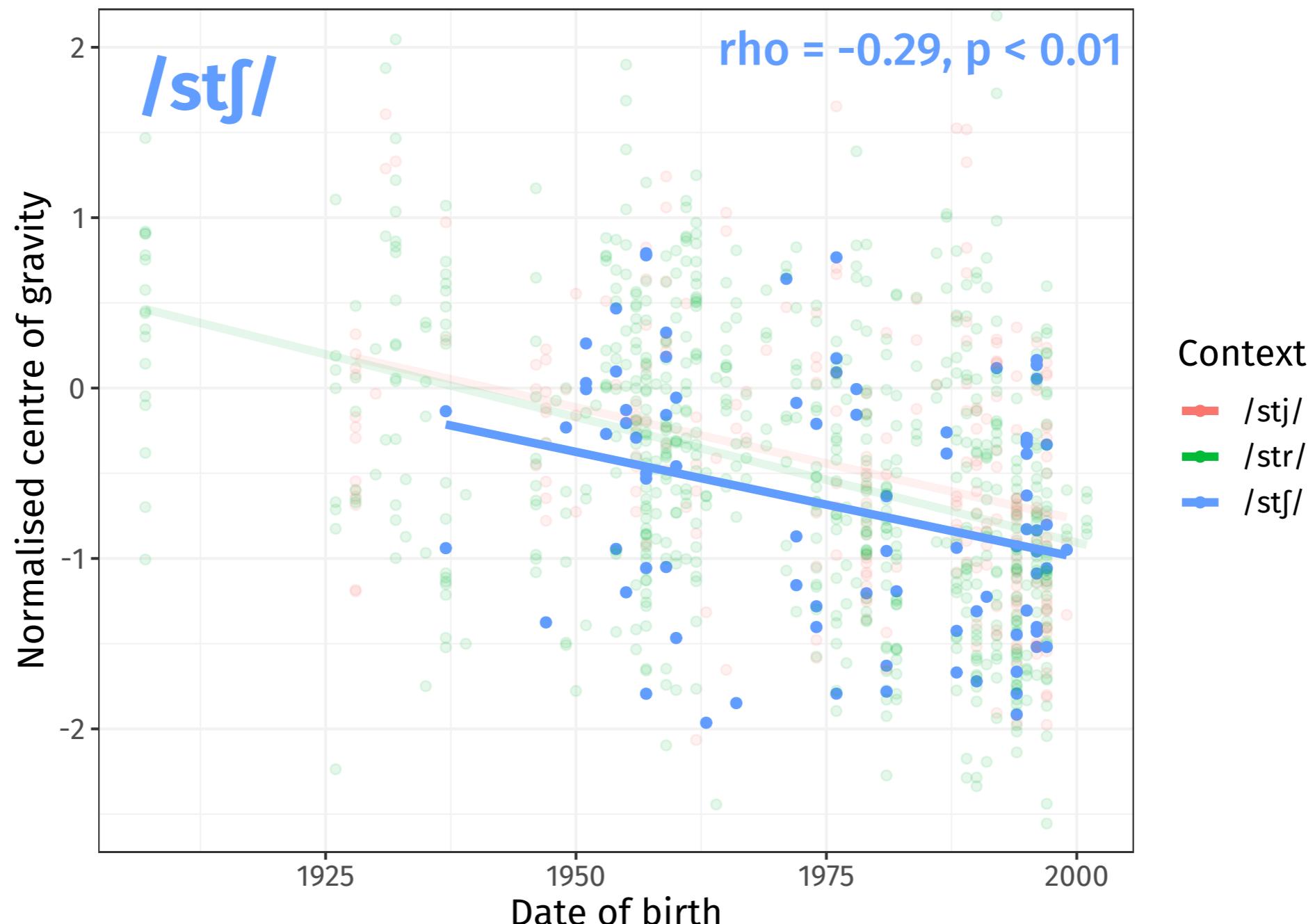


/stʃ/ (e.g. exchange) also involved in apparent-time change

# OTHER ENVIRONMENTS



# OTHER ENVIRONMENTS



# DISCUSSION

# DISCUSSION

/ʃ tɹ iː t /

/ʃ tʃɹ iː t /

- The case for non-local assimilation:
  - Baker et al. (2011) on long-distance lingual relationship between /s/ and /ɹ/
  - phonotactic restriction against [sɹ], suggesting again that there's something more phonetically natural about [ʃ]
  - evidence of local process of /sɹ/ → [ʃ] (see Zsigi 1995 on *press* vs. *press you* vs. *pressure*)
  - so there's a clear phonetic motivation as to why /r/ and /j/ could directly cause an /s/ to take on a hushier realisation

# DISCUSSION

/ʃ tɹ i: t /

/ʃ tʃɹ i: t /

- The case for local assimilation:
  - affrication occurs in both environments (Nichols & Bailey 2018; see also Magloughlin & Wilbanks 2016)
  - affrication as a single underlying cause is the more parsimonious explanation
  - evidence that /s/ retracts before an affricate even in the absence of /ɹ/ and /j/
    - both word-internally (e.g. *exchange*) and across word boundaries (e.g. *nice chap*)
    - lack of retraction in other (non-affricating) clusters with /ɹ/ and /j/, i.e. /spɹ, skɹ, spⱡ, skⱡ/

# **CONCLUSIONS**

# CONCLUSIONS

- First robust evidence of community-level change in BrEng /st/
  - regular coarticulatory sound change: led by young women, and more advanced in high frequency words and (possibly) working class speech
- New insight into the mechanisms of /s/-retraction:
  - first quantitative investigation of retraction in /stj/, which is changing in parallel with /st/
  - although /j/ and /tj/ may have some direct effect on /s/, this is unlikely to be enough to act as the initiation of this change
- The solution to the actuation problem proposed by Baker et al. (2011) – which relies on covert articulatory variation in /j/ – has not been able to account for this particular instance of /s/-retraction
- Future: fine-grained phonetic realisation of /t/ and /tj/ affrication and their change over time (covariation between /t/-affrication, /tj/-coalescence, and /s/-retraction?)

# Thank you!

-  <http://www-users.york.ac.uk/~gb1055/>  
 george.bailey@york.ac.uk  
 @grbails
-  <http://personalpages.manchester.ac.uk/staff/stephen.nichols/>  
 stephen.nichols@manchester.ac.uk
-  <https://www.research.manchester.ac.uk/portal/maciej.baranowski.html>  
 maciej.baranowski@manchester.ac.uk
-  <http://danielleturton.rbind.io/>  
 d.m.turton@lancaster.ac.uk