

# **Apparent-time change in Turkish front-mid-vowel allophony**

**Deepthi Gopal** (Uppsala) & **Stephen Nichols** (Oxford / Essex)

LAGB 2022, 15 September.

# Background

## The basic problem

**The phenomenon.** Front mid vowels /e/ and /ø/ undergo alternations conditioned by the following coda.

- – **before coda sonorants**, i.e. /r, l, m, n/ (+ complications).
  - Noted in previous descriptive literature, but not very thoroughly, not based on experimental work, & with a lot of systematic variability (...) and not at all in the phonetic or phonological literature.
    - The latter except our previous work (Gopal & Nichols ... eventual)
- In addition to the need for an up-to-date picture of the Turkish vowel system, this raises both **synchronic** and **diachronic issues**.
  - How is this active class defined? How **natural** is it? Is class information in this case straightforwardly phonetic or phonological?
    - Even though ‘the sonorants’ is a class we can describe, it is a **relatively rare active class**, which is plausibly due to its **lack of phonetic unity**.
  - **How did this system arise?** Is it consistent with pictures of phonological change that assume that new patterns are always phonetically well-grounded?

# Background

## The Turkish vowel system

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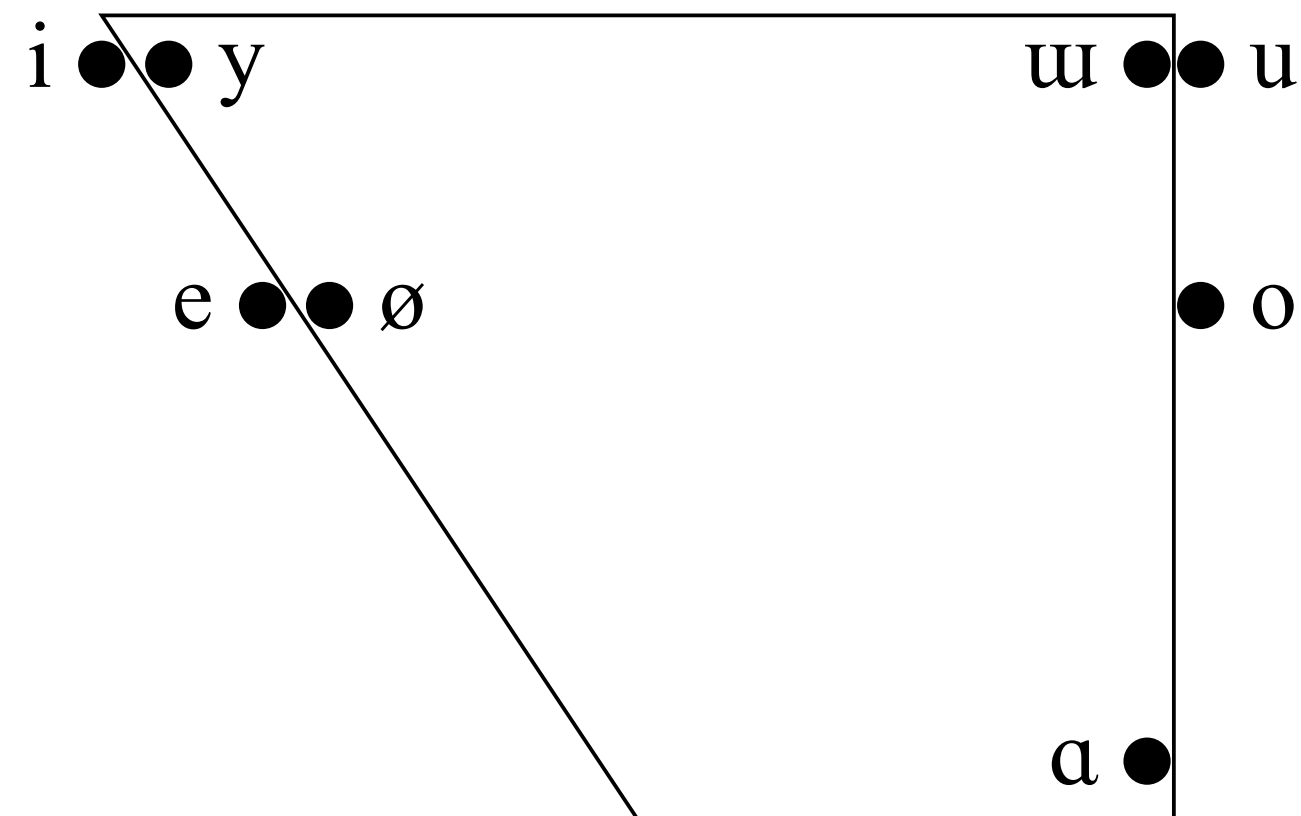
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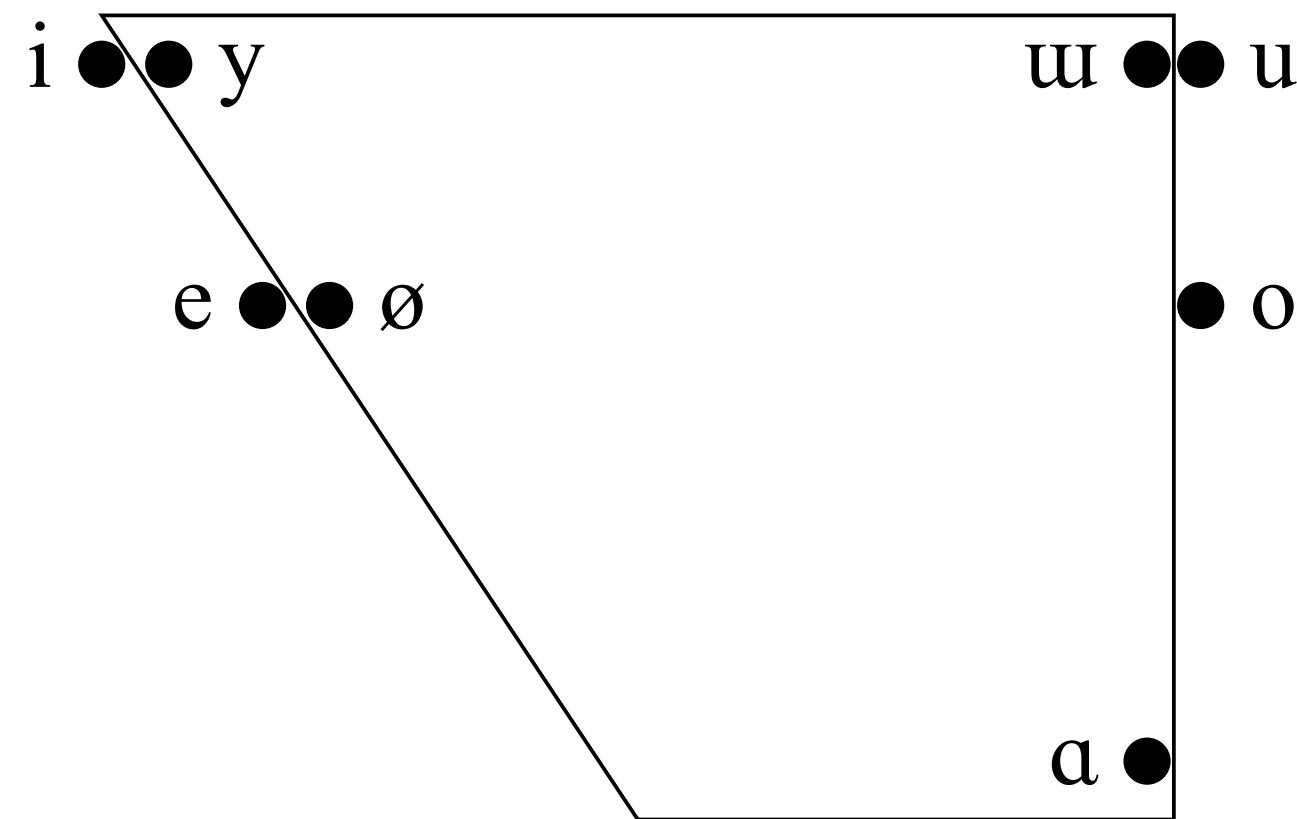


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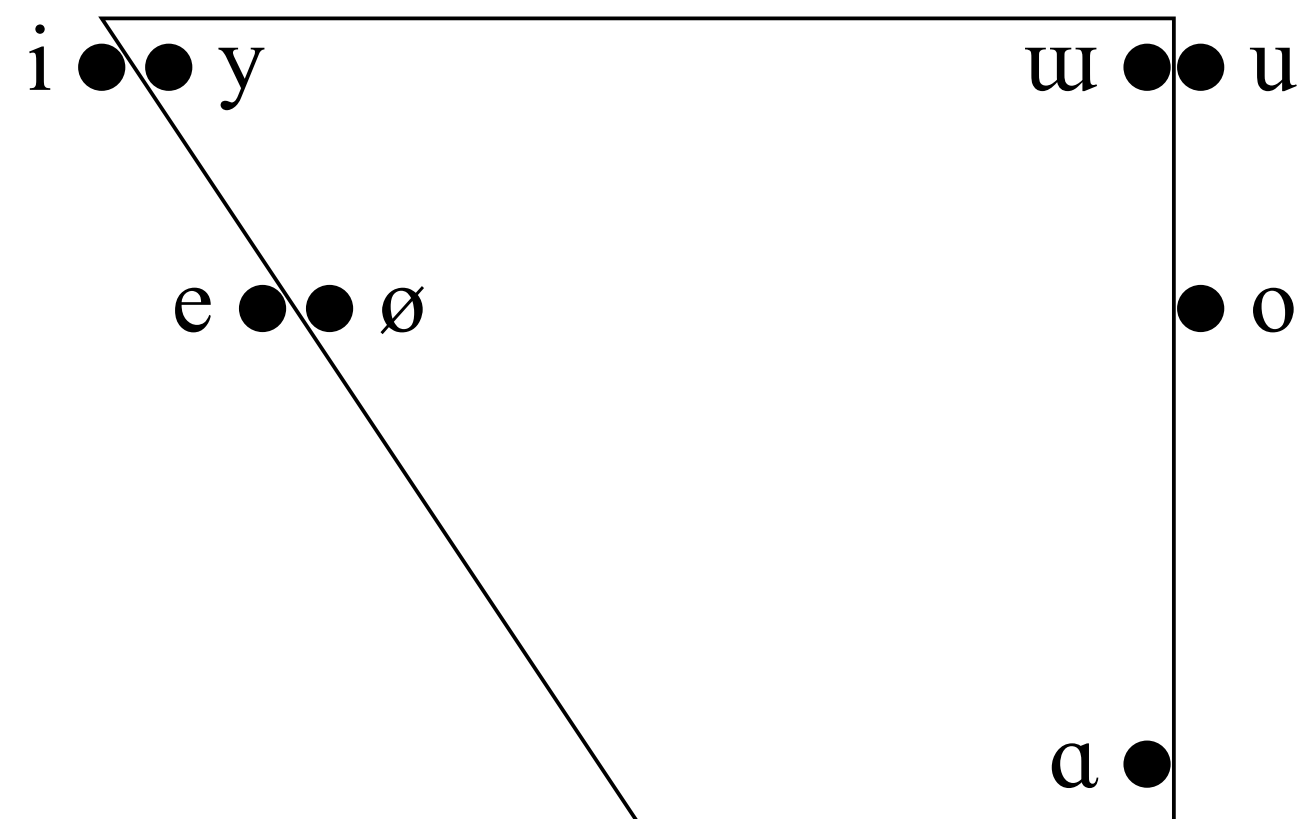
but really only in initial syllables

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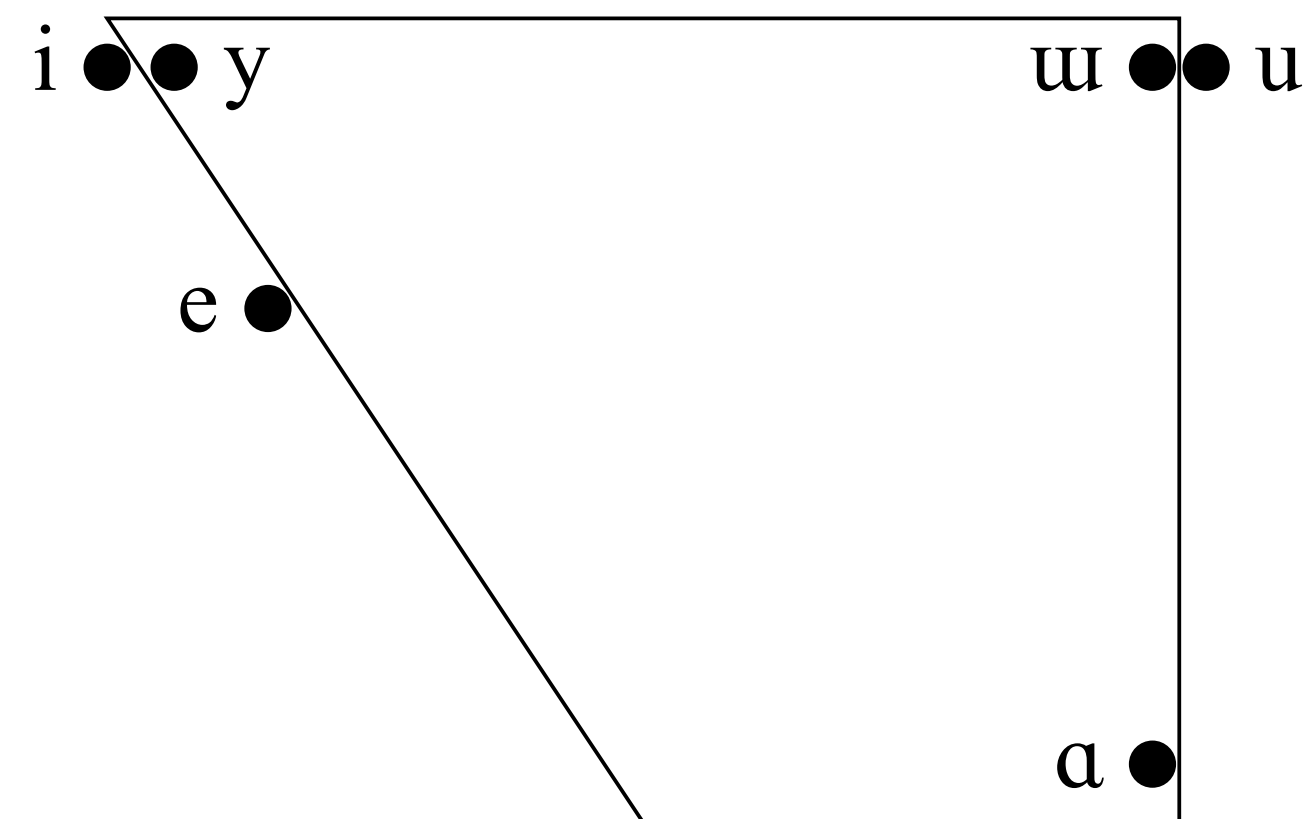
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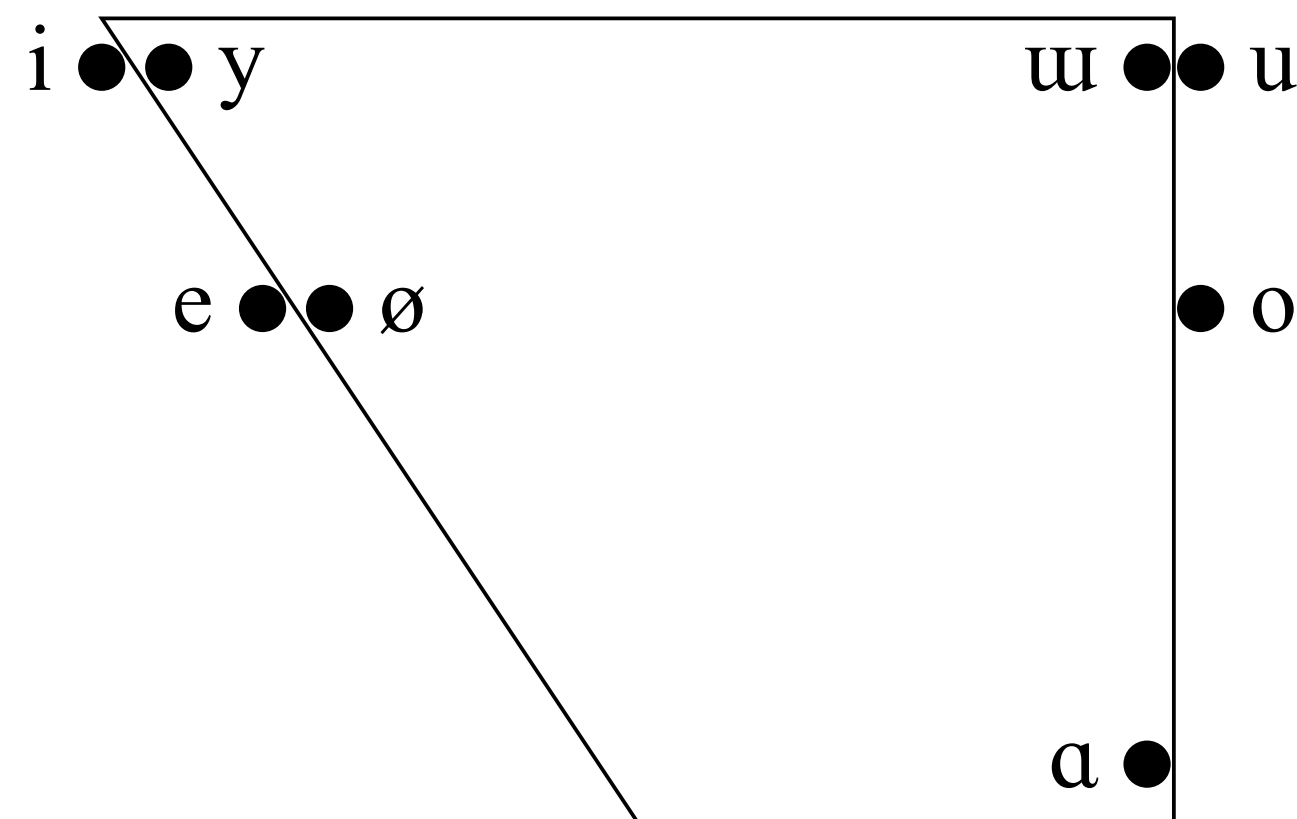
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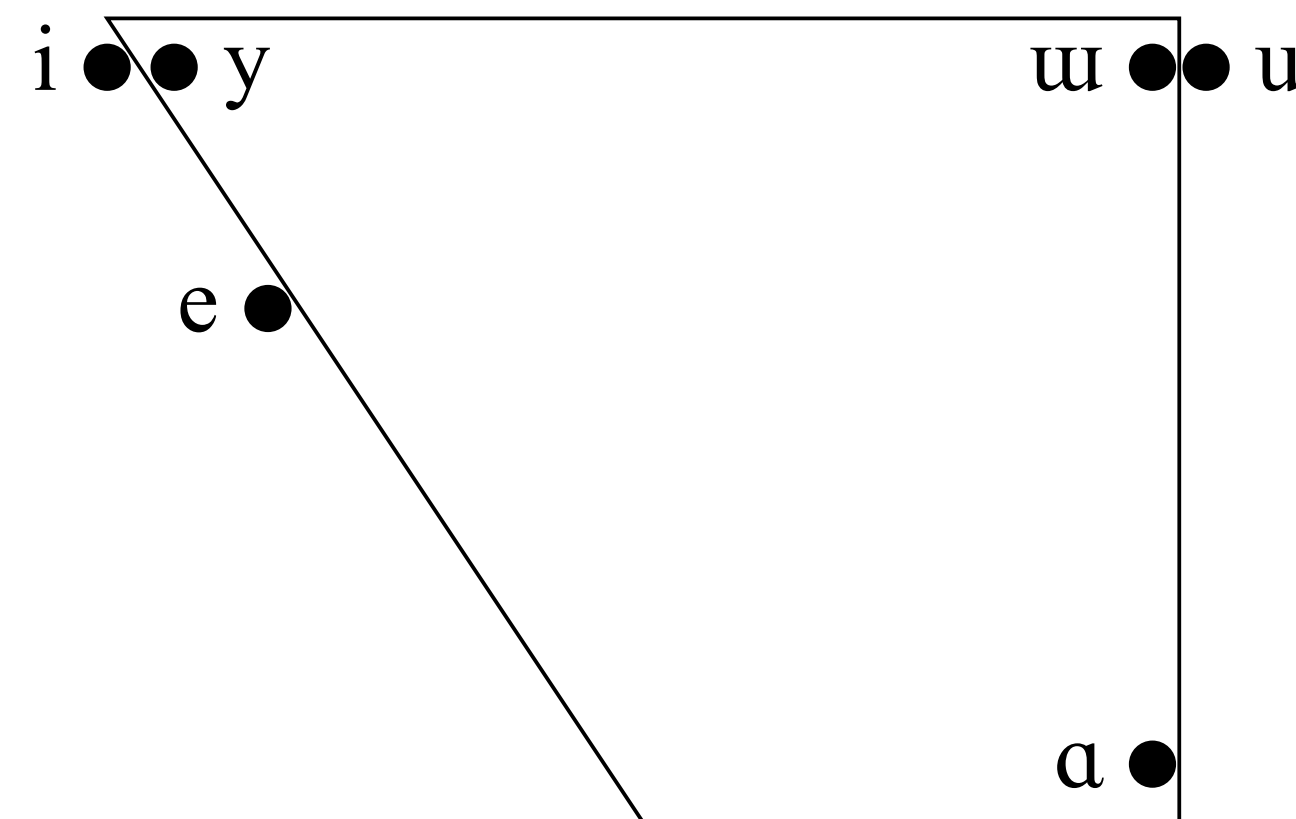
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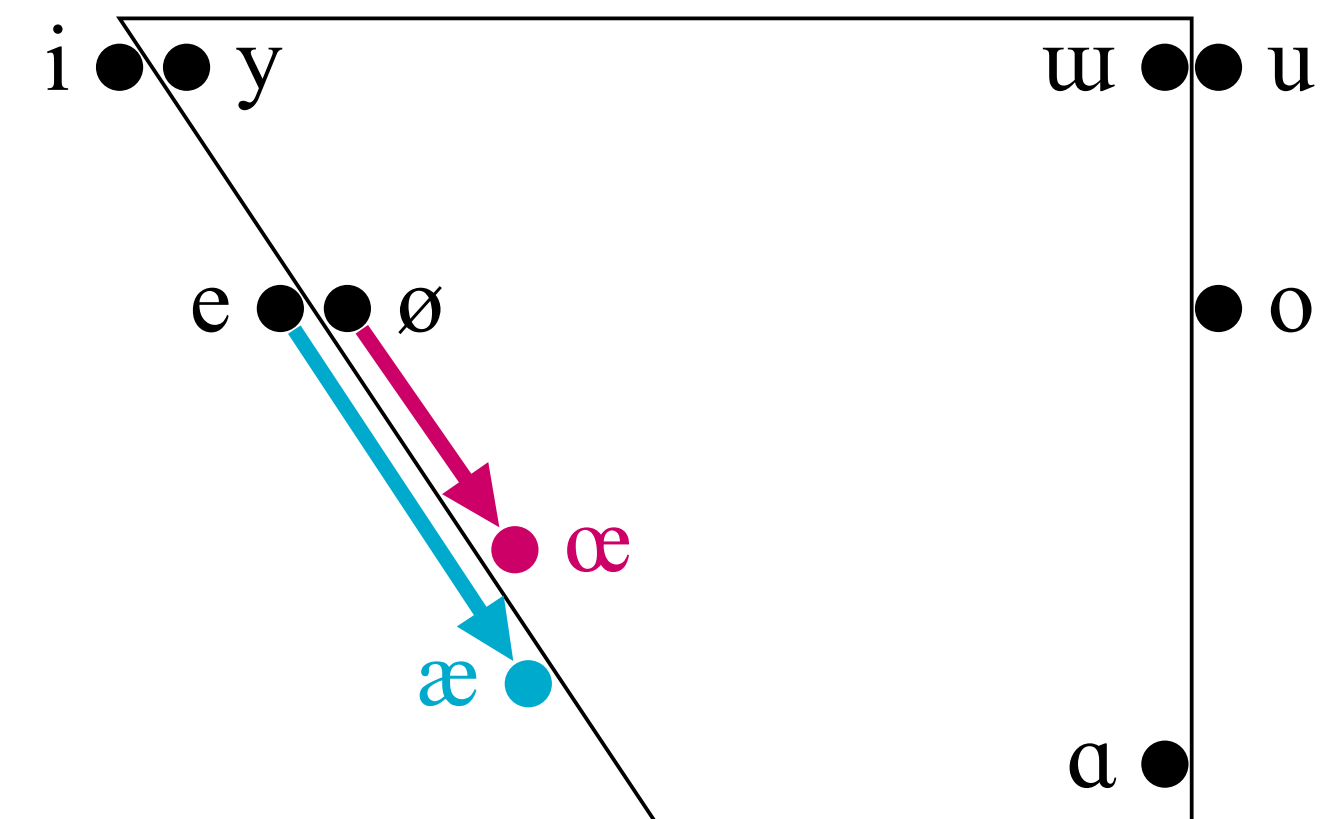
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... worth observing at this stage that vowels in this pattern go where they have room to go

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- General point of agreement: Turkish has 8 vowels in a pretty symmetrical system.
- **Previous descriptions.** We claimed that there's a little bit of attestation of this phenomenon in the descriptive literature. Here is what we have found:
  - Lewis's (1967, 14) reference grammar: describes **raising in unstressed open syllables**: 'a closer pronunciation, verging on the sound of i, especially in the first syllables of [...] gece 'night' ', but mentions **no lower allophone** and **no preconsonantal effects of any kind**.
  - Kornfilt (1997, 512), 30 years later: an 'alternation phenomenon affects the front, nonhigh vowels [e] and [ø], **which are lowered before sonorants in closed syllables**'. She transcribes the lower allophone of [e] as [ɛ], but this seems to be an impressionistic judgment, not a measurement.
  - Göksel and Kerslake (2005) give the distribution of /e/ as [æ] **before sonorants**, [ɛ] **in stressed open syllables**, and [e] **elsewhere**.

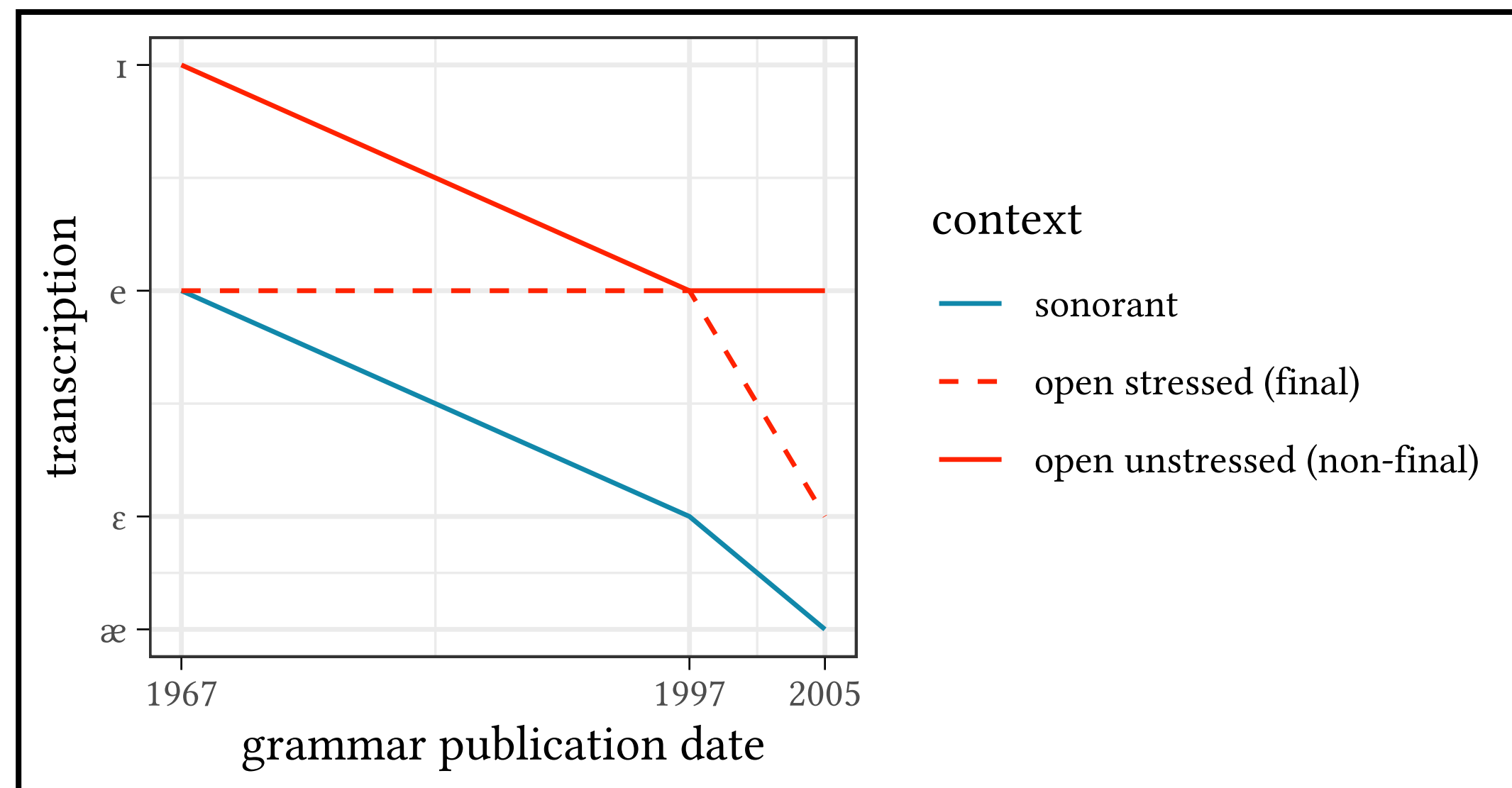


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apparent-time plot  
of descriptive  
grammars of Turkish

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## Mid-vowel alternations in Turkish

**The phenomenon.** Front mid vowels /e/ and /ø/ undergo alternations conditioned by the following coda.

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/erdem/	[æ.r.dæm]	'virtue'
/hejkel/	[hej.kæɫ]	'statue'
/gizem/	[gi.zæm]	'mystery'
/biber/	[bi.bæɾ]	'pepper'
/gøl/	[gœɫ]	'lake'
/gømmek/	[gœm.mek]	'bury'-INF
/şoför/	[ʃo.fœɾ]	'driver'

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This is destroyed by resyllabification-inducing affixation.

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/gømmek/	[gœm.mek]	'bury'-INF
/ʃofør/	[ʃo.fœɾ]	'driver'

[æ.r.de.mi]	'virtue'-ACC
[hej.ke.li]	'statue'-ACC
[gi.ze.miz]	'mystery'-1PL.POSS
[bi.be.rin]	'pepper'-2SG.POSS
[gø.ly]	'lake'-ACC
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/gømmek/	[gœm.mek]	'bury'-INF	[gø.mer]
/fofør/	[fo.fœɾ]	'driver'	[fo.fø.rɯn]

/bebek/	[be.bek]	'baby'
/hejkel/	[hej.kæɫ]	'statue'
/herkes/	[hær.kes]	'everyone'
/tjøp/	[tjøp]	'garbage'
/göz/	[göz]	'eye'
/søjle/	[søj.le]	'say'-IMP.2SG
/ban.li.jø/	[ban.li.jø]	'suburb'

**/j/ is probably not a sonorant anyway.**

1. sonorant-obstruent clusters ok word-finally (ders, mert, genç, renk ...), but j+C clusters in recent loans (teyp, feyk) broken up by high-vowel epenthesis.
2. coda h-deletion pervasive before sonorant onsets (fihrist 'index', tehlike 'danger', Mehmet), but not j: Yahya, Kütahya

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in some syllables closed by /z/

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/pekmez/	[pek.mæz]	'molasses'
/merkez/	[mæɾ.kæz]	'centre'
/gel-mez/	[gæɫ.mæz]	'go'-NEG.AOR



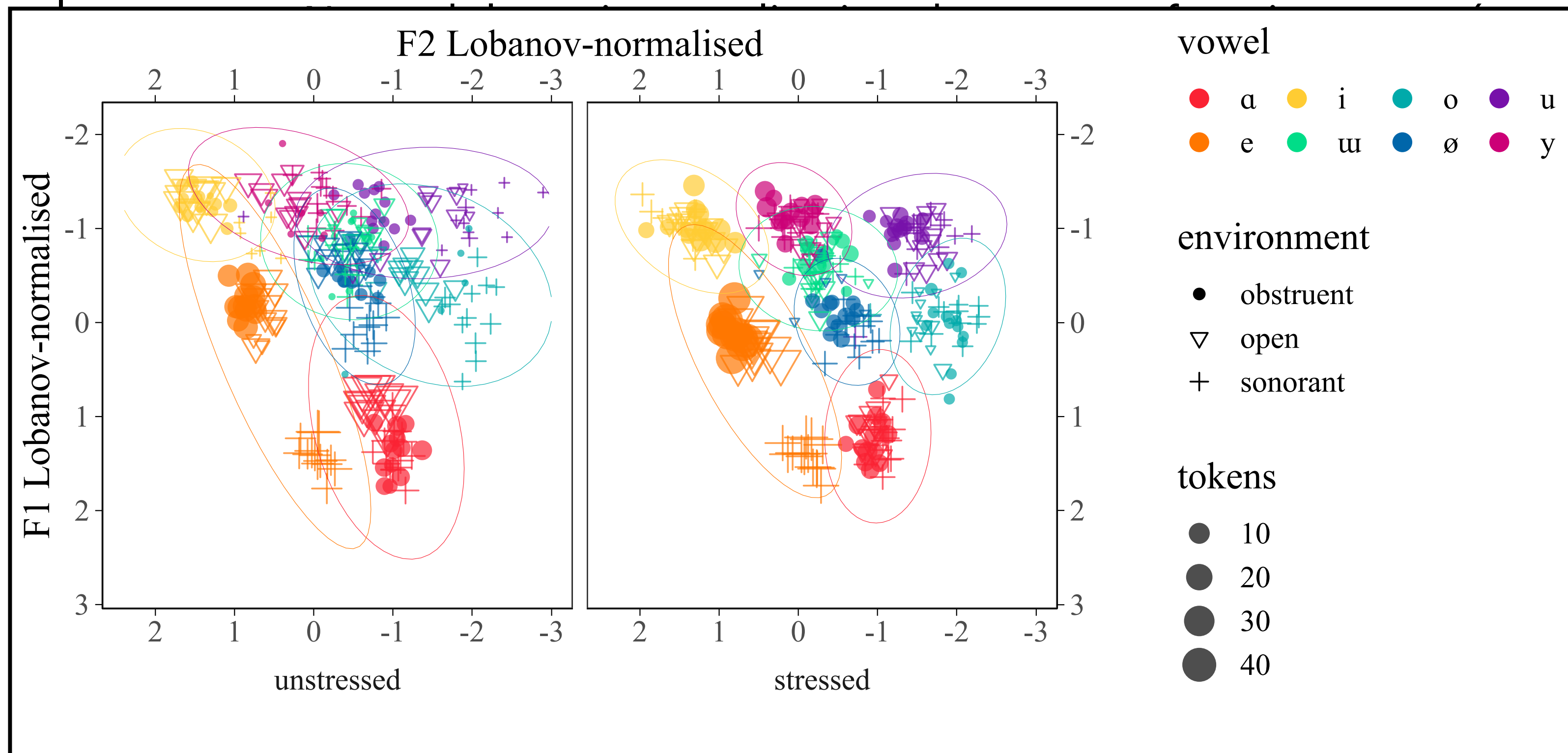
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top, pre-fricative, pre-#)



Data from our previous production study — 11 female speakers, birth years 1980– 1997. This is massive in phonetic space — completely discontinuous sets of realisations in the different environments.

# Typology & diachrony

## Some preliminary anxieties

**So far.** Front mid vowels /e/ and /ø/ undergo alternations conditioned by the following coda.

/r l m n/? /z/? Is this really a good idea?

- **Question.** How natural is phonological change, *really*?

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- Our case is at the intersection of two broader typologies of basically phonetically well-motivated phenomena:
  - **vowel quality effects conditioned by syll. structure** (‘closed syllable vowel laxing’)
    - Closed-syllable vowel laxing is well-established, but **only sometimes predicated on the manner of articulation of the coda consonant**, and usually if so **only licensed with consonants that are particularly good phonetic precursors to lowering.**
  - **sonorant-related height effects**
    - Sonorant-triggered height effects are common but **rarely dependent on syllable structure** and **rarely independent of the choice of segment within that class;**
      - and the different sonorants have very different phonetics...

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- Both diagnoses suggest that we should think about the relationship between the different consonants in this class and the pattern that they trigger.
  - Strong articulatory and acoustic properties of the **rhotics cross-linguistically favour the development of height effects in a pre-rhotic vowel.**

**lowered third formant** (Ladefoged 2003); **trills** (Recasens 2002, Recasens & Pallarès 1999) **force tongue dorsum lowering** and retraction



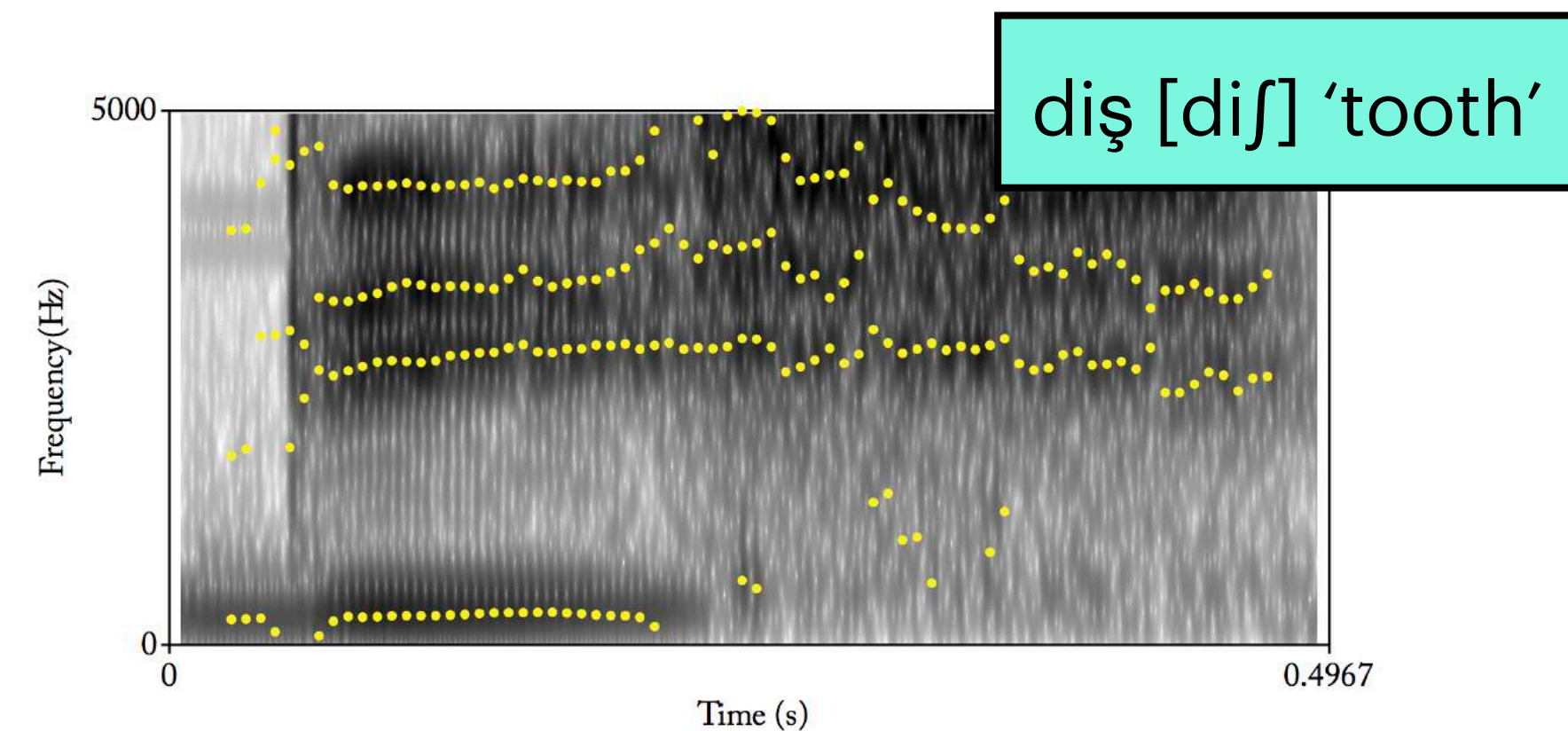
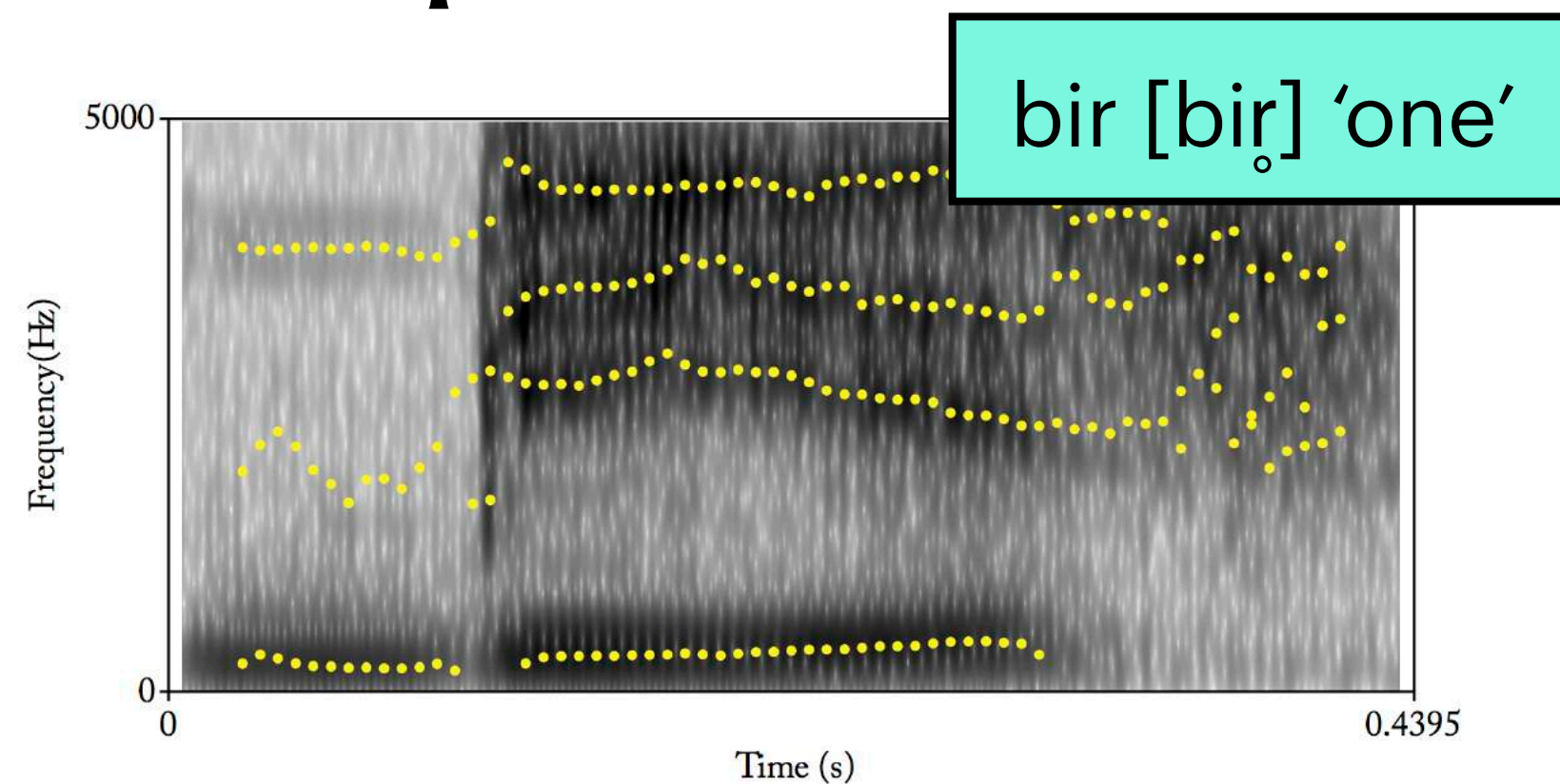
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  - Strong articulatory and acoustic properties of the **rhotics cross-linguistically favour the development of height effects in a pre-rhotic vowel.**
  - **The laterals are less straightforward.** Languages with lowering rules often ignore them.

while **velar laterals** should cause **F2 decrease & F1 increase** (Recasens 2012, Carter & Local 2007), **palatalised laterals** should cause **F1 decrease = raising**

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  - **The laterals are less straightforward.** Languages with lowering rules often ignore them.
  - **The nasals are a bit ambivalent — associated with both phonetic raising and lowering.**

**anticipatory nasalisation should increase F1** (Krakow et al. 1988), but the **nasal anti-formant** causes **perceptual raising** in low-mid, low vowels.

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- **Take-home message.** The set of segments involved in the Turkish case, considered individually, contains:
  - some unambiguously pretty good phonetic triggers for lowering (r)
  - some triggers whose effect depends crucially on secondary articulation (l good if velarised, bad if palatalised);
  - some triggers whose potential effects are multifarious, potentially competing (m, n)



# The corpus

## Speaker metadata

Name	Gender	Birthyear	Birthplace
Nazim Hikmet	M	1902	Thessaloniki
Oktay Rifat	M	1914	Trabzon
Orhan Veli	M	1915	İstanbul
Behçet Necatigil	M	1916	İstanbul
Can Yücel	M	1926	İstanbul
Gülten Akin	F	1933	Yozgat
Hilmi Yavuz	M	1936	İstanbul
Refik Durbaş	M	1944	Erzurum
Metin Cengiz	M	1953	Ardahan
Tugrul Tanyol	M	1953	İstanbul
Haydar Ergülen	M	1956	Eskişehir
Adnan Özer	M	1957	Gazioğlu/Tekirdağ

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Metin Celâl	M	1961	Ankara
Reha Yünlüel	M	1967	Edremit
Gökçenur Çelebioğlu	M	1971	İstanbul
Onur Behramoğlu	M	1975	İstanbul
Nilay Özer	F	1976	İstanbul
Mehmet Altun	M	1977	Kars
Efe Duyan	M	1981	İstanbul
Neslihan Yalman	F	1982	Ankara
Gonca Özmen	F	1982	Burdur
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Publically-available recordings of poets reading their own poems (public figures who we can therefore name).

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24 speakers (19 male, 5 female; birth years 1902–1986, median 1957). 276 minutes of (largely) continuous speech (median 10 minutes per speaker), with 12,630 tokens of /e/ in all (3,270 before tautosyllabic sonorants, 1,812 before tautosyllabic obstruents, 7,548 in open syllables). This presentation: 14 of the 24 speakers, all male.

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largest number of speakers M. from Istanbul — we expect this to be point of origin / these speakers alone might be best picture of 'stationary' diachrony (but won't get into that here)



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# Data

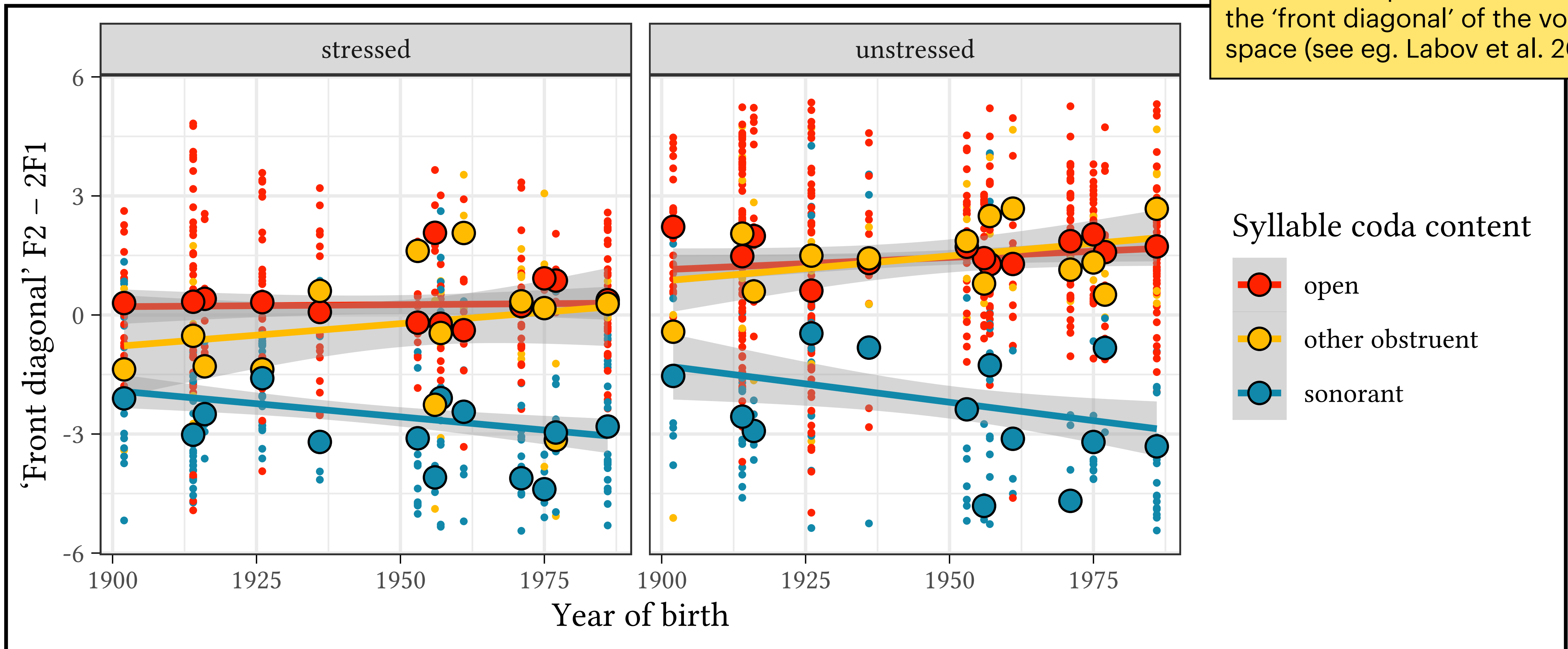
## ***/e/*-realisations across environments**

F2 – 2F1 to capture movement along the ‘front diagonal’ of the vowel space (see eg. Labov et al. 2013).

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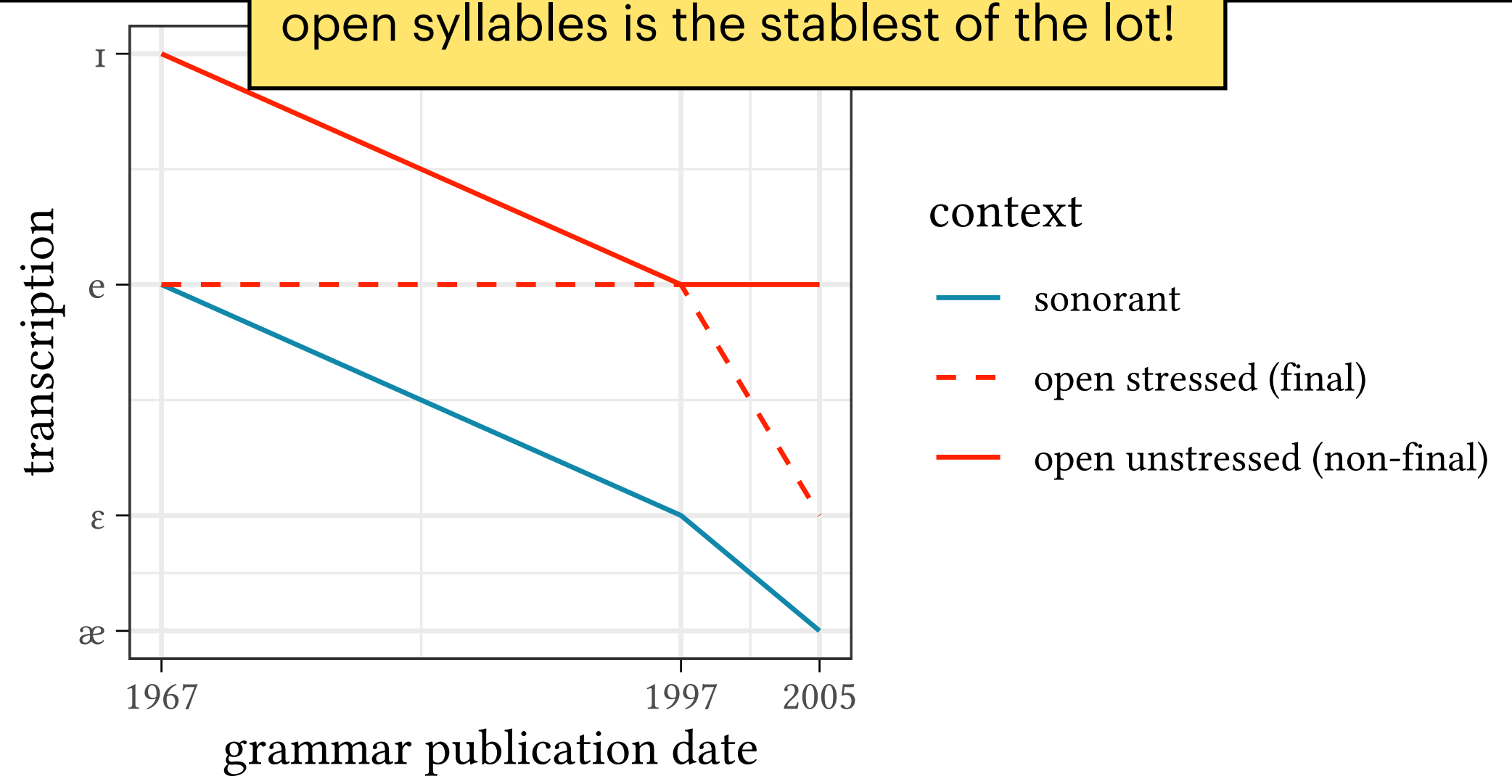
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What the descriptive grammars seem to get wrong is 'what's moving' — /e/ in open syllables is the stablest of the lot!



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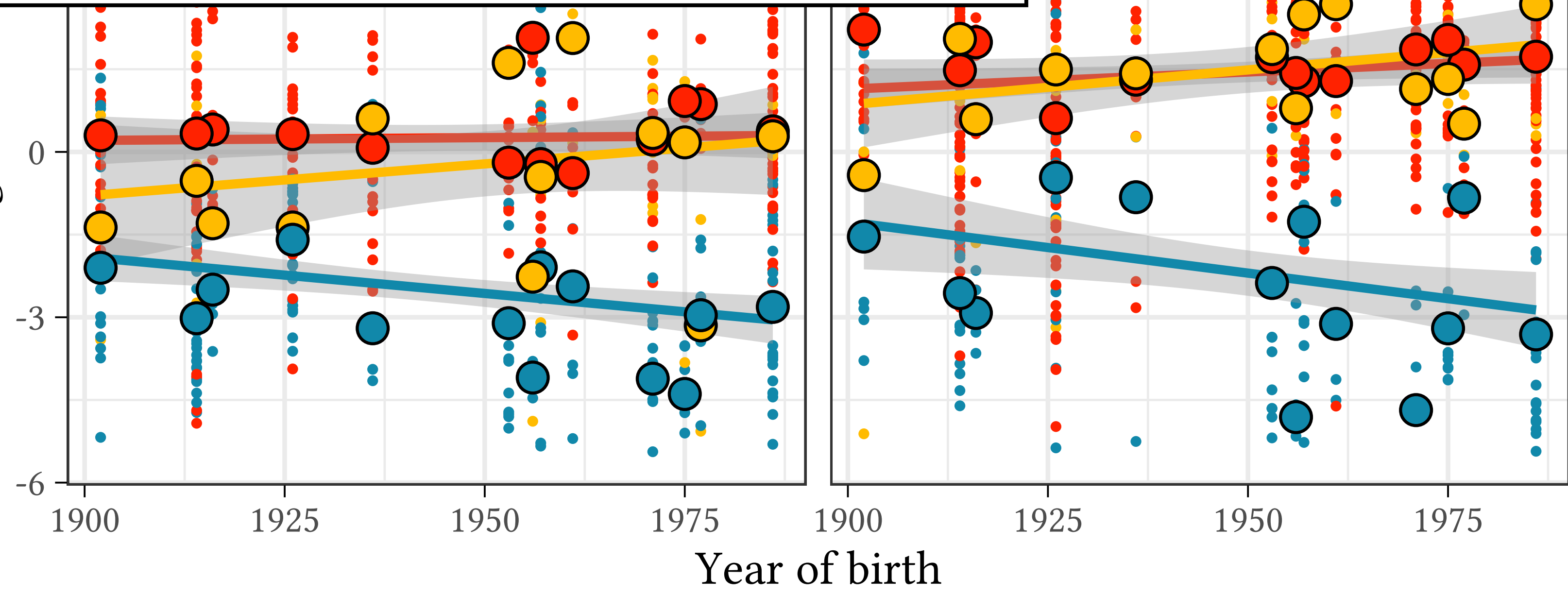
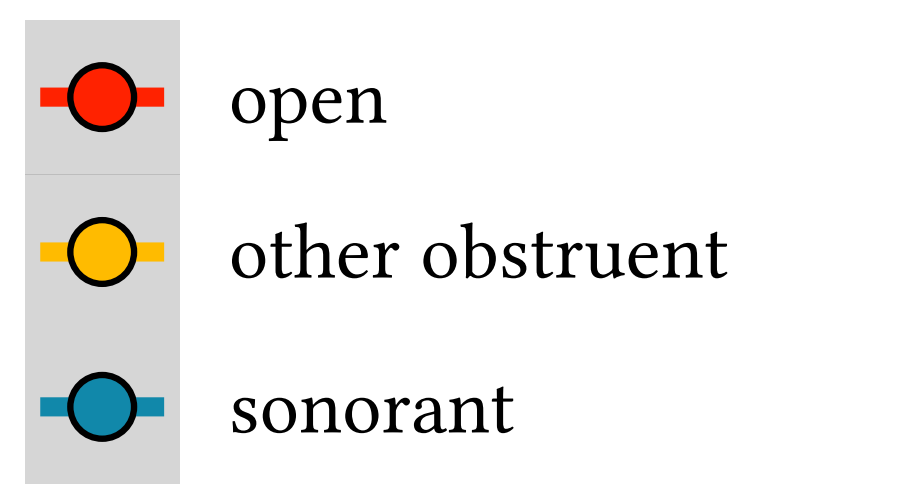
## cross environments

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'Front diagonal' F2 – 2F1

unstressed

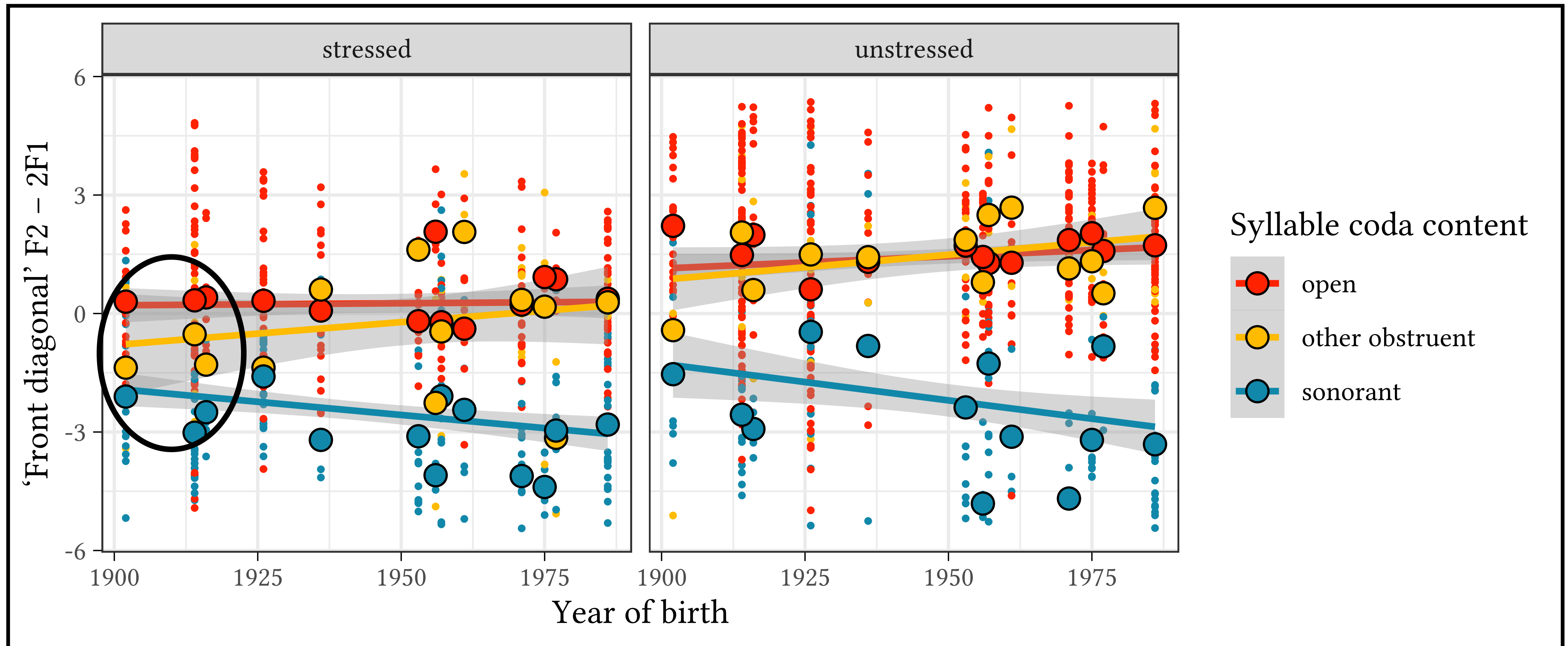
Syllable coda content



**old system.** closed syllables ≠ open syllables  
irrespective of further environment?

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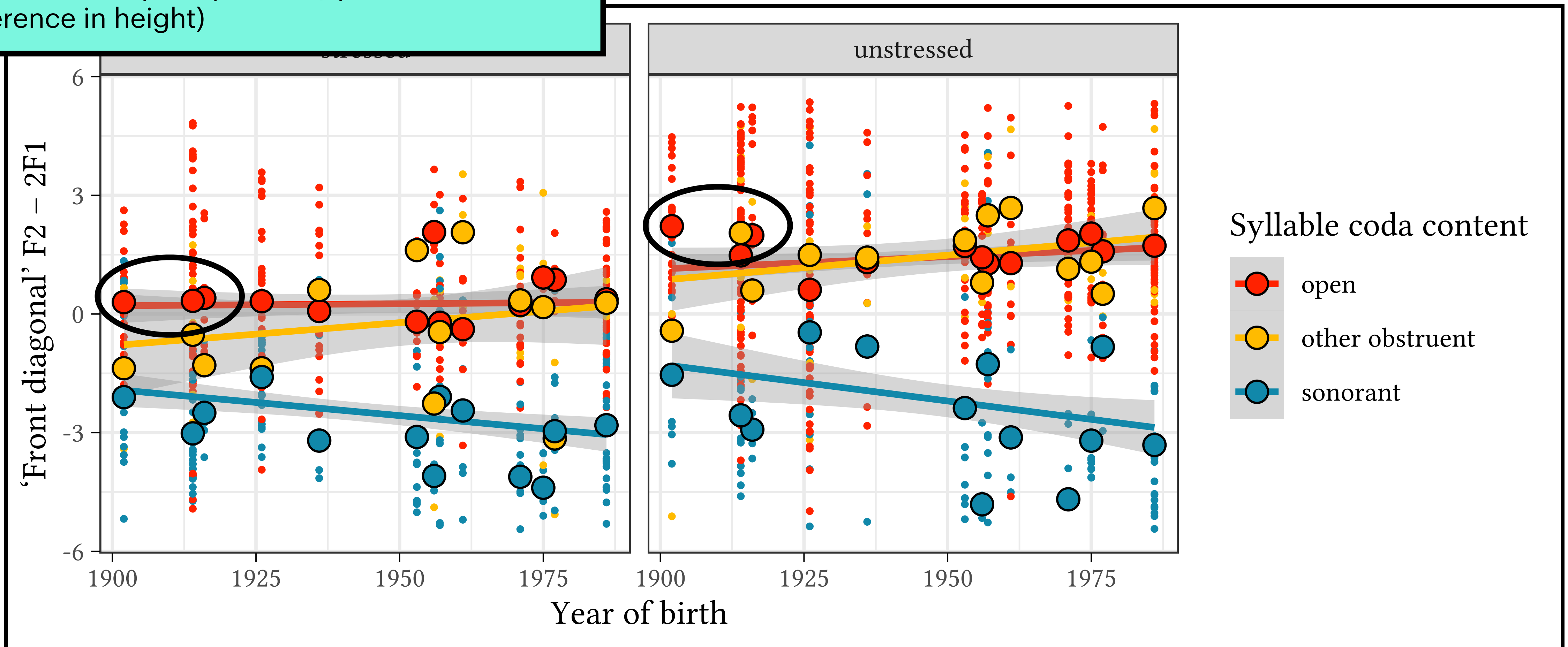


**old system.** closed syllables ≠ open syllables  
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**old system.** possible to tell apart stressed &  
unstressed in open syllables (systematic  
difference in height)

# Data

## variations across environments



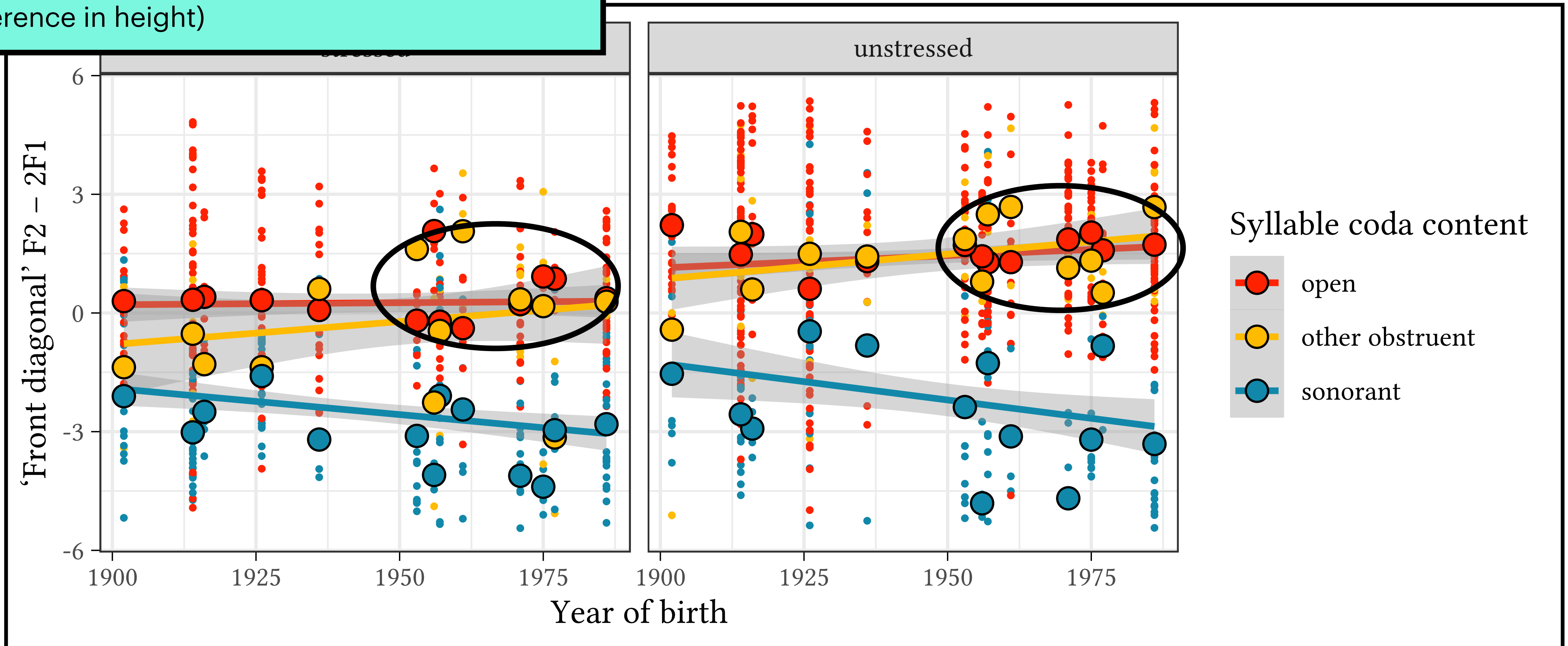
**old system.** closed syllables ≠ open syllables  
irrespective of further environment?

**old system.** possible to tell apart stressed &  
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difference in height)

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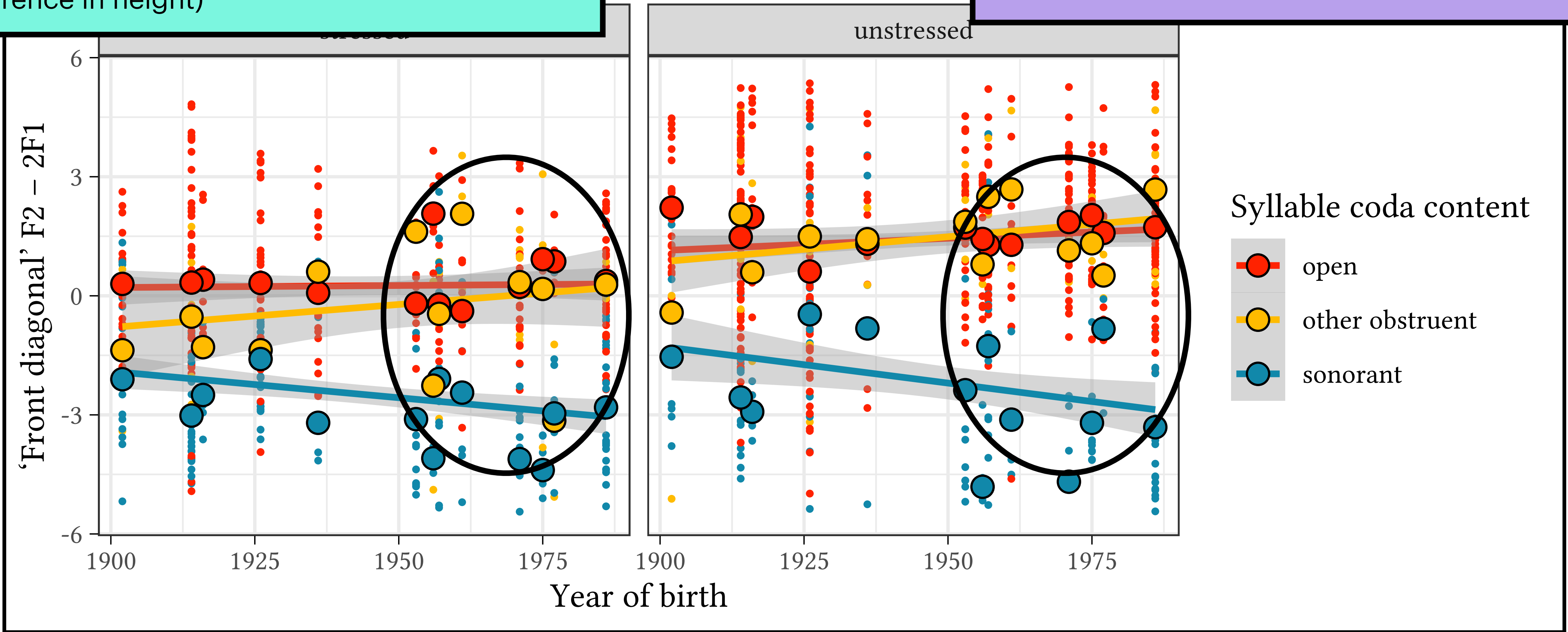
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variations across environ



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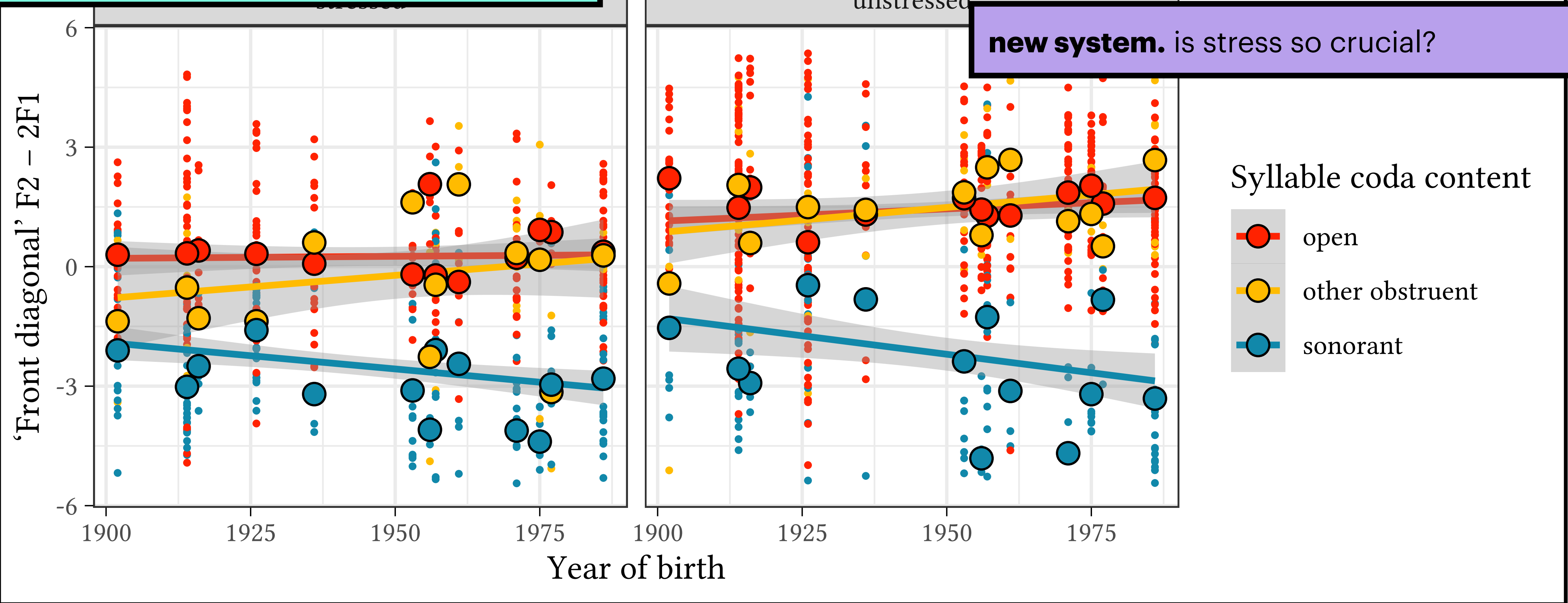
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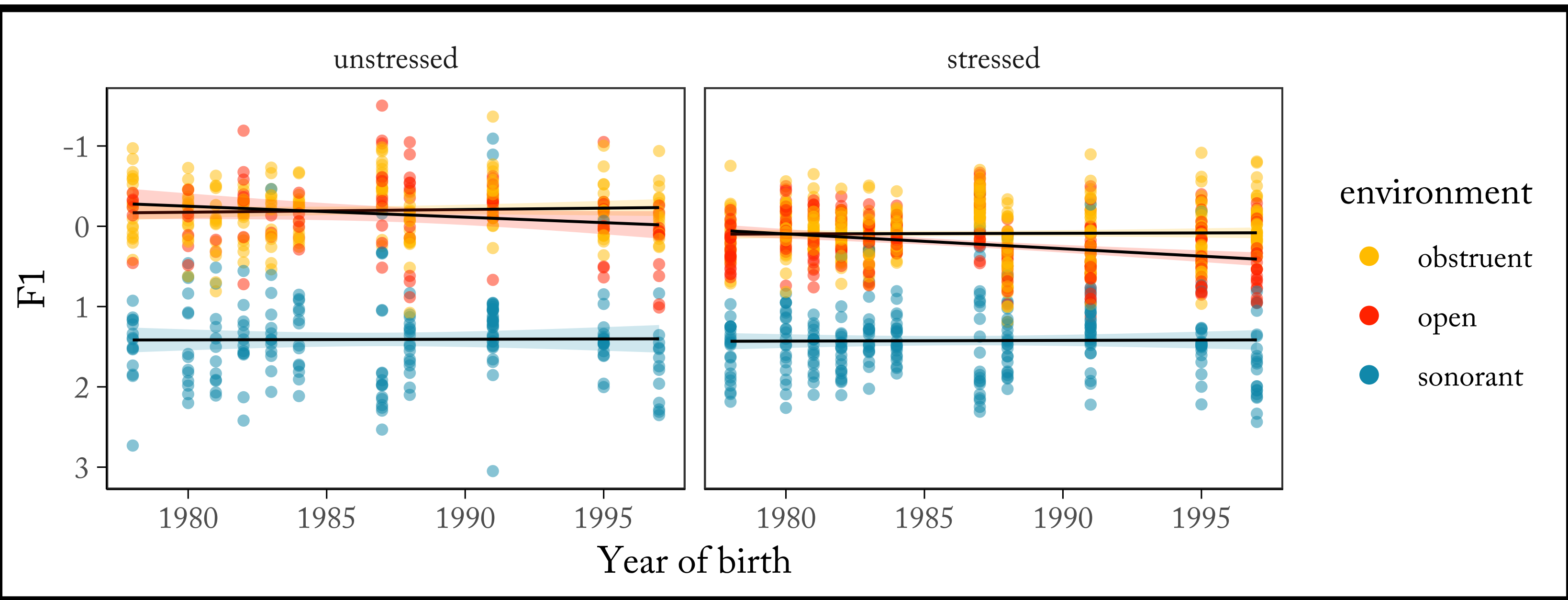
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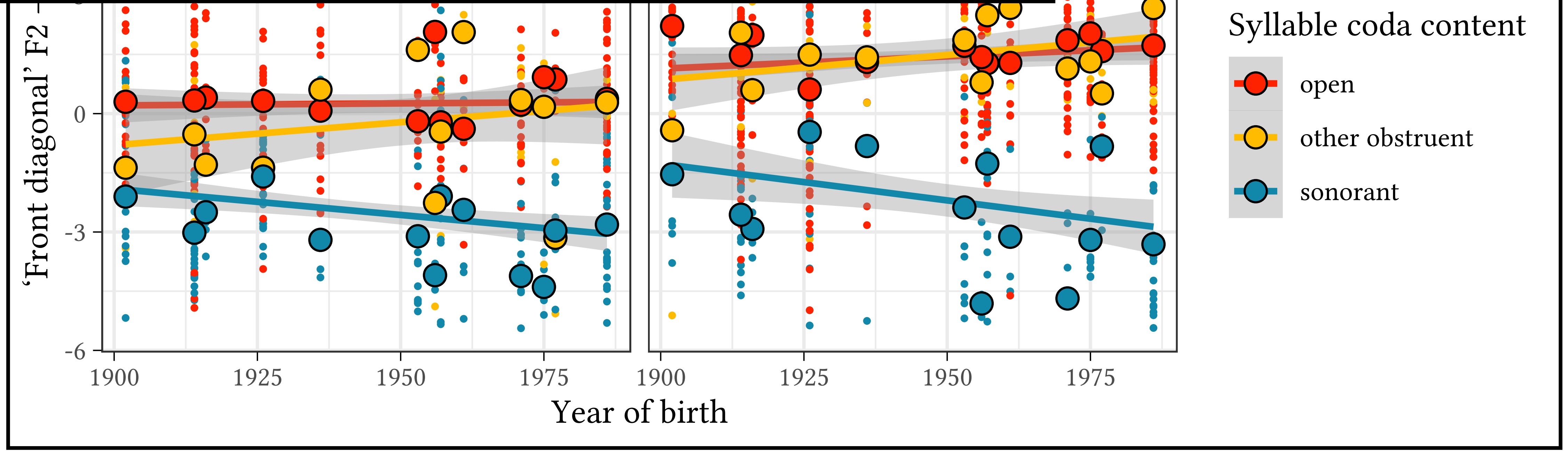
**new system.** is stress so crucial?







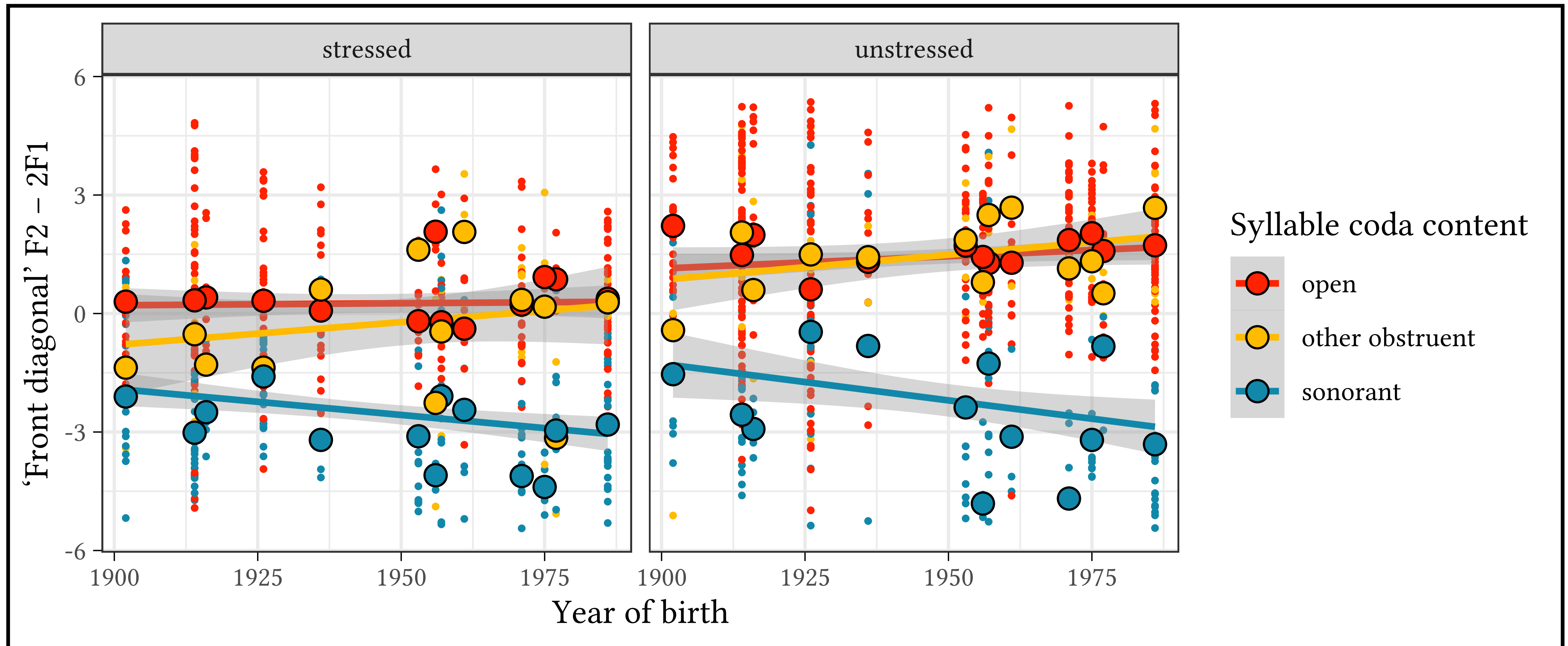
**A vision of the future.**  
 From our ms. (11 *female* speakers, **1980-1997**):  
 pre-sonorant realisations don't move very much  
 any more, pre-obstruent realisations still working  
 on being the highest.



**What about individual coda  
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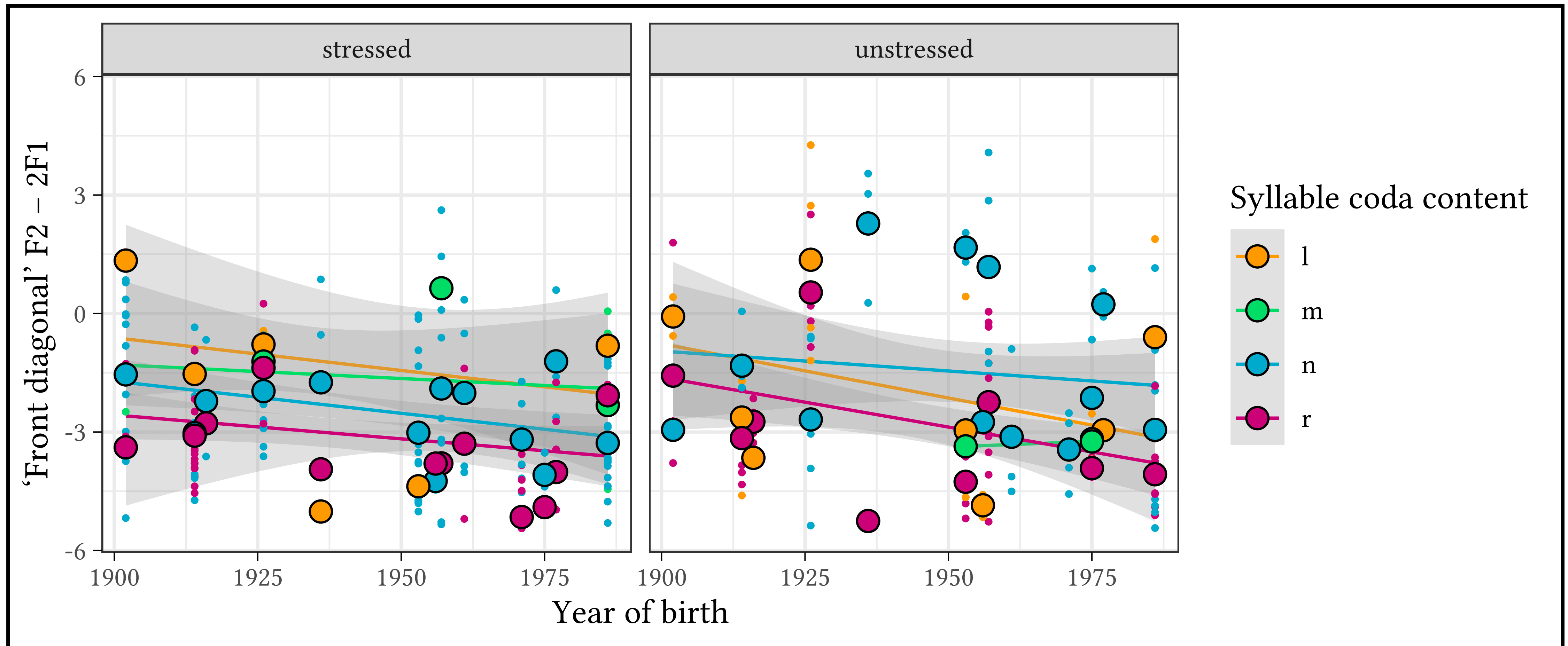
**/e/-realisations across environments**



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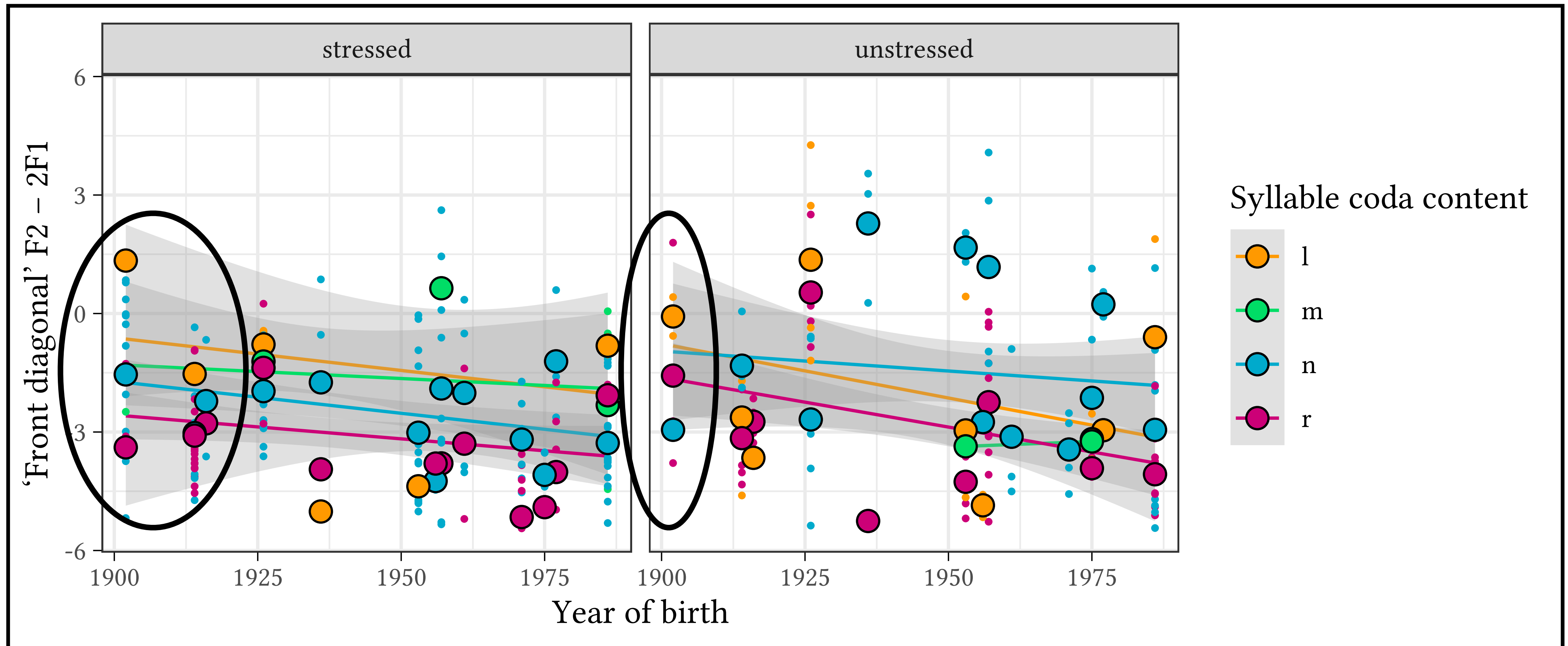
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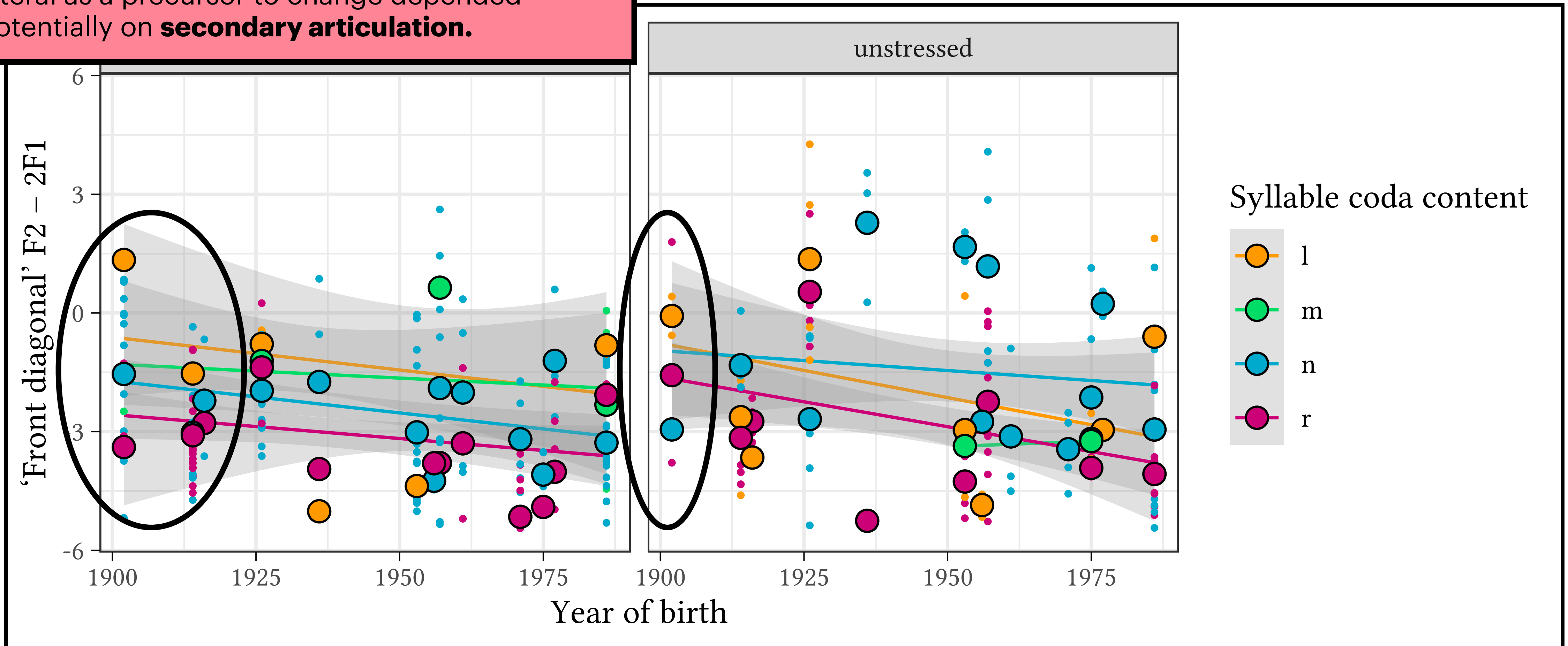


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# Data

## Changes across environments



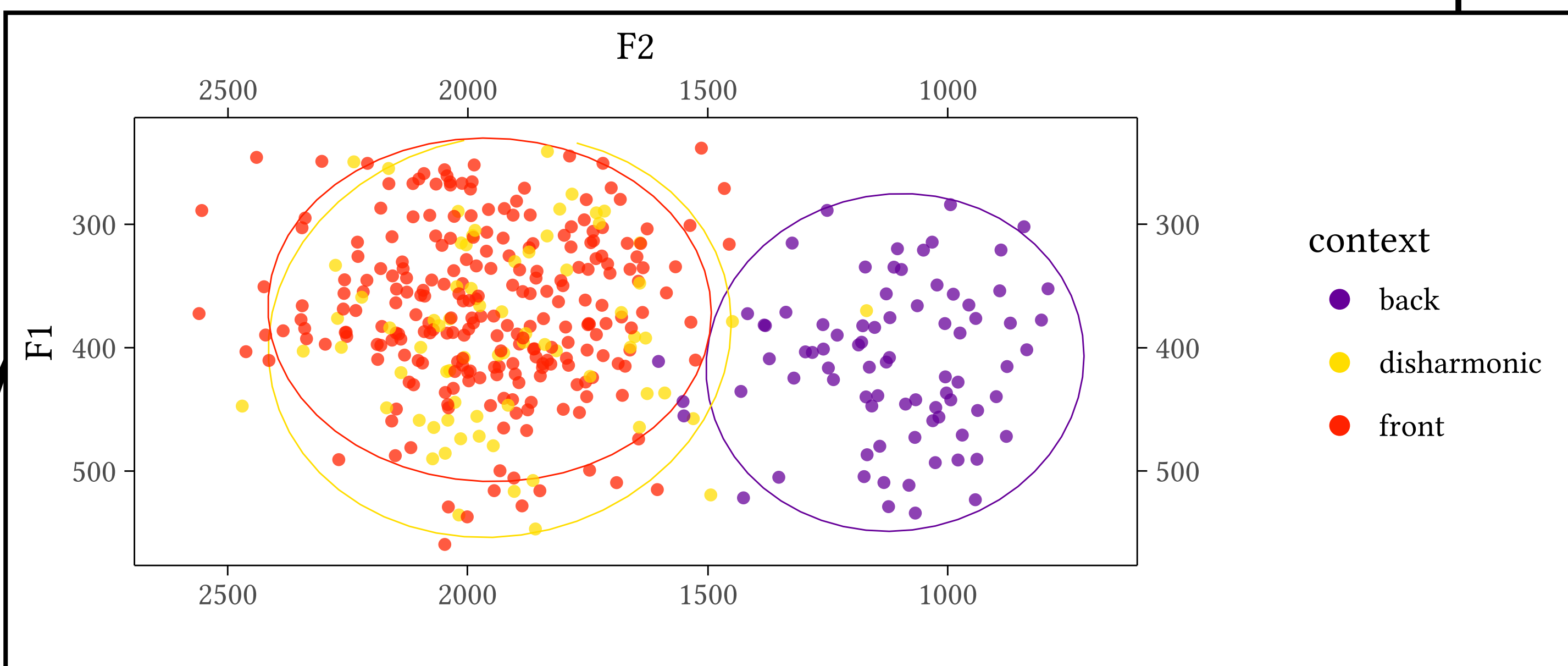
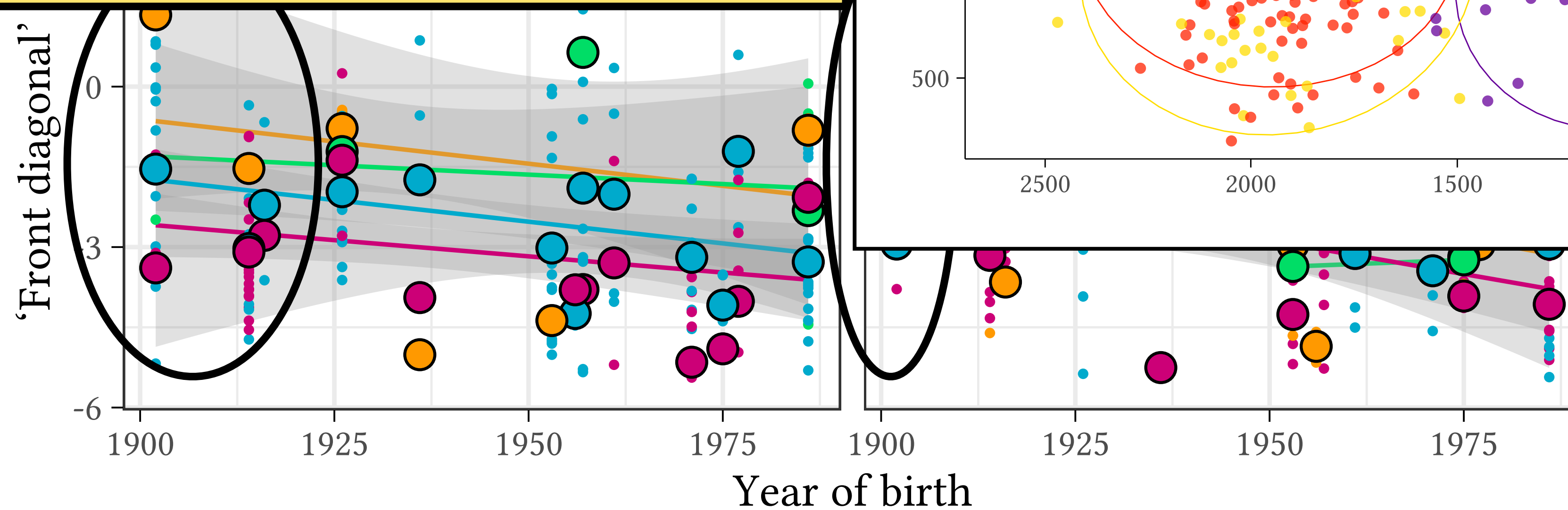
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## Realisations across environments



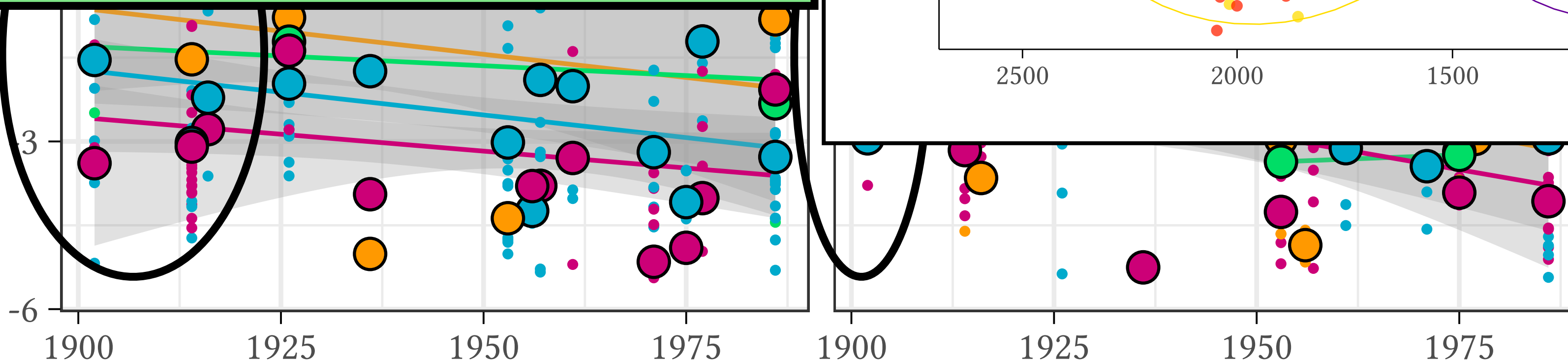
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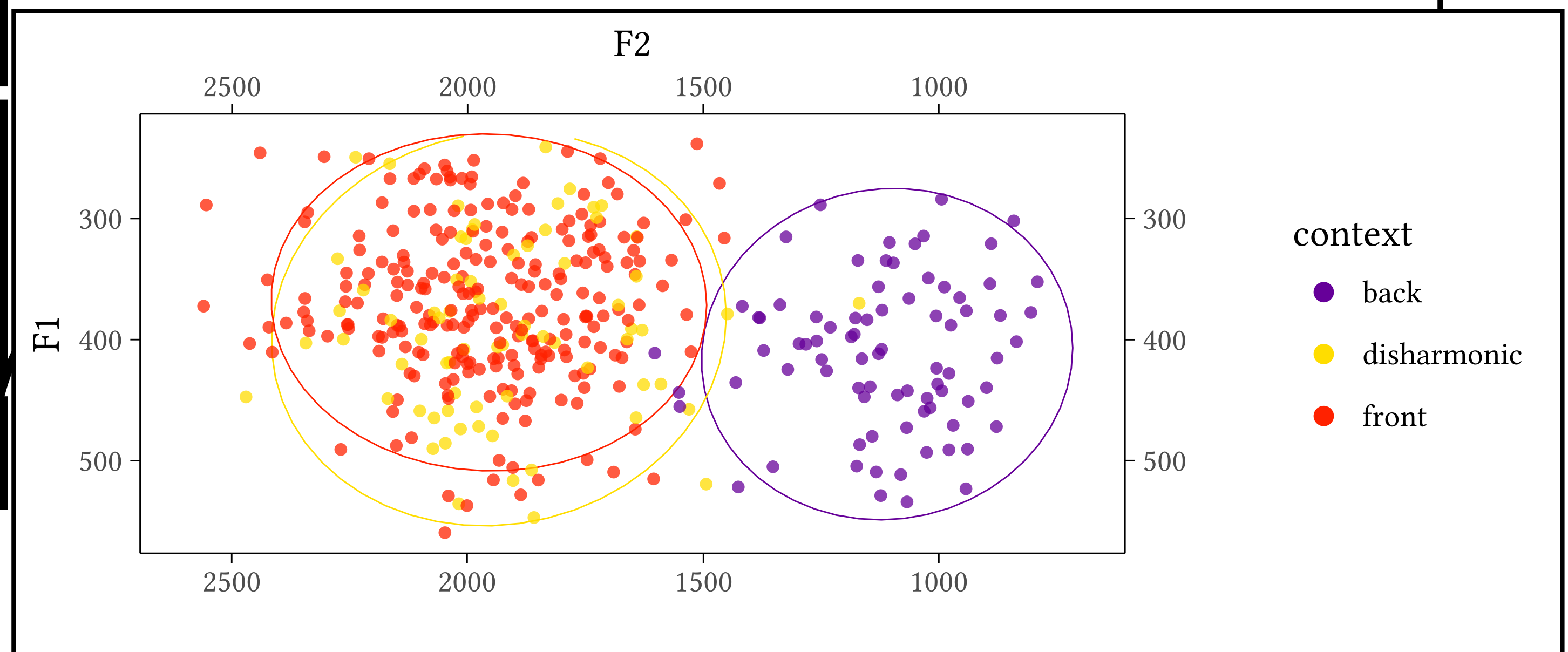
'Front diag



Year of birth

# Data

## variations across environments



context

- back
- disharmonic
- front

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What about /z/?

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There wasn't that much /z/ in the corpus as analysed so far (not a high-frequency segment save in some morphology). In our previous study:

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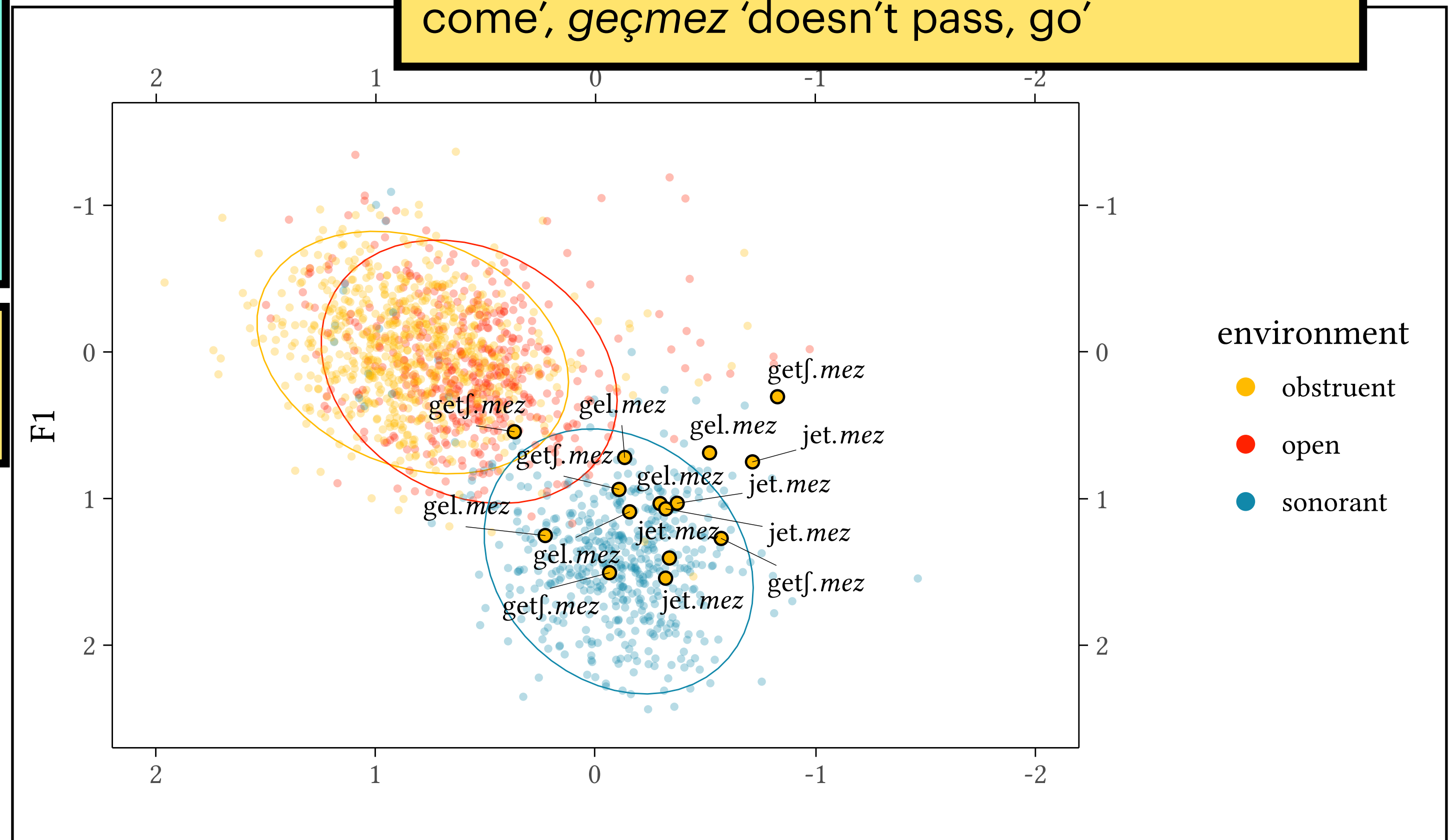
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*(can't tell you about diachronic trajectory pre-z, but can at least demonstrate to you that it's real)*

## Realizations across environments

*yetmez* 'doesn't suffice', *gelmez* 'doesn't come', *geçmez* 'doesn't pass, go'



# Other sources of evidence

## Regional variation

**So far.** Alternation exists; we have a bit of diachrony. Interested in putting together a slightly more large-scale picture.

# Other sources of evidence

## Regional variation

**Western Anatolian rhoticity loss.** An old example of compensatory lengthening triggered by syllable-final /r/-deletion (Korkmaz 1965; Sezer 1986; Kavitskaya 2002) in which there are incidentally additional /r/-triggered height effects, even when the rhotic is absent on surface. **But**, this is old data, so we can't be sure it's not just a version of what we have now.

*Standard Turkish*

var

verdi

giderler

pifirir

verir

*Western Anatolian*

va:

væ:.di

gi.dæ:.læ:

pifiræ:

viri:

ROMANIA

BULGARIA

GEORGIA

ARMENIA

IRAN

SYRIA

IRAQ

Euphrates

Tigris





# Other sources of evidence

## Regional variation

**Trabzon sonorants and velars.** In traditional Eastern Anatolia, /e-æ/ is phonemic (as e.g. Azerbaijani); in Trabzon, Brendemoen (2002: 53, 55) describes an ongoing **merger to /i/** between phonemic /e/ and /i/, unless blocked by following /r l ɣ ŋ/ (= liquids + dorsals?), with further free variation between **[e]** and **[æ]** in pre-sonorant and pre-velar positions /r l k ɣ ŋ n/ excl. /m/.

<i>Standard Turkish</i>	<i>Trabzon</i>	
/erkek/	er.kek ~ er.kik	‘male’
/køp/ <sup>88</sup>	kep ~ kip	‘many’
/et/	et ~ it	‘do/reach’
/kel/	kel *kil	‘come’
/ejer/	ezer *ezir	‘saddle’

<i>Standard Turkish</i>	<i>Trabzon</i>	
/geldi/	gæl.di	‘came’
/gid-er-ken/	gidærgæn	‘while going’
/benzer/	bænzer	‘similar’
/ben/	bæn	‘I’
/yemek/	yemæk	‘food’



# Typology & diachrony revisited

## Summing up

**The phenomenon.** Front mid vowels /e/ and /ø/ undergo alternations conditioned by the following coda.



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In closely-related varieties, a range of patterns is united **only by the involvement of the rhotic**; and the rhotic is also the most unambiguously phonetically good environment for this kind of alternation.

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- **Conjecture.** This pattern originates in a gradient phonetic effect driven by coda rhotics. (Plausible!)
  - Western Anatolian Turkish: don't generalise beyond the rhotic;
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Generalisation: both the standard and the Trabzon patterns involve an **active class that mixes sonorants and obstruents**, and which **does not necessarily respect the quality of the phonetic cues** corresponding to each environment.

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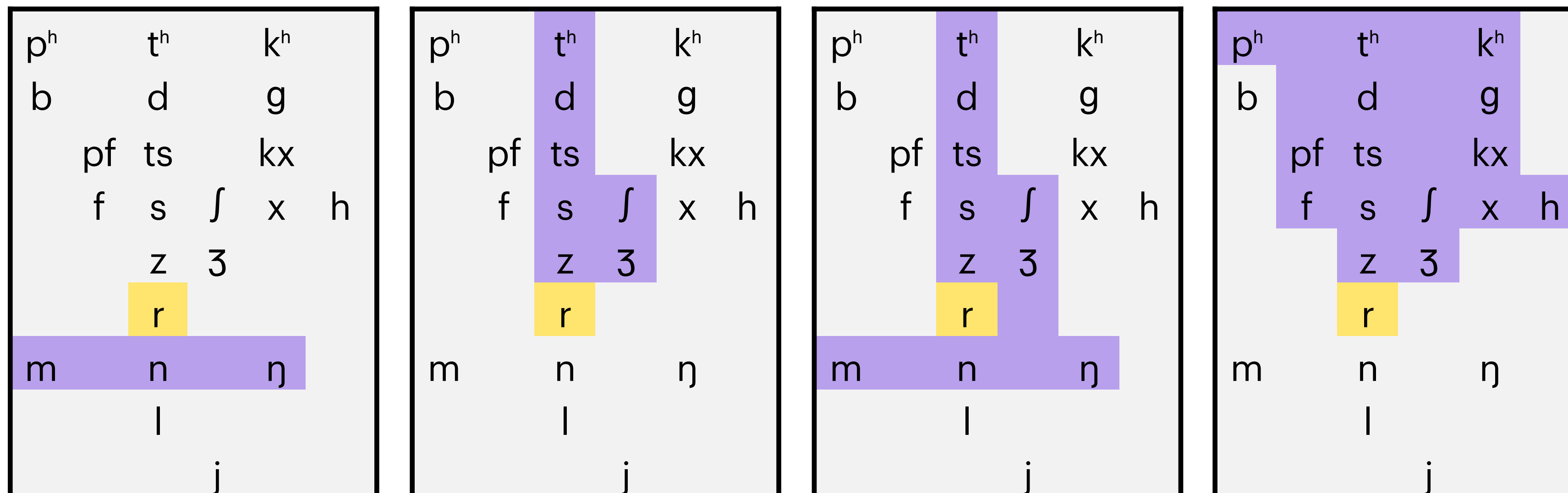
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**The phenomenon.** Front mid vowels /e/ and /ø/ undergo alternations conditioned by the following coda.

**Conjecture.** 'Slightly weird classes' tell us something about the structure of phonologisation.

- In **Schaffhausen Swiss German** (Keel 1982, Janda & Joseph 2003), a rule which historically lowered pre-rhotic [o] to [ɔ] has undergone different generalisations in different villages.



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- In **Georgian**, syncope occurs in /VCV(C)/ sequences if the intervening /C/ is /m, n, l, r, v/, and optionally also /b/ (Butskhrikidze & van der Weijer 2001, Butskhrikidze 2002).

/mercxal-is/	[mercxlis]	swallow-GEN
/t'omara-it/	[t'omrit]	sack-INST
/ʃvel-is/	[ʃvlis]	deer-GEN
/bal-eb-i/	[blebi]	cherry-PL-NOM
/xed-av-a/	[xedva]	see-THEM-INF
/ʃe-i-p'χ'ar-ob/	[ʃeip'χ'rob]	'you will arrest'
/ga-tʃ'er-i/	[gatʃ'ri]	'you will cut'
/xar-av-a/	[xvra] <sup>66</sup>	gnaw-THEM-INF

/k'ak'ab-is/	[k'ak'bis]	partridge-GEN
/xoxob-is/	[xoxbis]	pheasant-GEN

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**Point.** Schaffhausen /o/-lowering, Georgian vowel syncope, and Turkish mid-vowel lowering all seem to apply in **environments which are supersets of some "sensible" set of environments**, with respect to **both phonetic grounding and natural class behaviour**.

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Extend over the full consonantal inventory of the language; Trabzon Turkish and ST *make different decisions about what the most legitimate extension is.*

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Even wilder **conjecture.** This is about decision functions denoting similarity to the trigger ...



**Teşekkür ederiz!**  
**Jättetack!**  
**Go raibh maith agat!**

Special thanks to:

Turkish speakers we worked with in Manchester 2016–2017

Yuni Kim, who has heard more about this data than anyone should have to