

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

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

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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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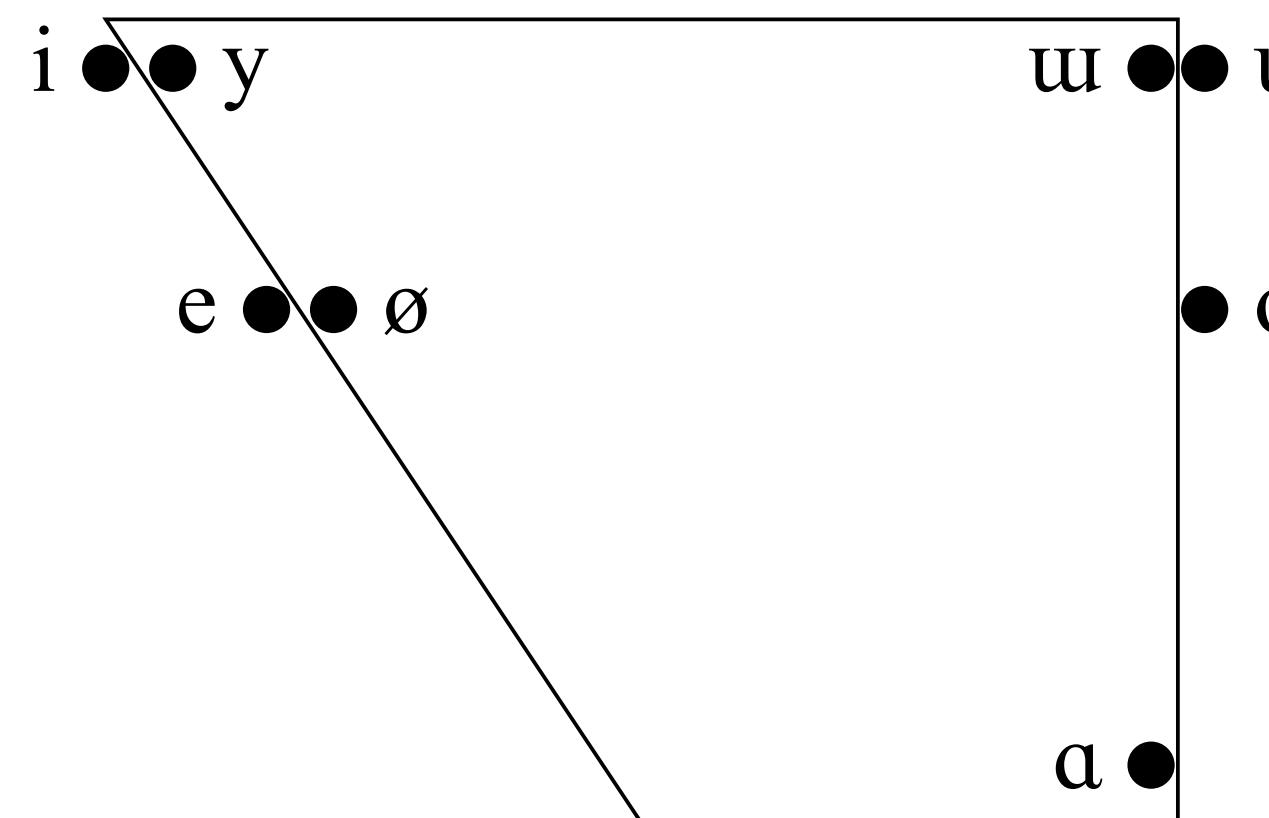
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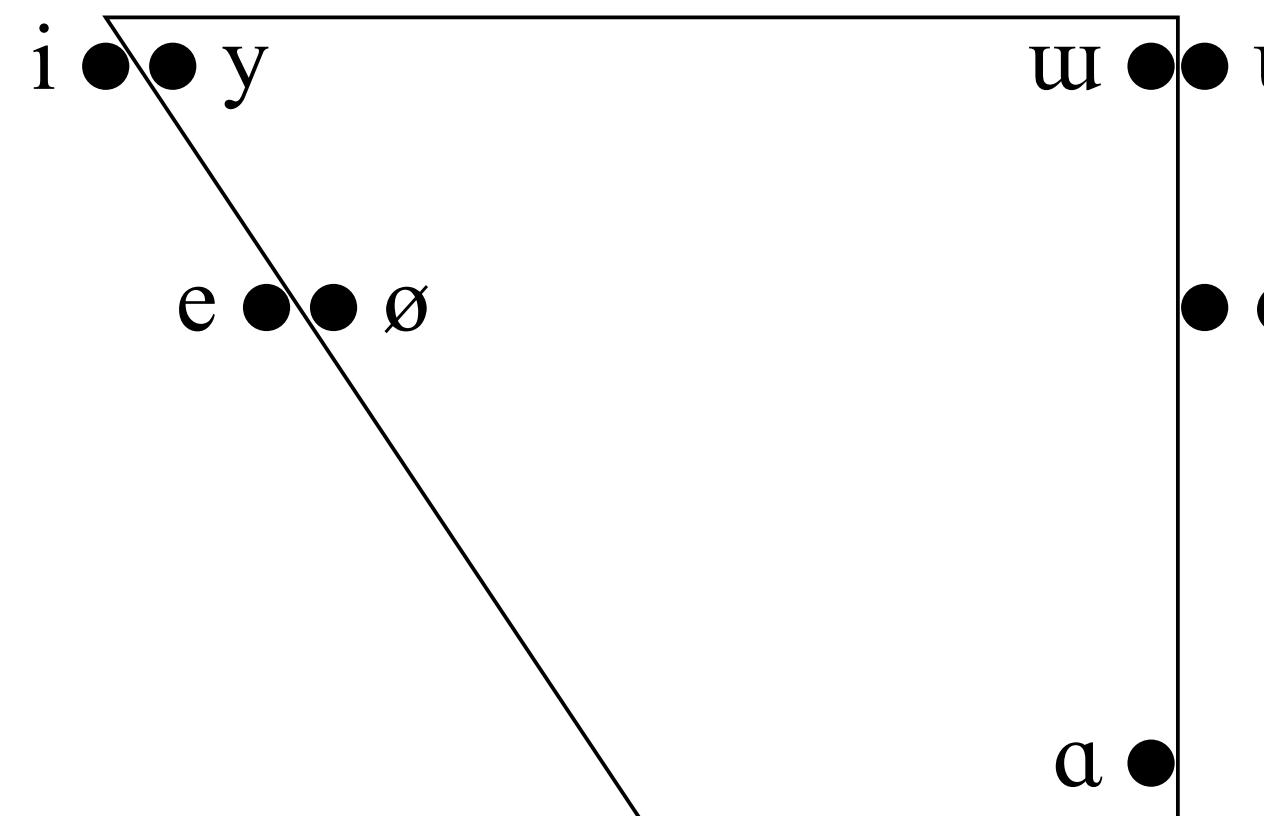


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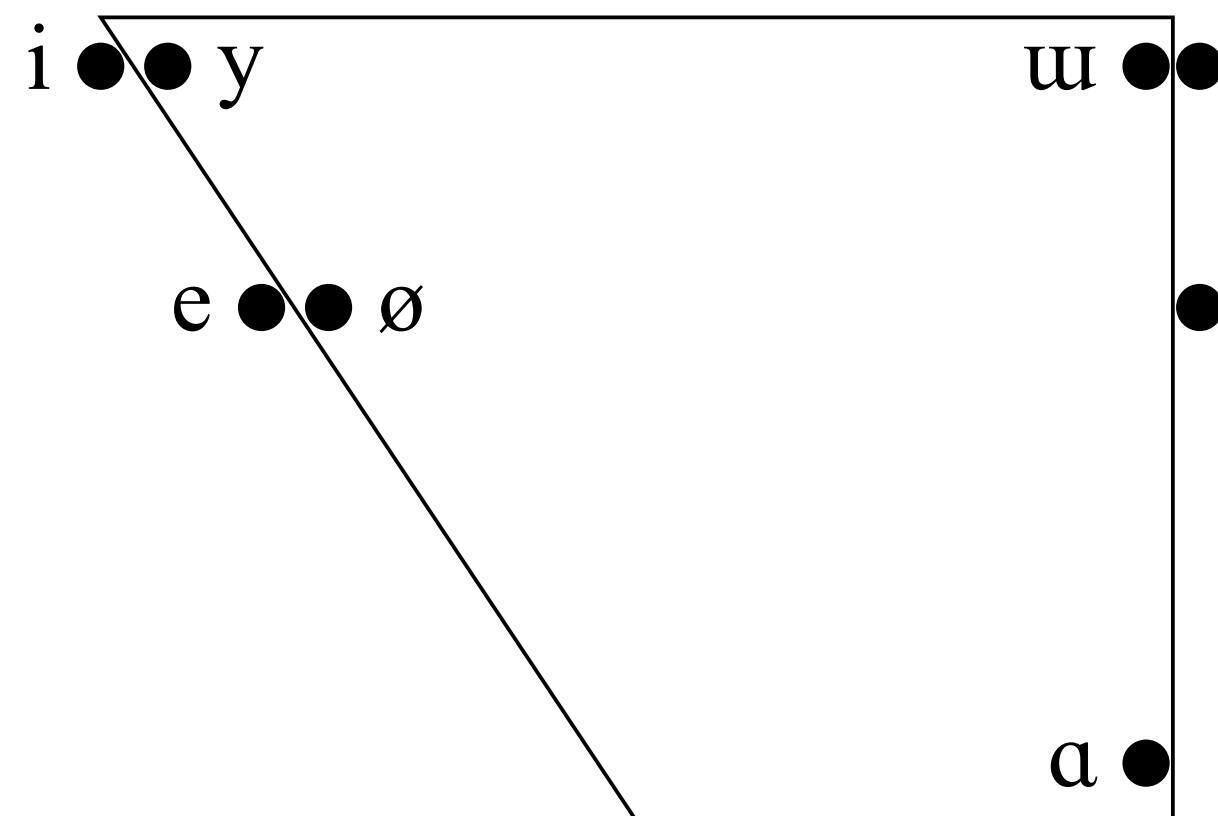
but really only in initial syllables

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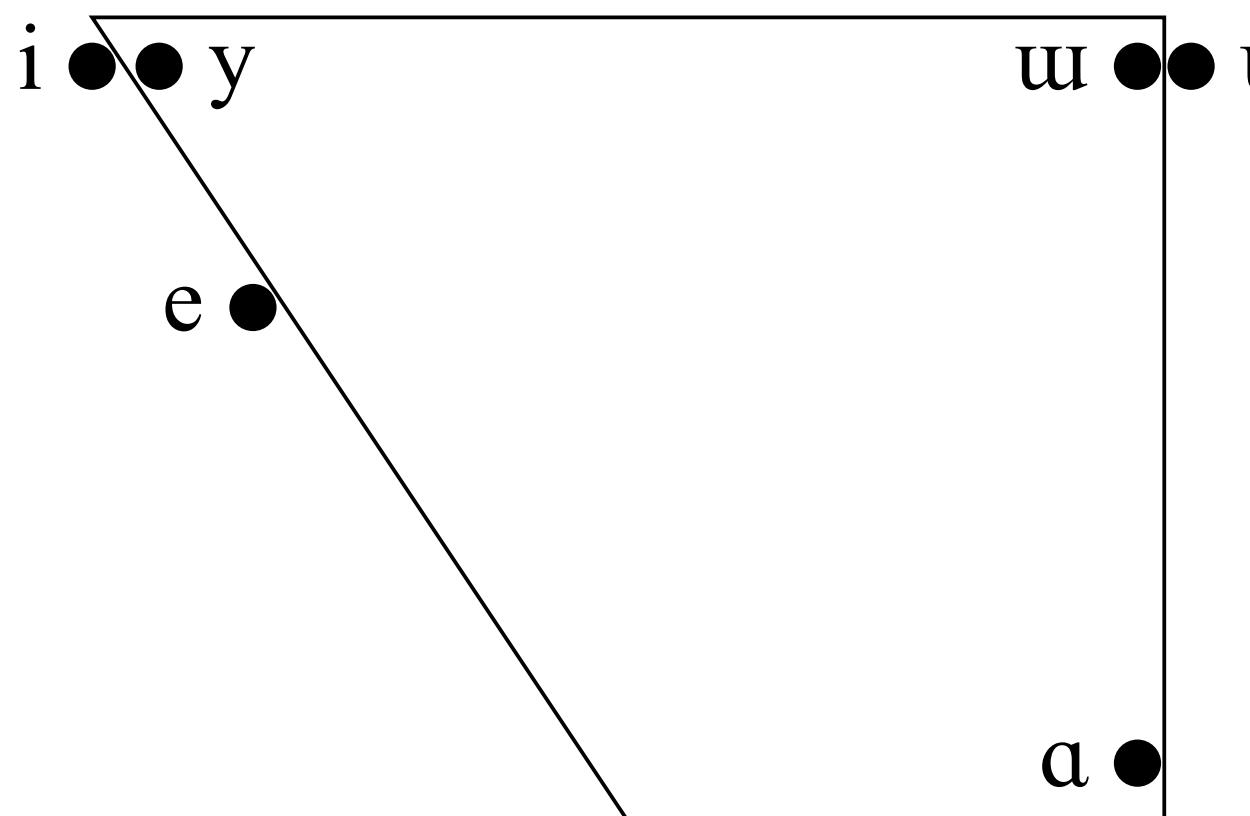
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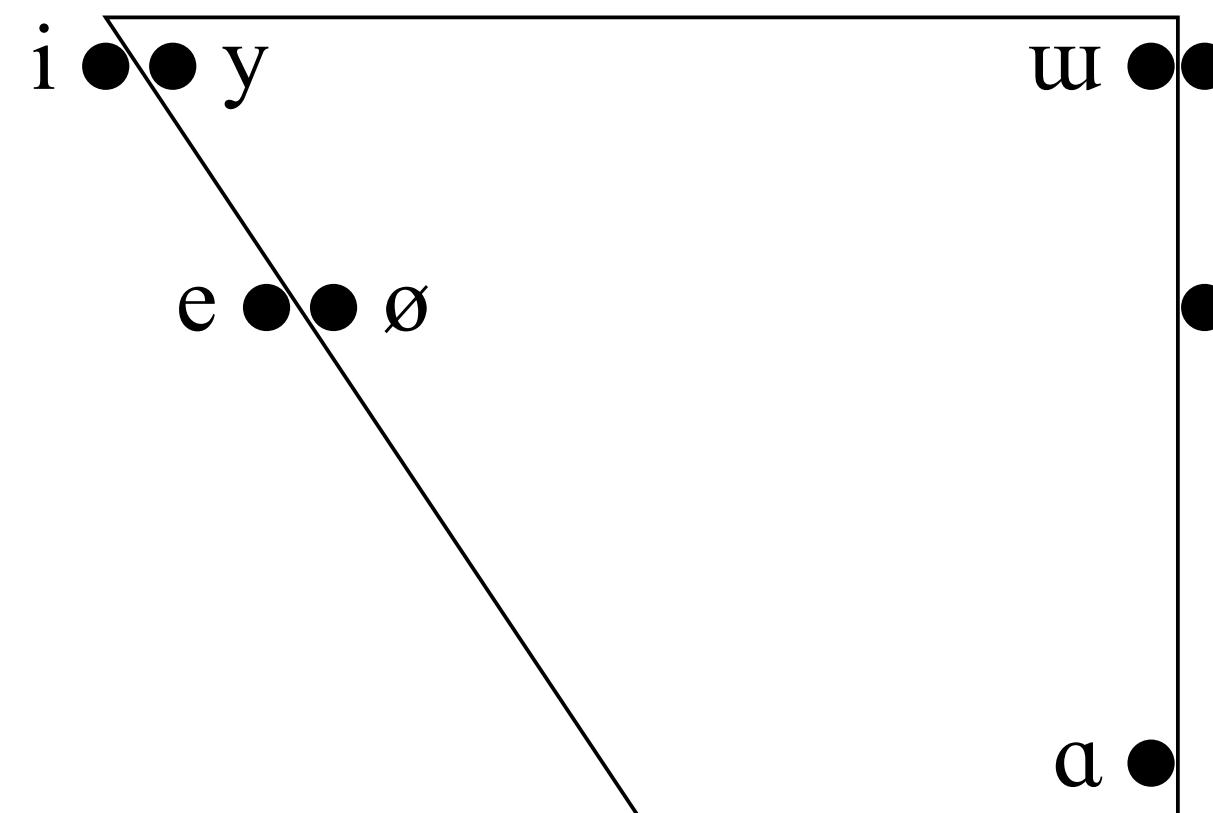
outside initial syllables, mid
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(never legit output of pervasive
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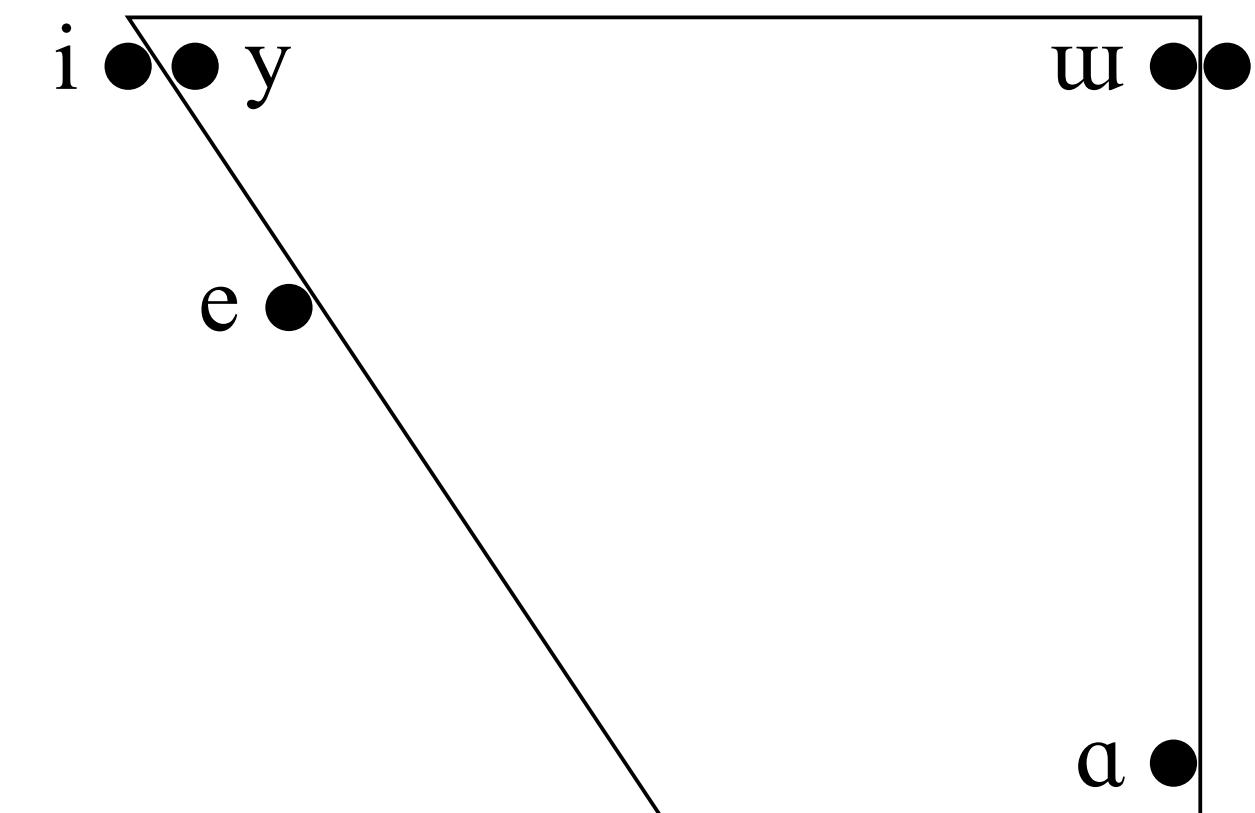
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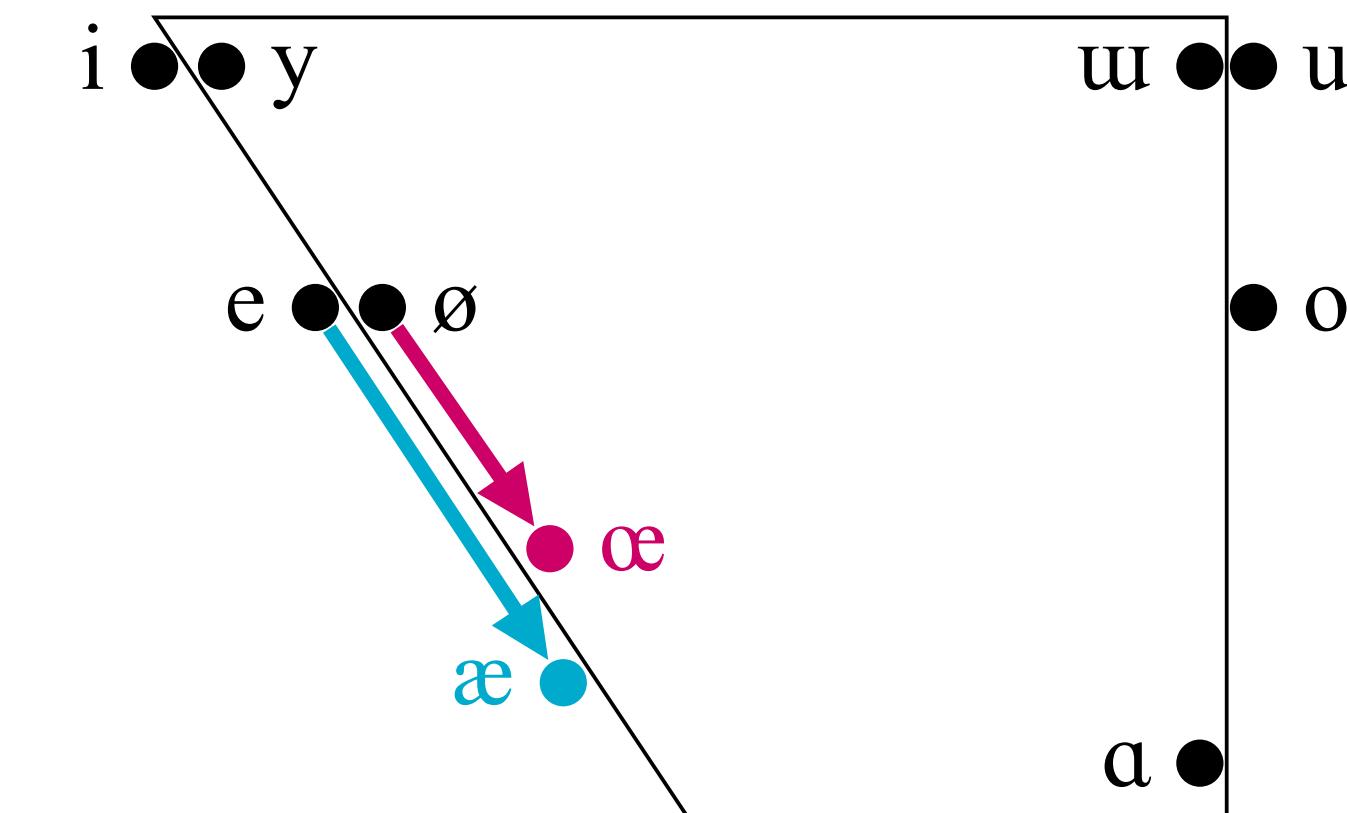
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... worth observing at this stage
that vowels in this pattern go
where they have room to go

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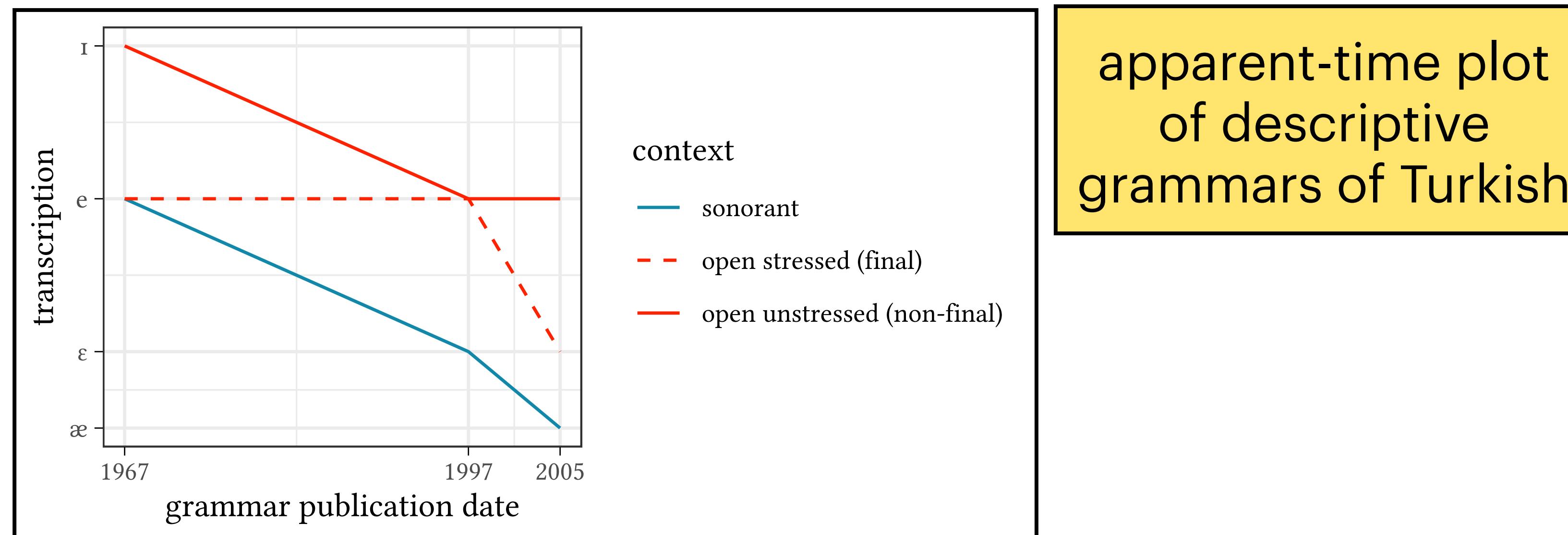
- General point of agreement: Turkish has 8 vowels in a pretty symmetrical system.
- **Previous descriptions.** We claimed that there's a little bit of attestation of this phenomenon in the descriptive literature. Here is what we have found:
 - Lewis's (1967, 14) reference grammar: describes **raising 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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- General point of agreement: Turkish has 8 vowels in a pretty symmetrical system.
- Previous descriptions.



Background

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/	[ær.dæm]	'virtue'
/hejkel/	[hej.kæl]	'statue'
/gizem/	[gi.zæm]	'mystery'
/biber/	[bi.bær]	'pepper'
/gøl/	[gœl]	'lake'
/gømmek/	[gœm.mek]	'bury'-INF
/ſofør/	[ſo.fœr]	'driver'

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This is destroyed by resyllabification-inducing affixation.

/erdem/	[ær.dæm]	'virtue'	[ær.de.mi]	'virtue'-ACC
/hejkel/	[hej.kæl]	'statue'	[hej.ke.li]	'statue'-ACC
/gizem/	[gi.zæm]	'mystery'	[gi.ze.miz]	'mystery'-1PL.POSS
/biber/	[bi.bær]	'pepper'	[bi.be.rin]	'pepper'-2SG.POSS
/gøl/	[gøl]	'lake'	[gø.ly]	'lake'-ACC
/gømmek/	[gøm.mek]	'bury'-INF	[gø.mer]	'bury'-INF
/ſofør/	[ſo.foer]	'driver'	[ſo.fo.ryn]	'driver'

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No such lowering applies in other types of environment (pre-stop, pre-fricative, pre-#)

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/hejkel/	[hej.kæl]	'statue'	[hej.ke.li]	/hejkel/	[hej.kæl]	'statue'
/gizem/	[gi.zæm]	'mystery'	[gi.ze.miz]	/herkes/	[hær.kes]	'everyone'
/biber/	[bi.bær]	'pepper'	[bi.be.rin]	/tʃøp/	[tʃøp]	'garbage'
/gøl/	[gœl]	'lake'	[gø.ly]	/gøz/	[gøz]	'eye'
/gømmek/	[gœm.mek]	'bury'-INF	[gø.mer]	/søjle/	[søj.le]	'say'-IMP.2SG
/ſofør/	[ſo.fœr]	'driver'	[ſo.fø.ryn]	/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/

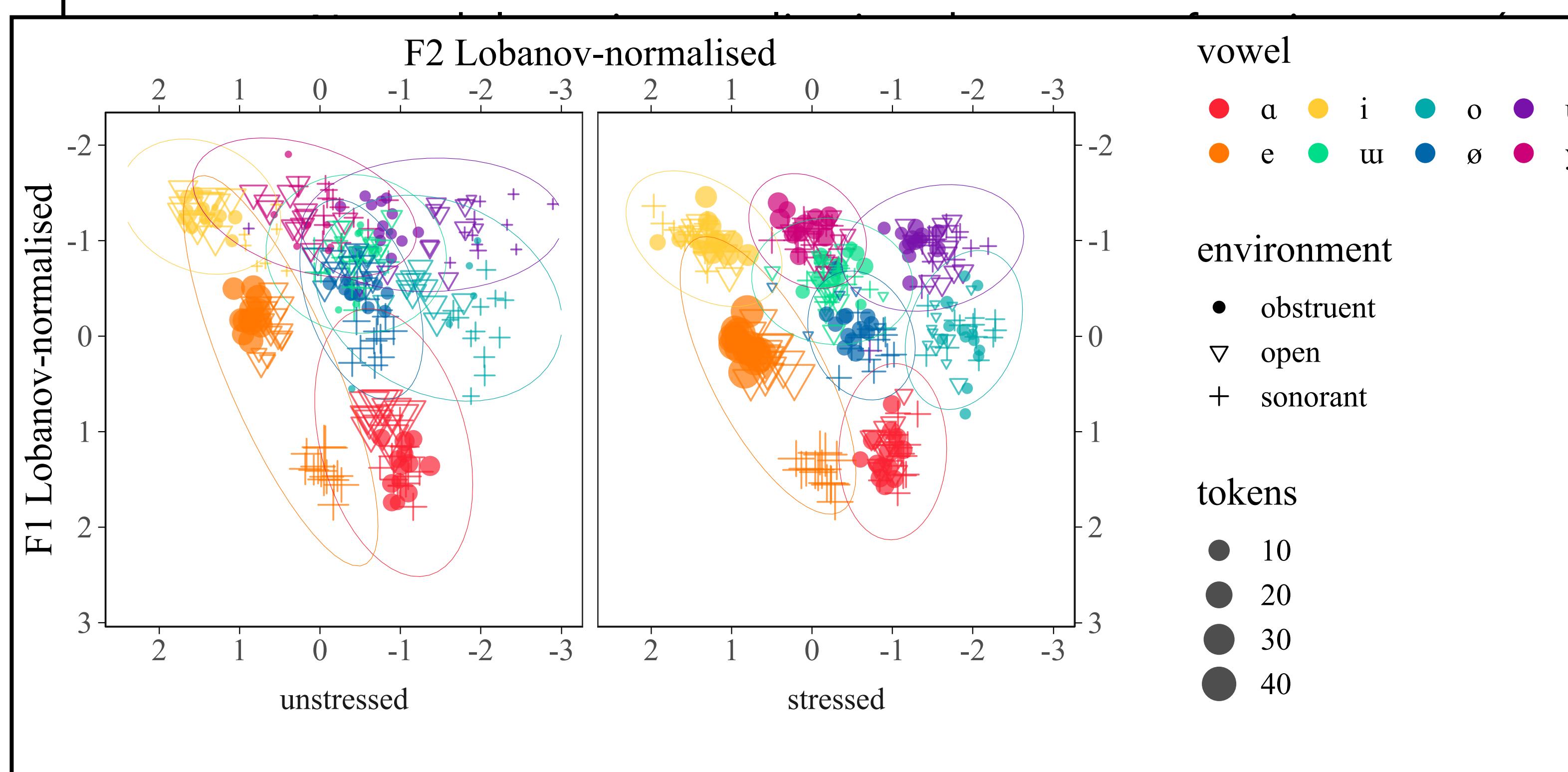
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/ſofør/	[ſo.før]	'driver'	[ſo.fø.ryn]	/merkez/ [mær.kæz] 'centre'
				/gel-mez/ [gæl.mæz] 'go'-NEG.AOR

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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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 - 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

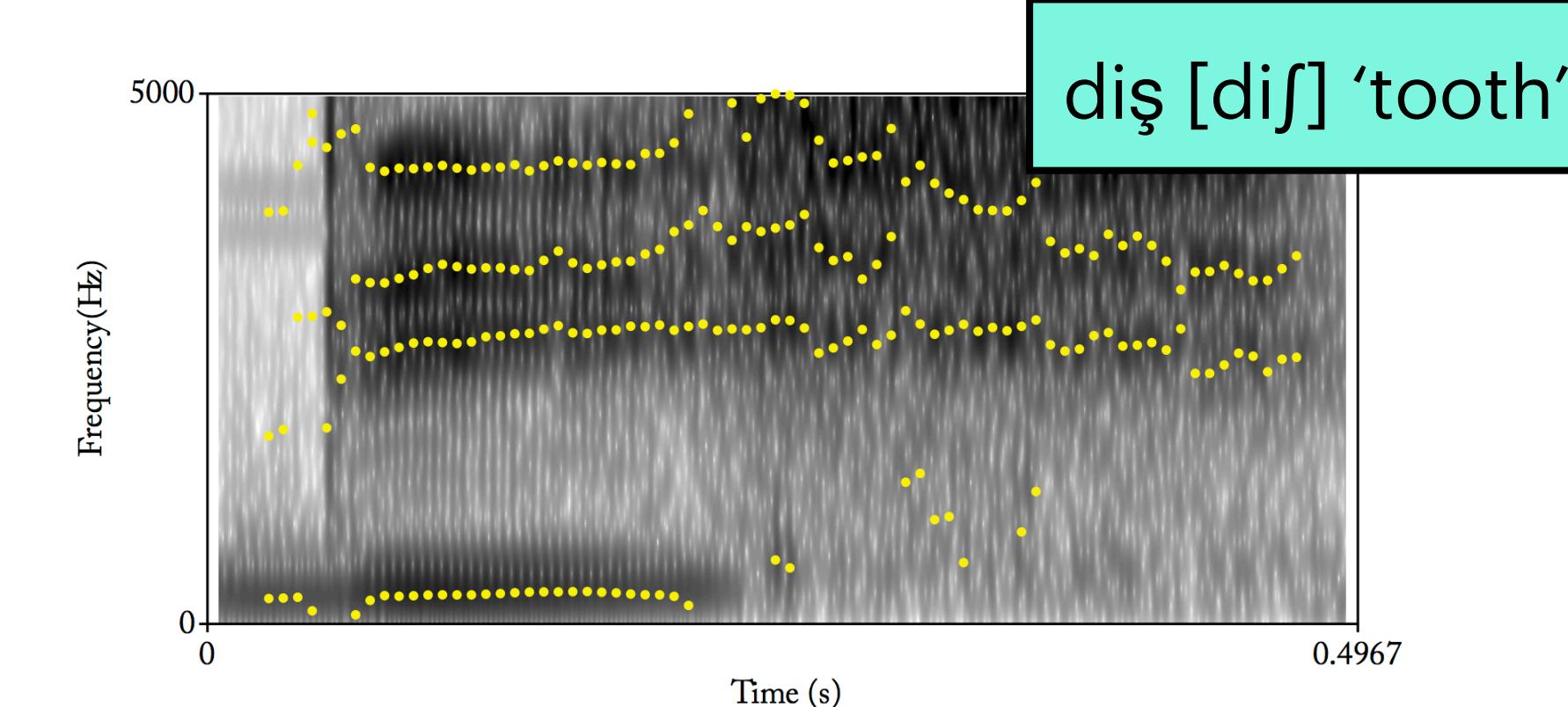
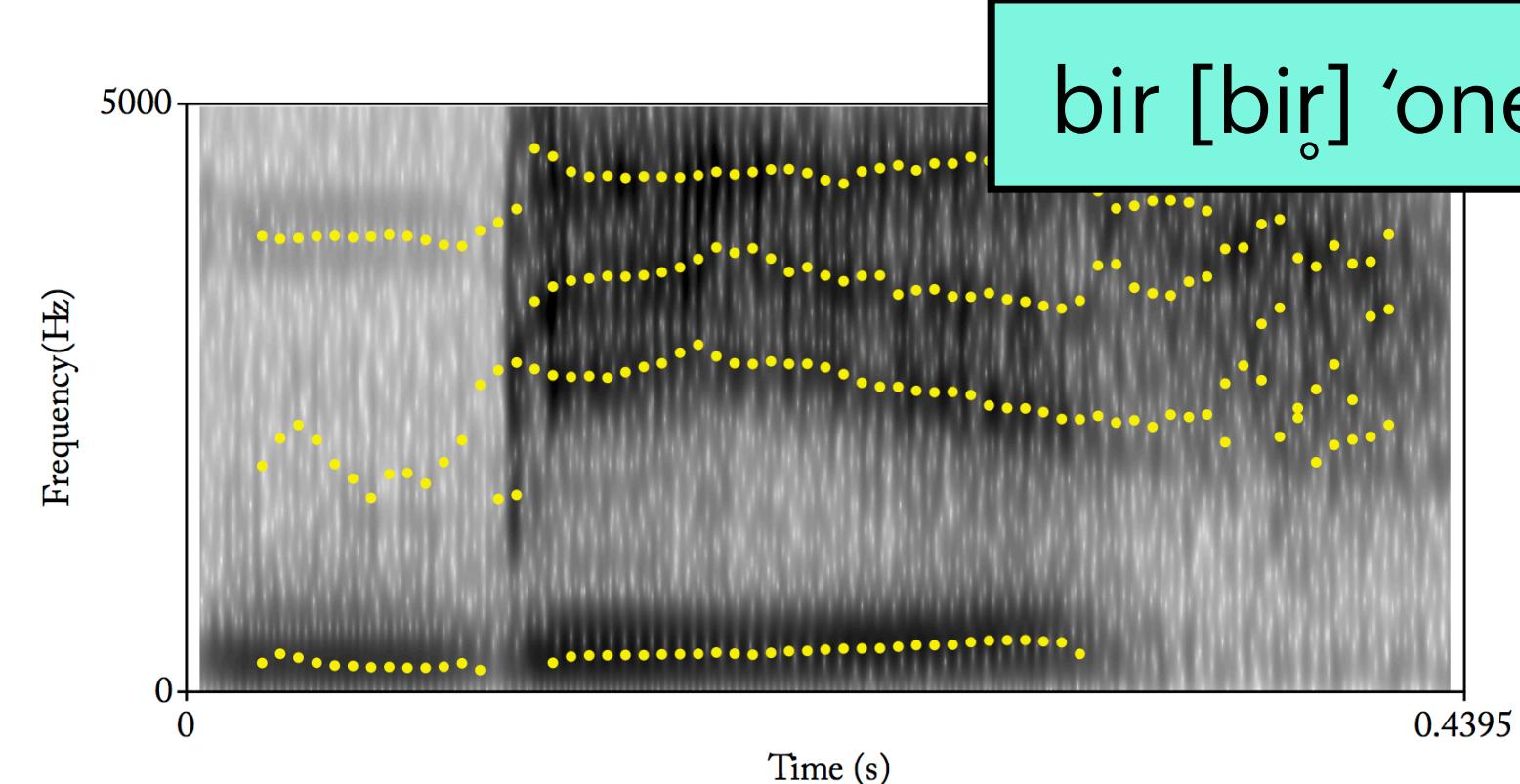
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 - **The laterals are less straightforward.** Languages with lowering rules often ignore them.

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	Name	Gender	Birthyear	Birthplace
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Orhan Veli	M	1915	İstanbul	Reha Yünlüel	M	1967	Edremit
Behçet Necatigil	M	1916	İstanbul	Gökçenur Çelebioğlu	M	1971	İstanbul
Can Yücel	M	1926	İstanbul	Onur Behramoğlu	M	1975	İstanbul
Gülten Akin	F	1933	Yozgat	Nilay Özer	F	1976	İstanbul
Hilmi Yavuz	M	1936	İstanbul	Mehmet Altun	M	1977	Kars
Refik Durbaş	M	1944	Erzurum	Efe Duyan	M	1981	İstanbul
Metin Cengiz	M	1953	Ardahan	Neslihan Yalman	F	1982	Ankara
Tugrul Tanyol	M	1953	İstanbul	Gonca Özmen	F	1982	Burdur
Haydar Ergülen	M	1956	Eskişehir	Müesser Yeniay	F	1984	İzmir
Adnan Özer	M	1957	Gazioğlu/Tekirdağ	Kaan Koç	M	1986	İstanbul

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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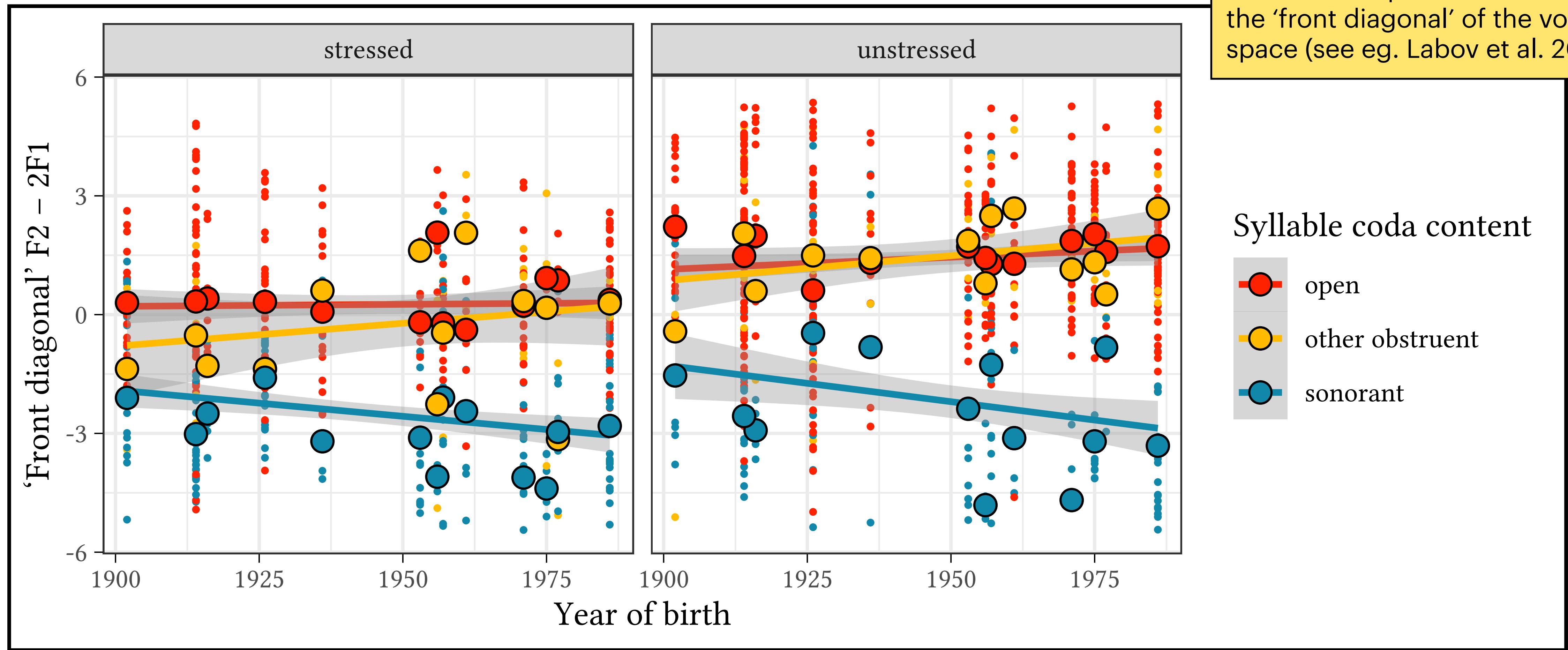
Data

/e/-realisations across environments

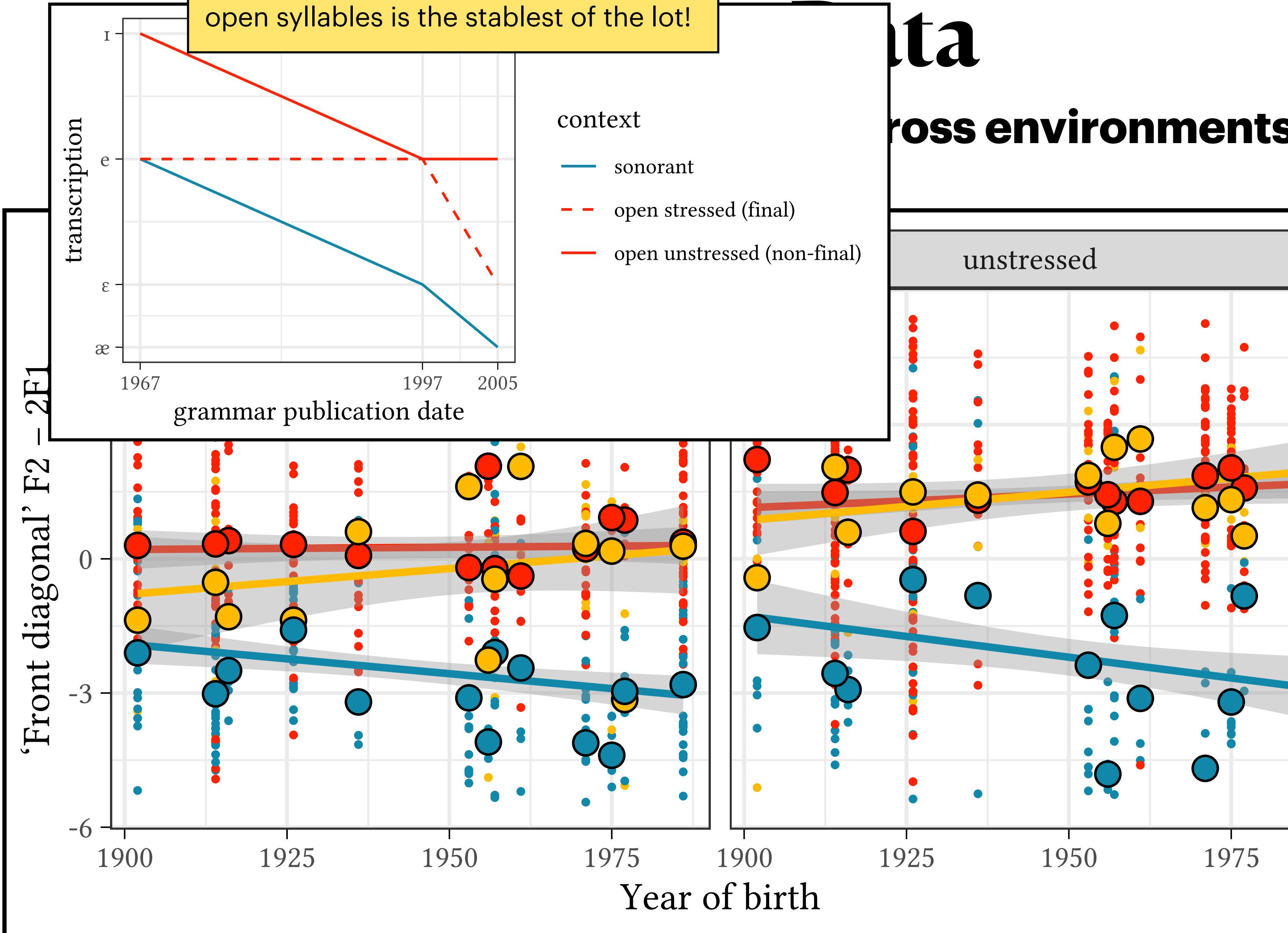
F2 – 2F1 to capture movement along the ‘front diagonal’ of the vowel space (see eg. Labov et al. 2013).

Data

/e/-realisations across environments



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



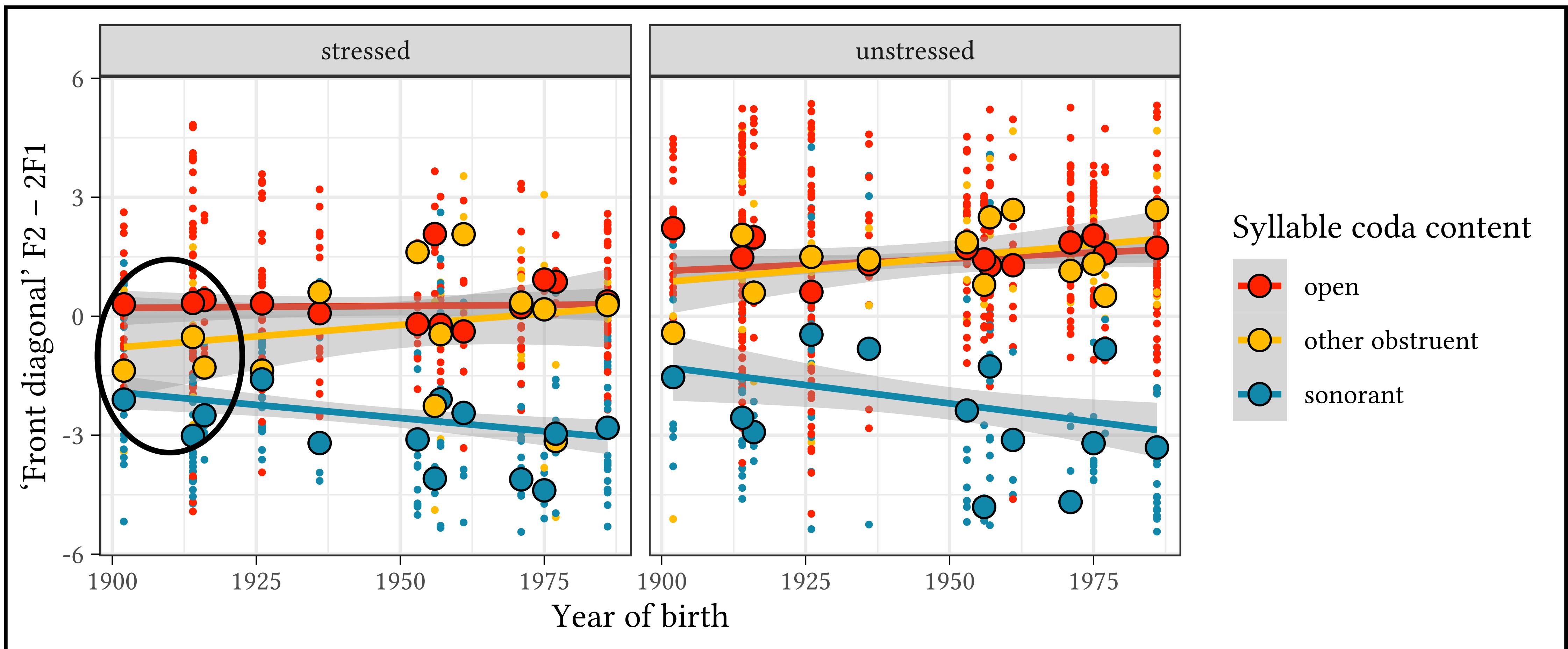
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old system. closed syllables ≠ open syllables
irrespective of further environment?

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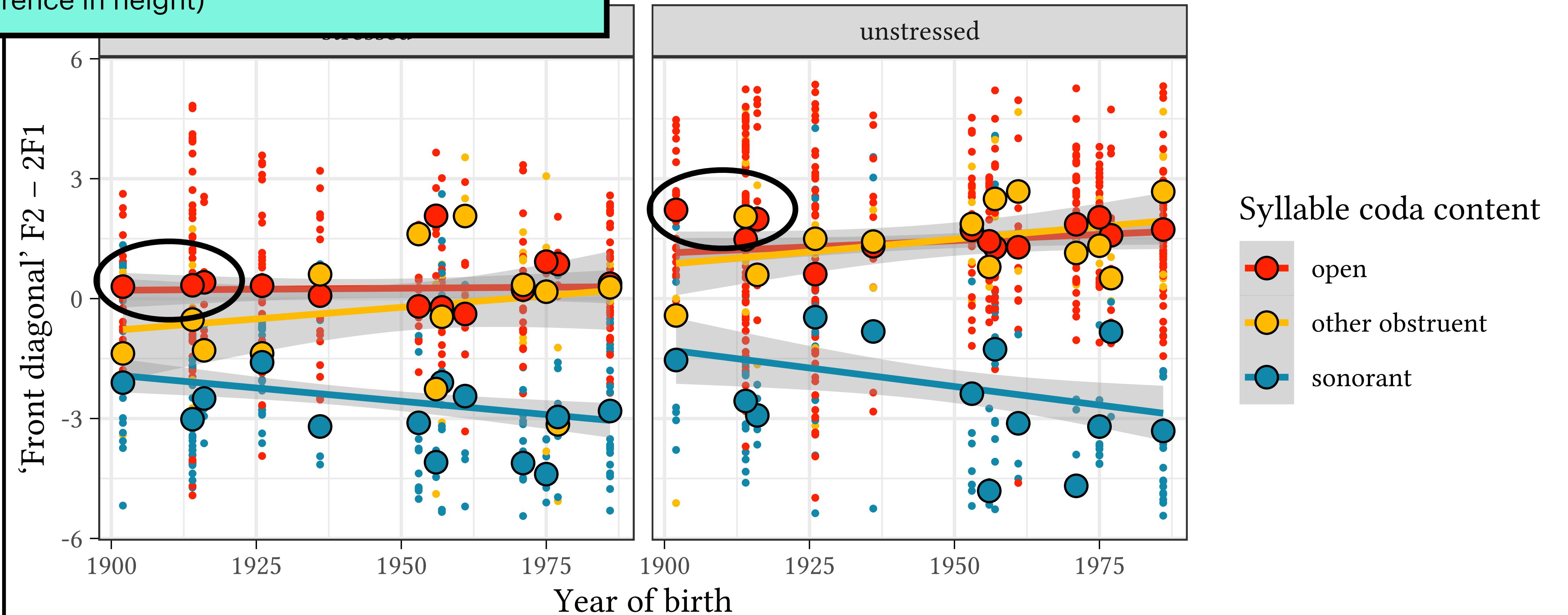


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old system. possible to tell apart stressed &
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Variations across environments



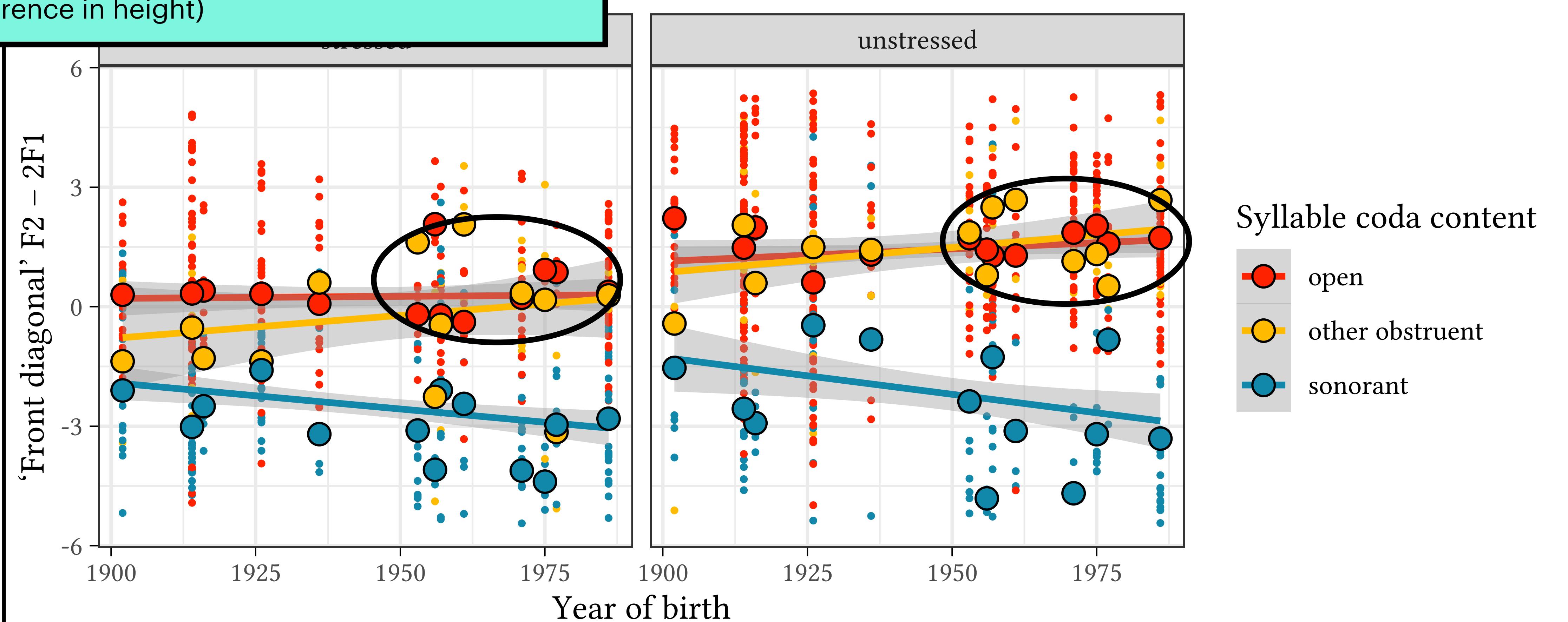
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Variations across environments



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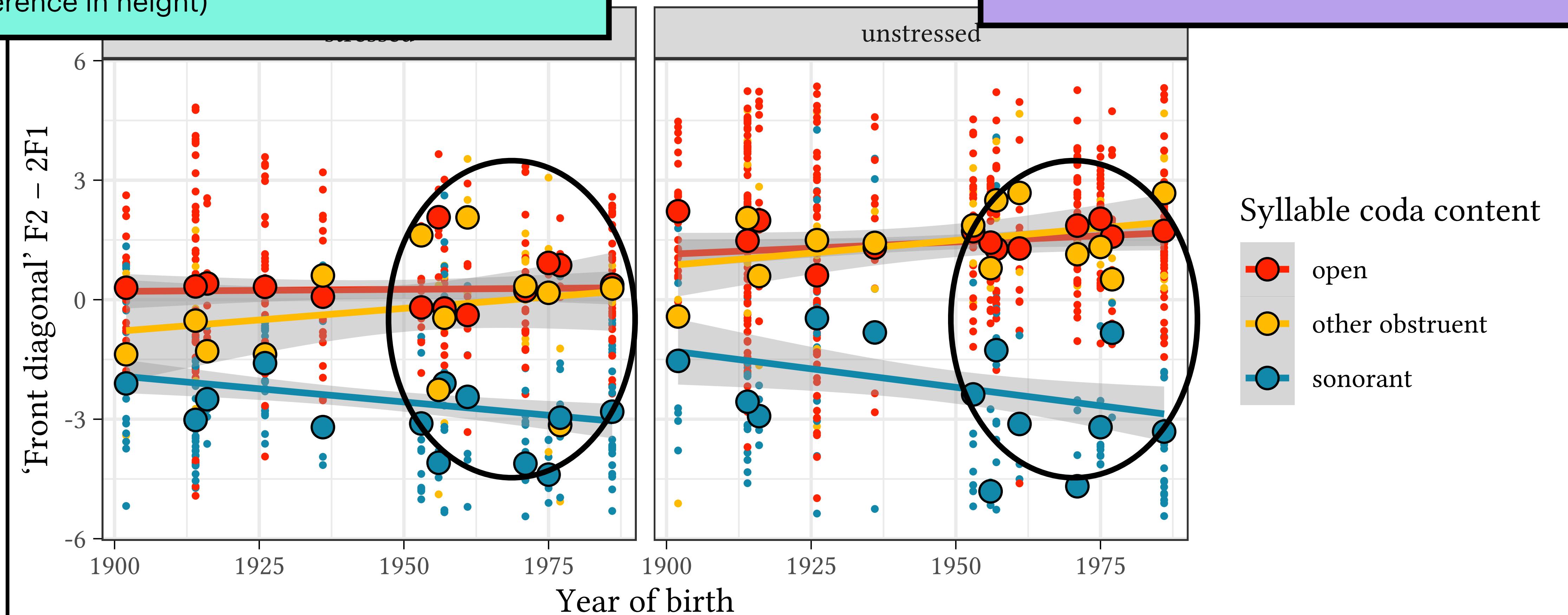
Variations across environments

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new system. pre-sonorant realisations get further and further away from everything else.



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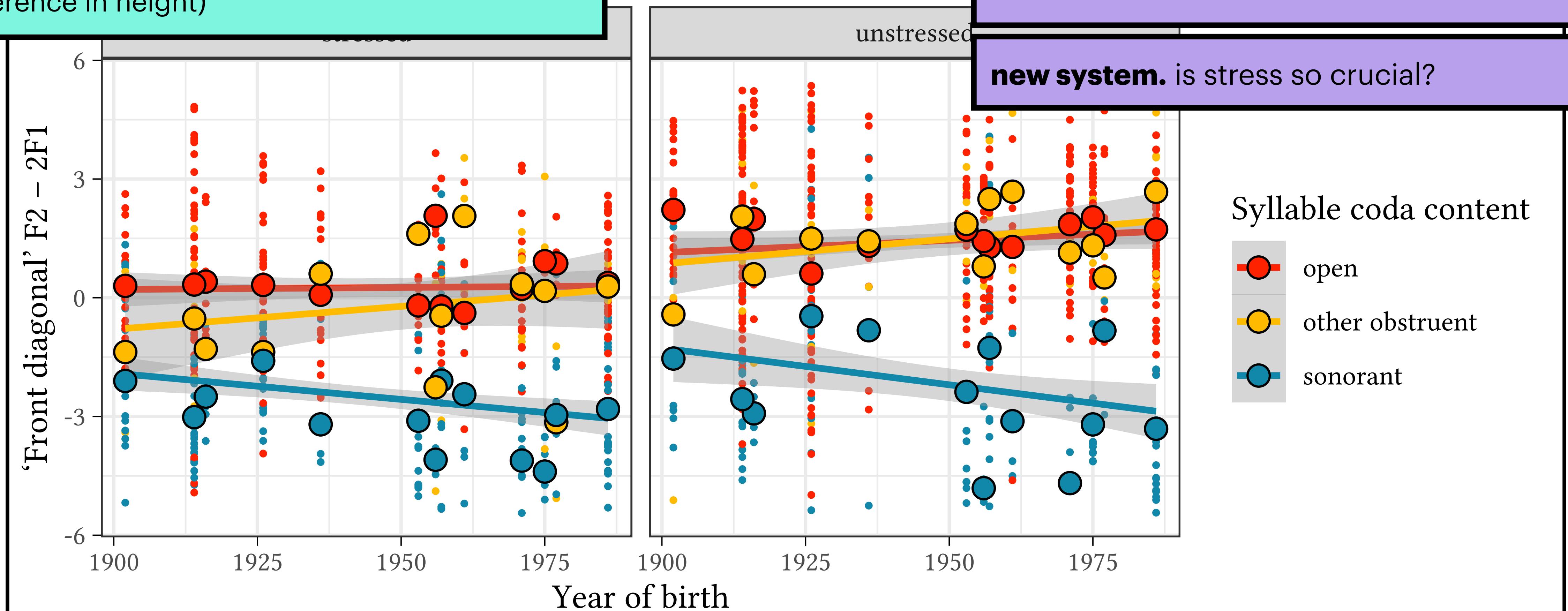
old system. closed syllables ≠ open syllables
irrespective of further environment?

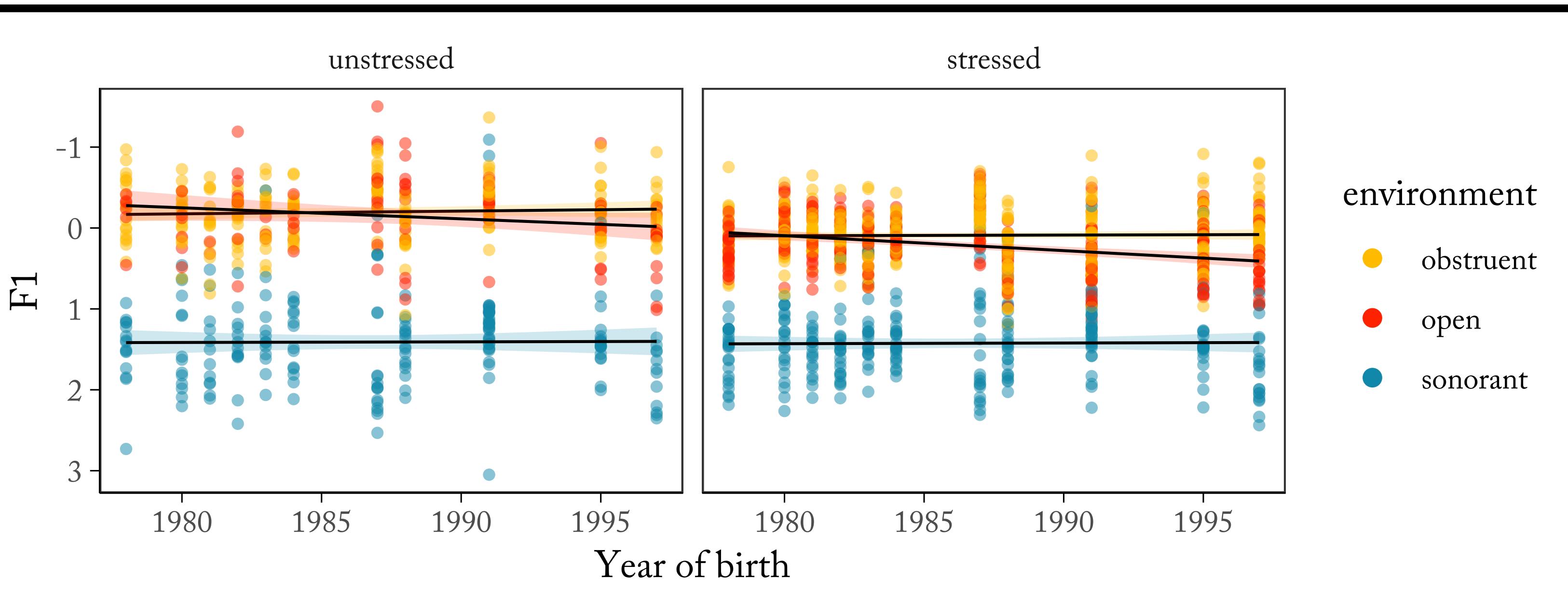
old system. possible to tell apart stressed &
unstressed in open syllables (systematic
difference in height)

new system. pre-obstruent ≥ open? realisations in
obstruent contexts have actually systematically drifted
upwards.

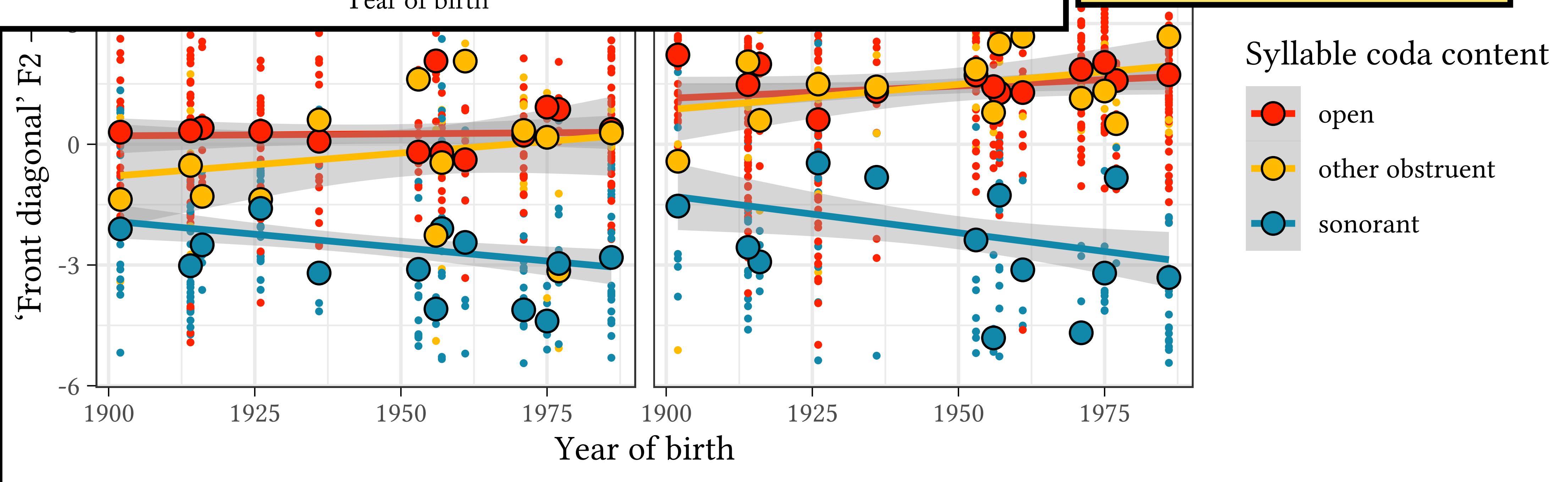
new system. pre-sonorant realisations get
further and further away from everything else.

new system. is stress so crucial?





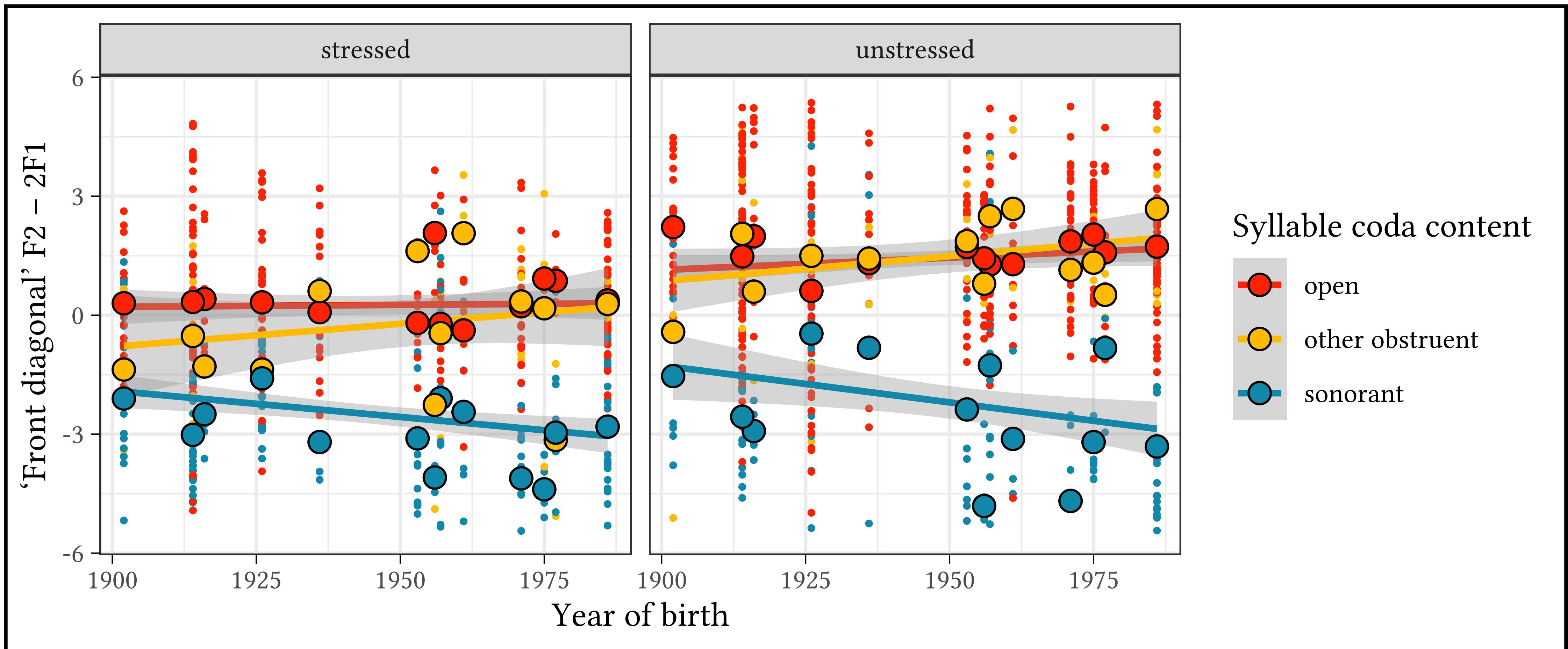
A vision of the future.
From our ms. (11 female speakers, **1980-1997**):
pre-sonorant realisations
don't move very much
any more, pre-obstruent
realisations still working
on being the highest.



What about individual coda sonorants?

Data

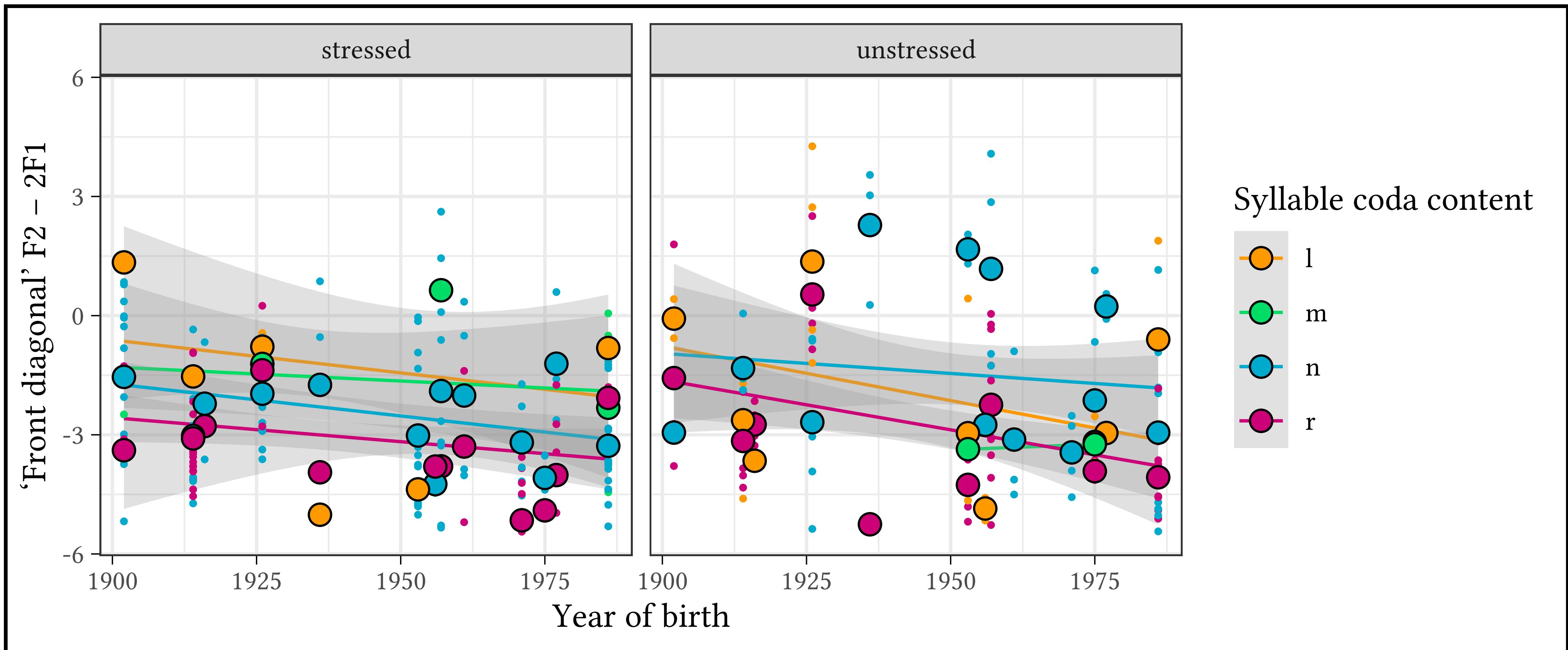
/e/-realisations across environments



What about individual coda sonorants? Differences between /n, l, m/ turn out **not** to be **statistically significant**, but /r/ is consistently ahead.

Data

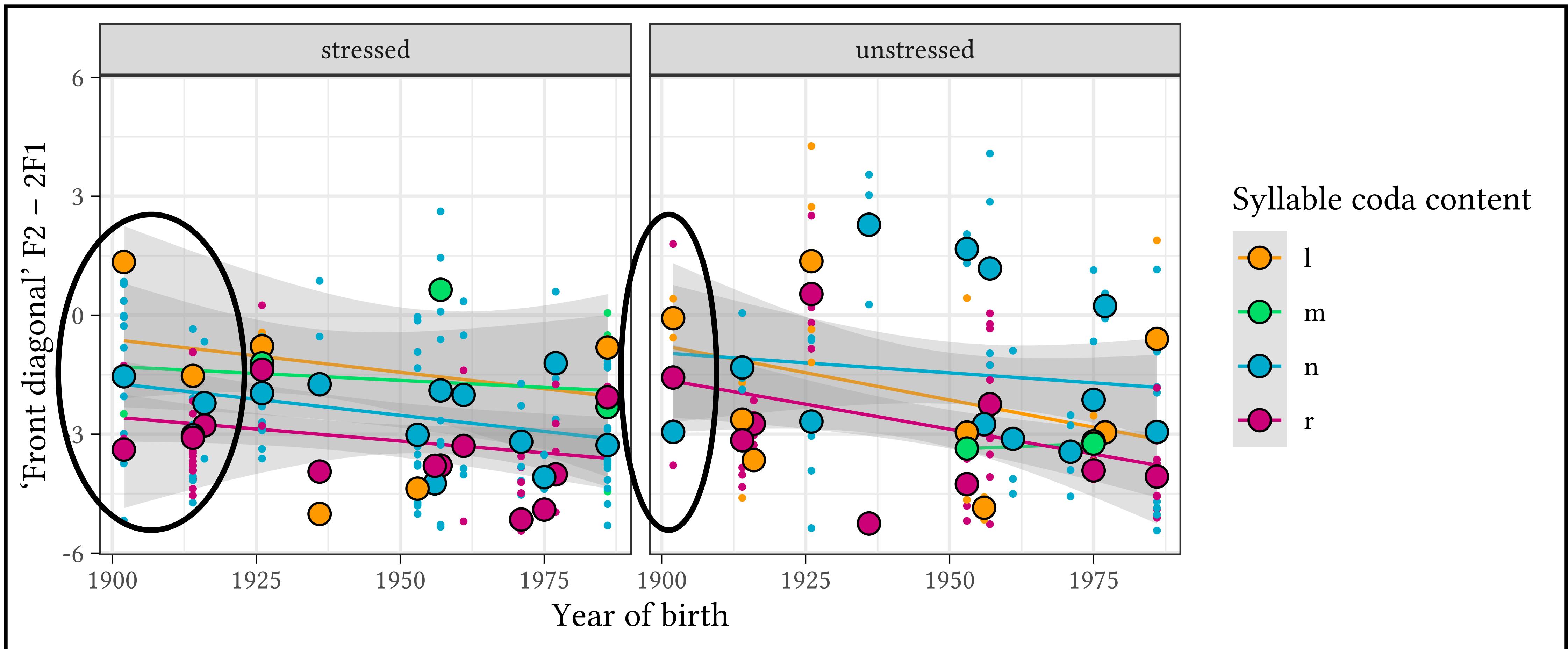
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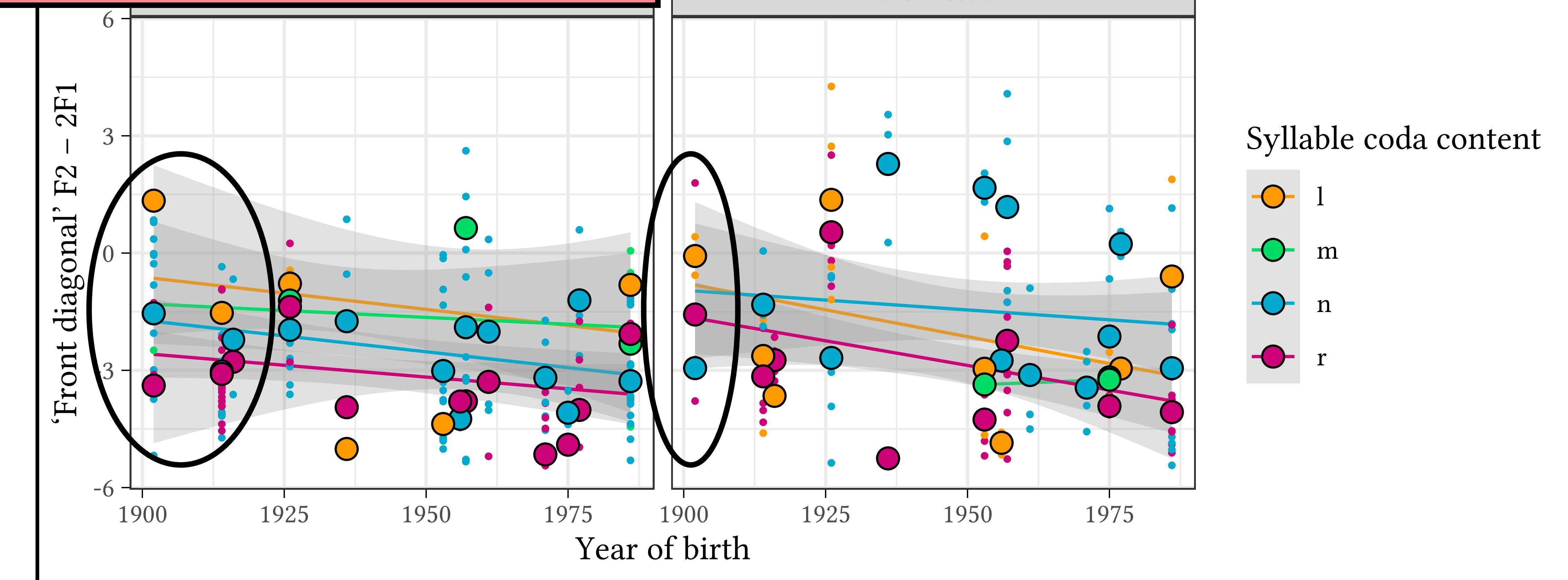
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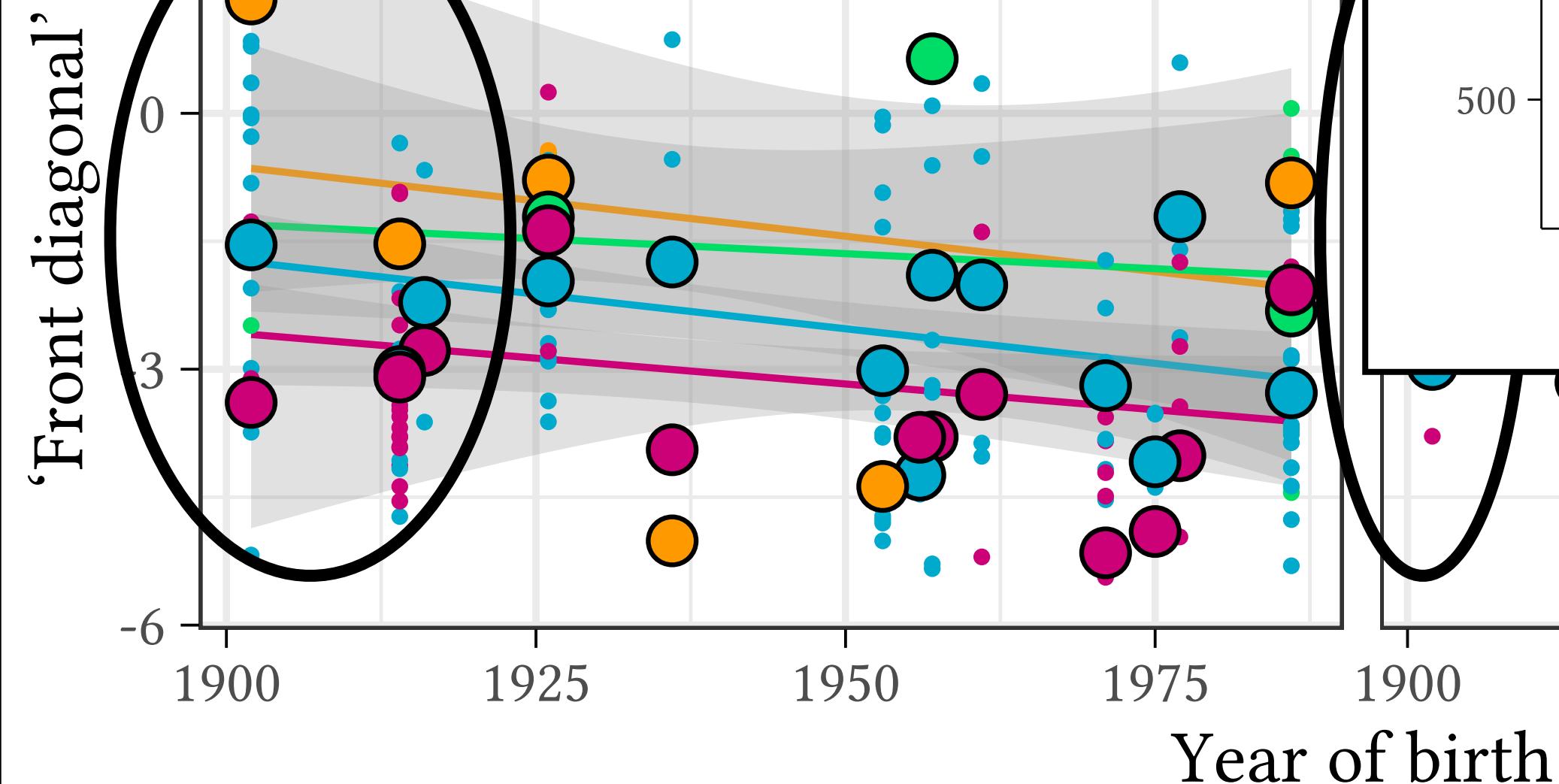
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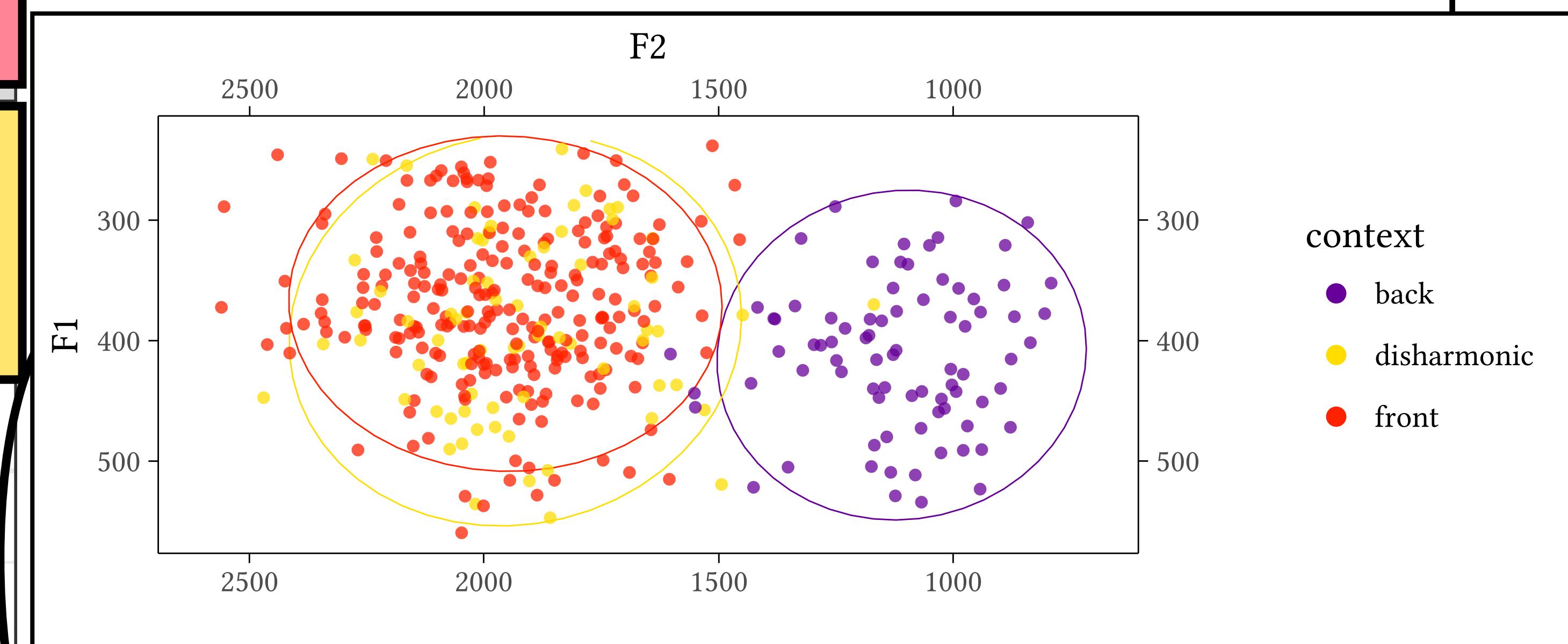
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It turns out that near any kind of front vowel, even a very low one, the lateral is **strongly palatalised** and totally discontinuous in phonetic space with more 'back' realisations.



Data

Realisations across environments

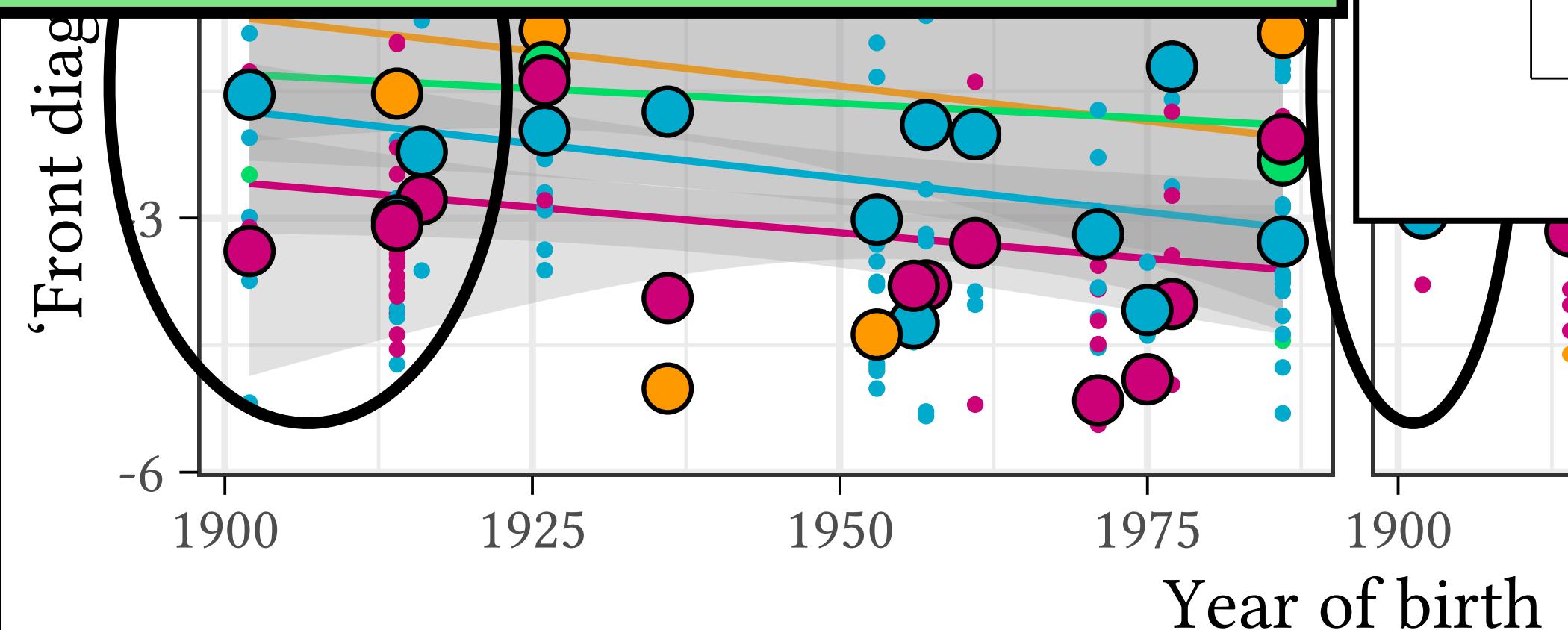


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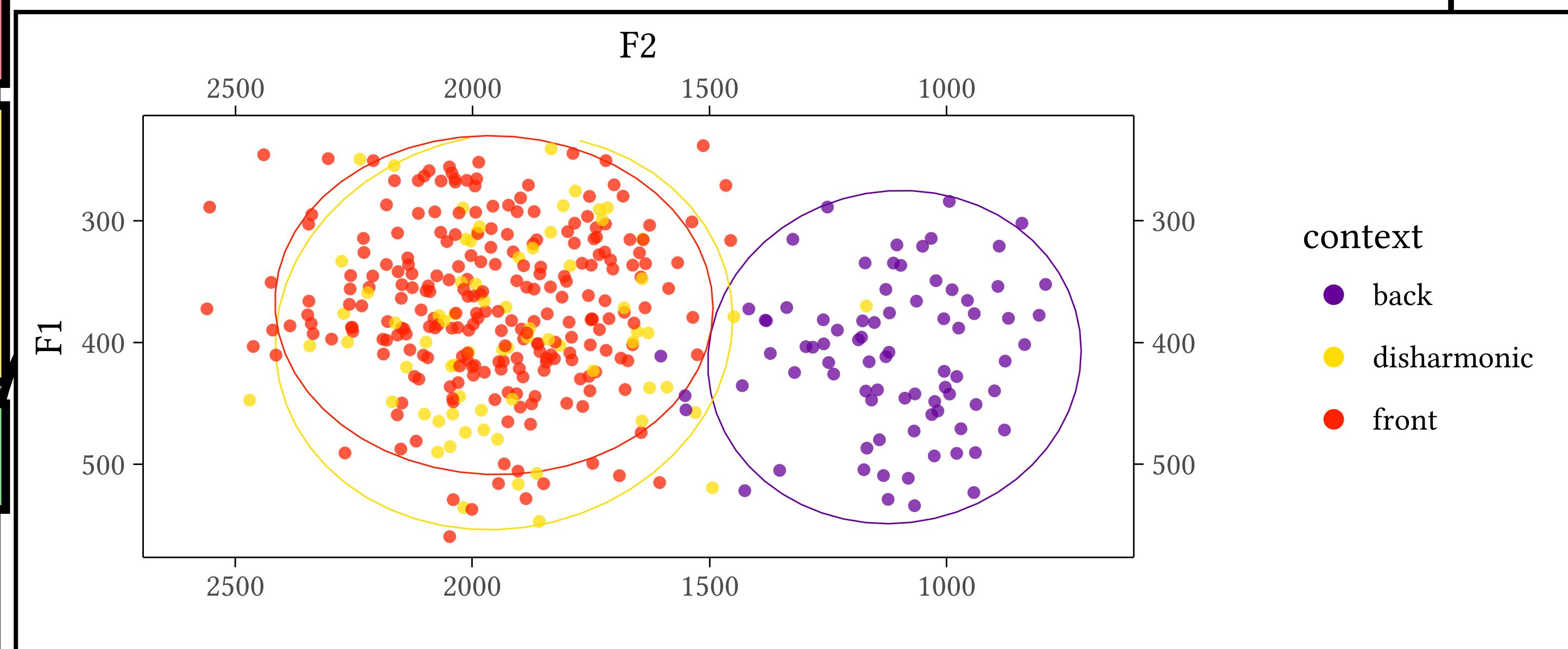
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!!



Data

Realisations across environments



What about individual coda sonorants? Differences between /n, l, m/ turn out **not** to be **statistically significant**, but /r/ is consistently ahead.

Data

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:

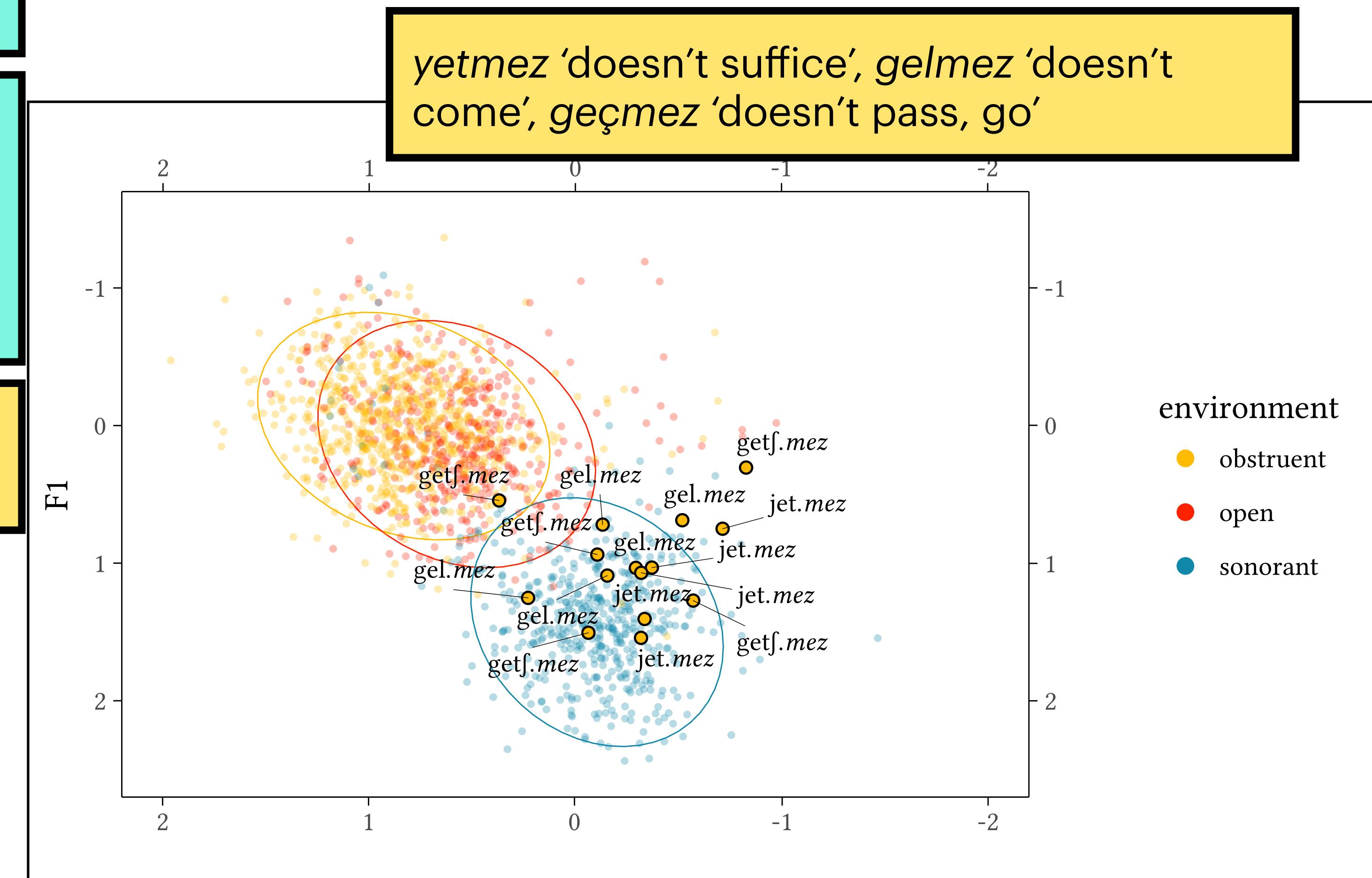
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(can't tell you about diachronic trajectory pre-z, but can at least demonstrate to you that it's real)



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.

<i>Standard Turkish</i>
var
verdi
giderler
pisirir
verir

<i>Western Anatolian</i>
va:
væ:.di
gi.dæ:.læ:
pisiræ:
viri:

'there is'
's/he gave'
'they go'
's/he cooks'
's/he gives'

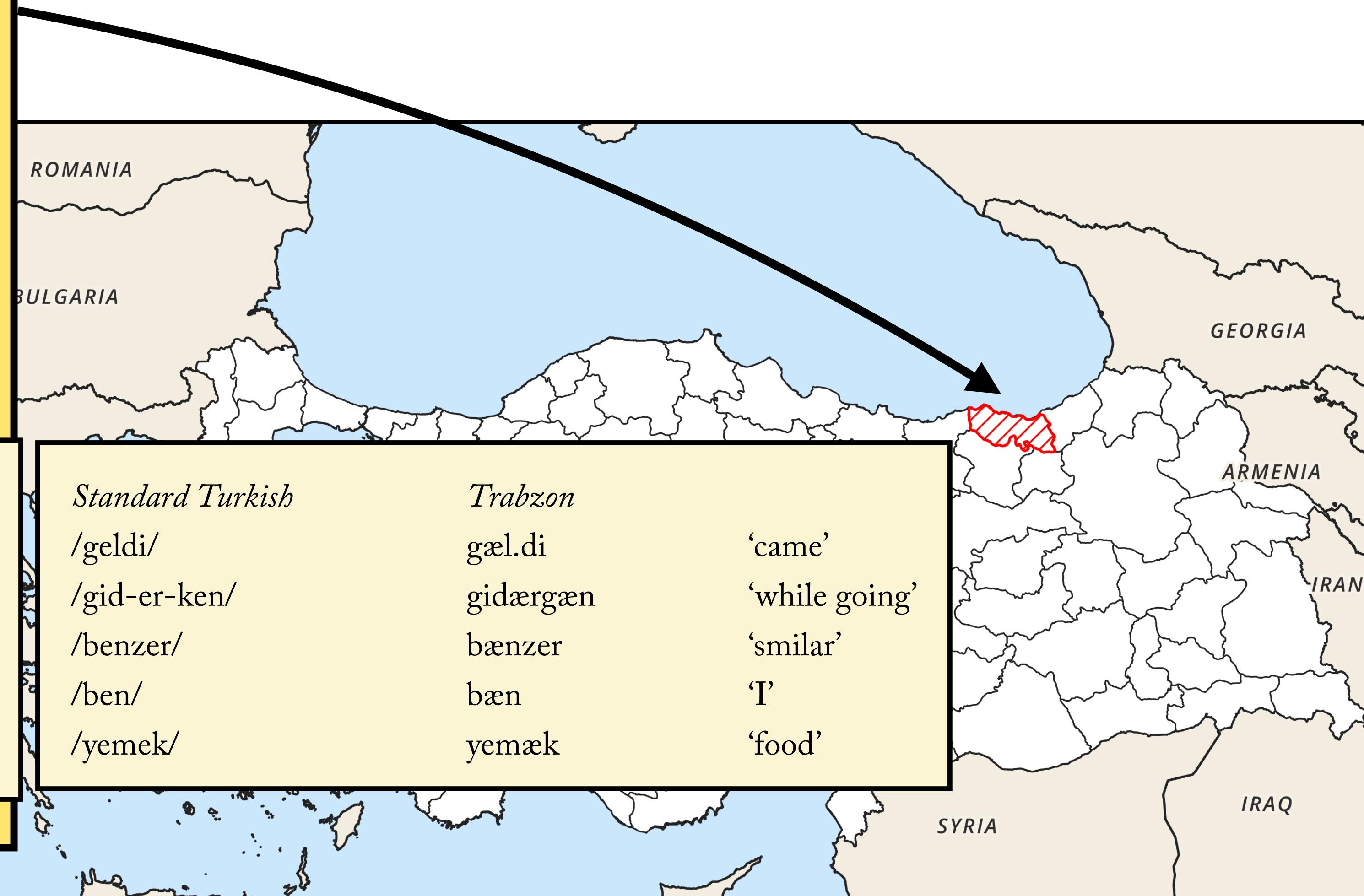


Other sources of evidence

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 γ n/** (= liquids + dorsals?), with further free variation between **[e] and [æ] in pre-sonorant and pre-velar positions /r l k γ n n/ excl. /m/.**

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



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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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.

p ^h	t ^h	k ^h
b	d	g
pf	ts	kx
f	s	ʃ
z	ʒ	
r		
m	n	ŋ
l		
j		

p ^h	t ^h	k ^h
b	d	g
pf	ts	kx
f	s	ʃ
z	ʒ	
r		
m	n	ŋ
l		
j		

p ^h	t ^h	k ^h
b	d	g
pf	ts	kx
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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).

/mercxl-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/	[gatʃri]	‘you will cut’
/xar-av-a/	[xvra] ⁶⁶	gnaw-THEM-INF

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

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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