Documenting endangered varieties: Eastern Basque (Zuberoan & Mixean)

Ander Egurtzegi (CNRS-IKER)

Advanced course in Sound Change with a focus on Basque

University of Chicago, 2025/03/31

Phonological inventory

Standard Basque — Euskara Batua (Hualde 2003)

		labial		apical		laminal	predorsal		postdorsal
		bilabial	labio-dental	apico-dental	apico-alveolar		palato-alveolar	palatal	
stop	voiceless	p		t				c	k
	voiced	b		d				ɟ	g
fricative			f		s̻	s̻	ʃ		x
affricate					t̻s̻	t̻s̻	t͡ʃ		
nasal		m			n			ɲ	
lateral					l			ʎ	
tap					ɾ				
trill					r				

	front	central	back
high	i		u
mid	e		o
low		a	

Zuberoan Basque (Hualde 1993; Egurtzegi 2018)

		labial		apical		laminal	predorsal		postdorsal	laryngeal
		bilabial	labio-dental	apico-dental	apico-alveolar	alveolar	palato-alveolar	palatal		
stop	voiceless	p		t				c	k	
	aspirated	p^h		t^h				c^h	k^h	
	voiced	b		d				ɟ	g	
Fricative	voiceless		f		s̪	s̪	ʃ			h/h̃
	voiced				z̪	z̪	ʒ			
affricate	voiceless				ʦ̪	ʦ̪	ʧ			
	voiced				ʣ̪					
nasal		m			n			ɲ		
lateral					l			ʎ		
tap					r					
trill					r					
glides								j	w	

	front	central	back
high	i/ĩ y/ỹ		u/ũ
mid	e		o
low		a/ã	

Zuberoan Basque — Zuberera

		labial		apical		laminal	predorsal		postdorsal	laryngeal
		bilabial	labio-dental	apico-dental	apico-alveolar	alveolar	palato-alveolar	palatal		
stop	voiceless			t̪				c		
	aspirate	p^h		$t̪^h$				c^h	k^h	
	voiced			d̪					ɡ	
Fricative	voiceless		f		s̪	s̪	ʃ			h/h̃
	voiced				z̪	z̪	ʒ			
affricate	voiceless				ʦ̪	ʦ̪	ʧ			
	voiced				ʣ̪					
nasal		m			n			ɲ		
lateral					l			ʎ		
tap					ɾ					
trill					r					
glides								j	w	

	front	central	back
high	i/ĩ y/ỹ		u/ũ
mid	e		o
low		a/ã	

Zuberoan Basque — Zuberera

		labial		apical		laminal	predorsal		postdorsal	laryngeal
		bilabial	labio-dental	apico-dental	apico-alveolar	alveolar	palato-alveolar	palatal		
stop	voiceless	p		t				c	k	
	aspirated	p^h		t^h				c^h	k^h	
	voiced	b		d				ɟ	g	
Fricative	voiceless		f		s̪		ʃ			h/h̃
	voiced				z̪	ʒ̪	ʒ			
affricate	voiceless						ʤ			
	voiced				dz̪					
nasal		m			n			ɲ		
lateral					l			ʎ		
tap					r					
trill					r					
glides								j	w	

	front	central	back
high	i/ĩ y/ỹ		u/ũ
mid	e		o
low		a/ã	

Zuberoan Basque — Zuberera

		labial		apical		laminal	predorsal		postdorsal	laryngeal
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stop	voiceless	p		t				c	k	
	aspirated	p^h		t^h				c^h	k^h	
	voiced	b		d				ɟ	g	
Fricative	voiceless		f		s̪	s̪	ʃ			h/h̄
	voiced				z̪	z̪	ʒ			
affricate	voiceless				t̪s̪	t̪s̪	ʧ			
	voiced				d̪z̪					
nasal		m			n			ɲ		
lateral					l			ʎ		
tap					r					
trill					r					
glides								j	w	

	front	central	back
high	i/ĩ y/ỹ		u/ũ
mid	e		o
low		a/ã	

Zuberoan Basque — Zuberera

		labial		apical		laminal	predorsal		postdorsal	laryngeal
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	aspirated	p^h		t^h				c^h	k^h	
	voiced	b		d				ɟ	g	
Fricative	voiceless		f		s̻	s̻	ʃ			h/h̃
	voiced				z̻	z̻	ʒ			
affricate	voiceless				t̻s̻	t̻s̻	ʧ			
	voiced				d̻z̻					
nasal		m			n			ɲ		
lateral					l			ʎ		
tap					r					
trill					r					
glides								j	w	

	front	central	back
high	i/ĩ y/ỹ		u/ũ
mid	e		o
low		a/ã	

Zuberoan Basque — Zuberera

		labial		apical		laminal	predorsal		postdorsal	laryngeal
		bilabial	labio-dental	apico-dental	apico-alveolar	alveolar	palato-alveolar	palatal		
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	aspirated	p^h		t^h				c^h	k^h	
	voiced	b		d				ɟ	g	
Fricative	voiceless		f		s̻	s̪	ʃ			h/h̃
	voiced				z̻	z̪	ʒ			
affricate	voiceless				ʦ̻	ʦ̪	ʧ			
	voiced				ʣ̻					
nasal		m			n			ɲ		
lateral					l			ʎ		
tap					ɾ					
trill					r					
glides								j	w	

	front	central	back
high	/ĩ/ /ỹ/		/ũ/
mid	e		o
low		/ã/	

Bearnese Gascon (Mooney 2014)

	Bilabial	Labio-dental	Alveolar	Post-alveolar	Palatal	Velar	Glottal
Plosive	p b		t d			k g	
Affricate					t͡ç d͡ʝ		
Nasal	m		n		ɲ	ŋ	
Trill			r				
Tap			ɾ				
Fricative		f v	s z	ʃ (ʒ)			h
Approximant					j	w	
Lateral			l		ʎ		

Bearnese Gascon (Mooney 2014)

	Bilabial	Labio-dental	Alveolar	Post-alveolar	Palatal	Velar	Glottal
Plosive	p b		t d			k g	
Affricate					t͡ɕ d͡ʑ		
Nasal	m		n		ɲ	ŋ	
Trill			r				
Tap			ɾ				
Fricative		f v	s z	ʃ ʒ			h
Approximant					j	w	
Lateral			l		ʎ		

Bearnese Gascon (Mooney 2014)

	Bilabial	Labio-dental	Alveolar	Post-alveolar	Palatal	Velar	Glottal
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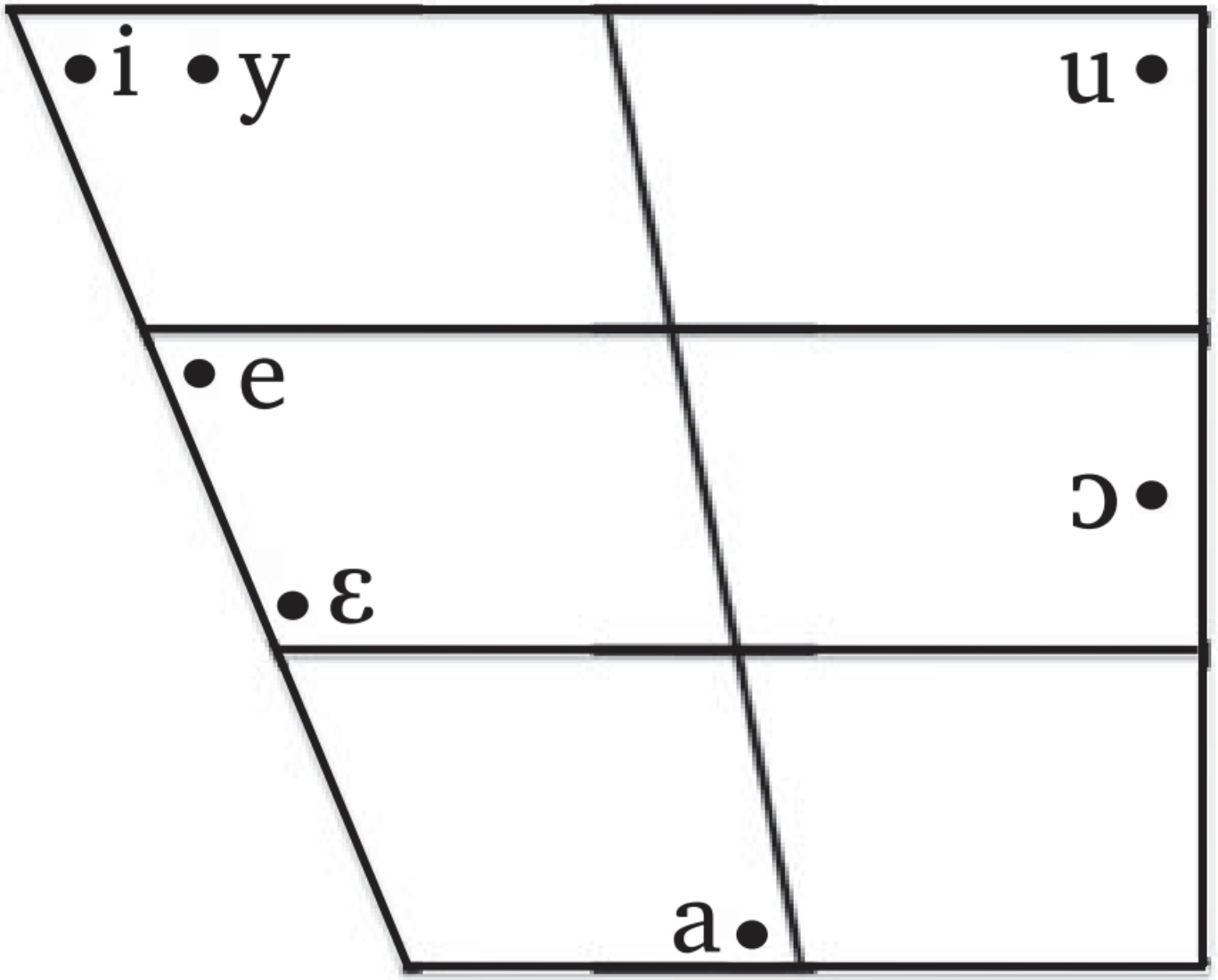
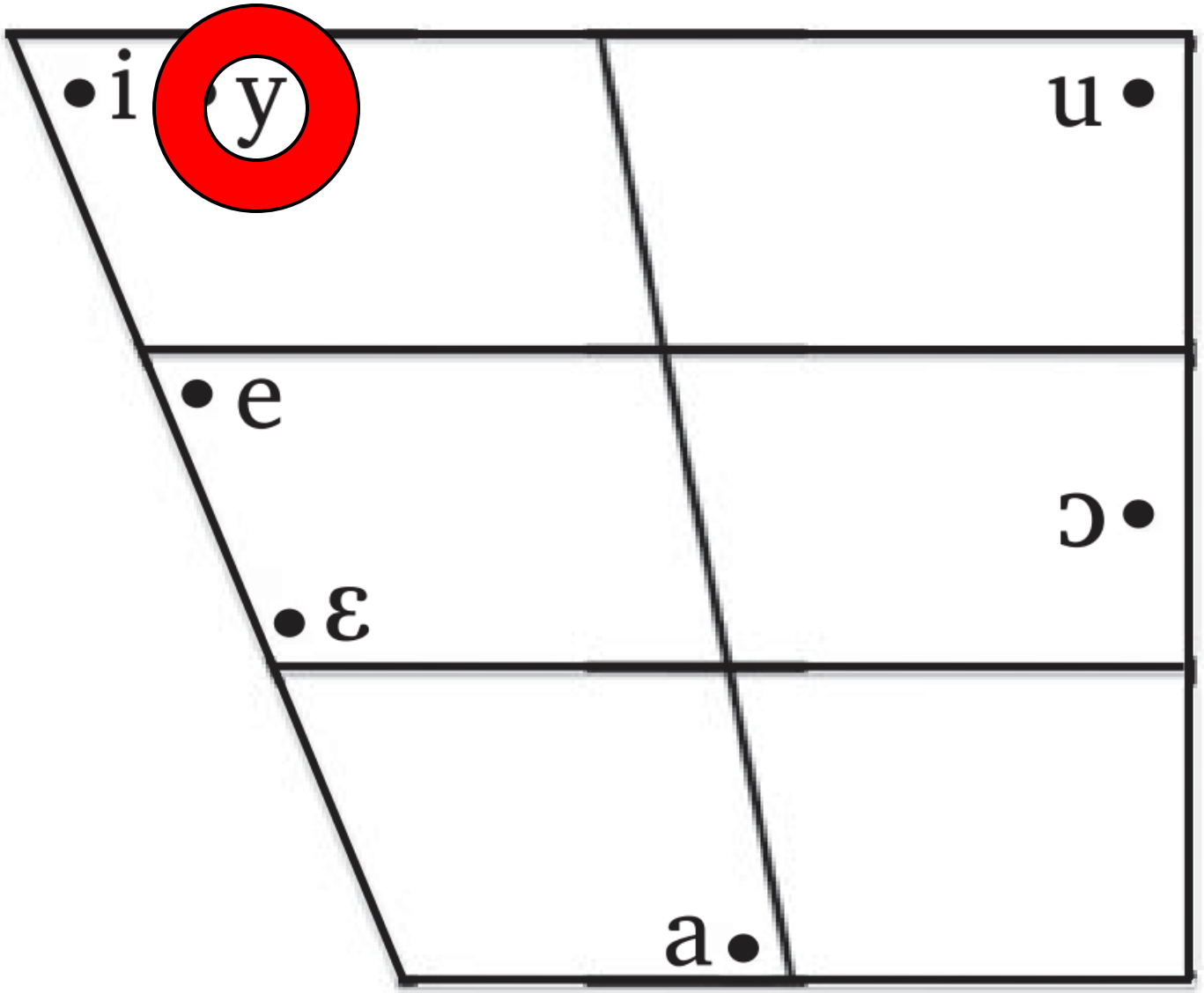
Affricate					t͡ɕ d͡ʑ		
Nasal	m		n		ɲ	ŋ	
Trill			r				
Tap			ɾ				
Fricative		f v	s z	ʃ (ʒ)			h
Approximant					j	w	
Lateral			l		ʎ		

Bearnese Gascon (Mooney 2014)



Bearnese Gascon (Mooney 2014)

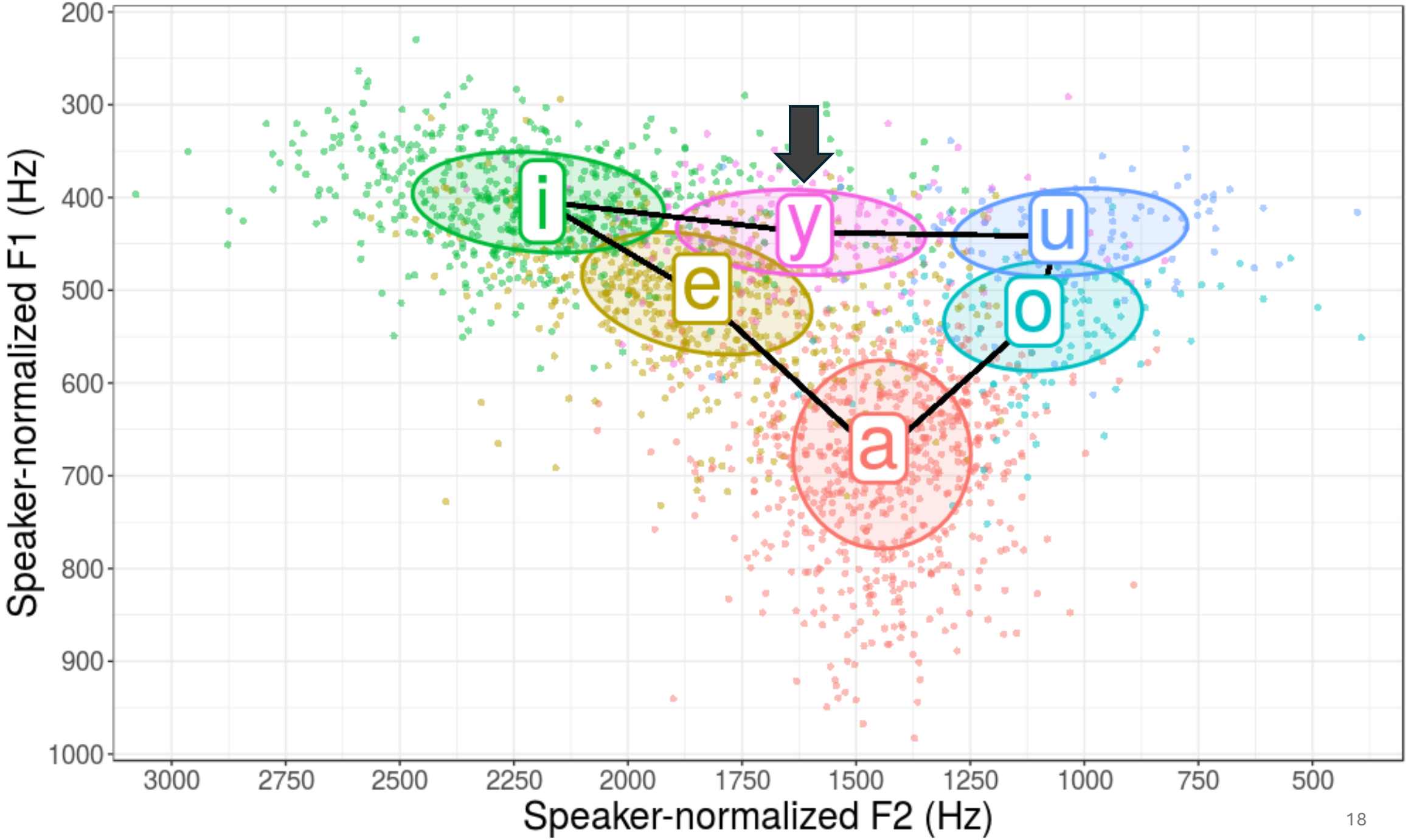


Phonetic analysis

Vowels

Oral vowels

- Six oral vowel qualities:
  - High: /i, y, u/
  - Mid: /e, o/
  - Low: /a/

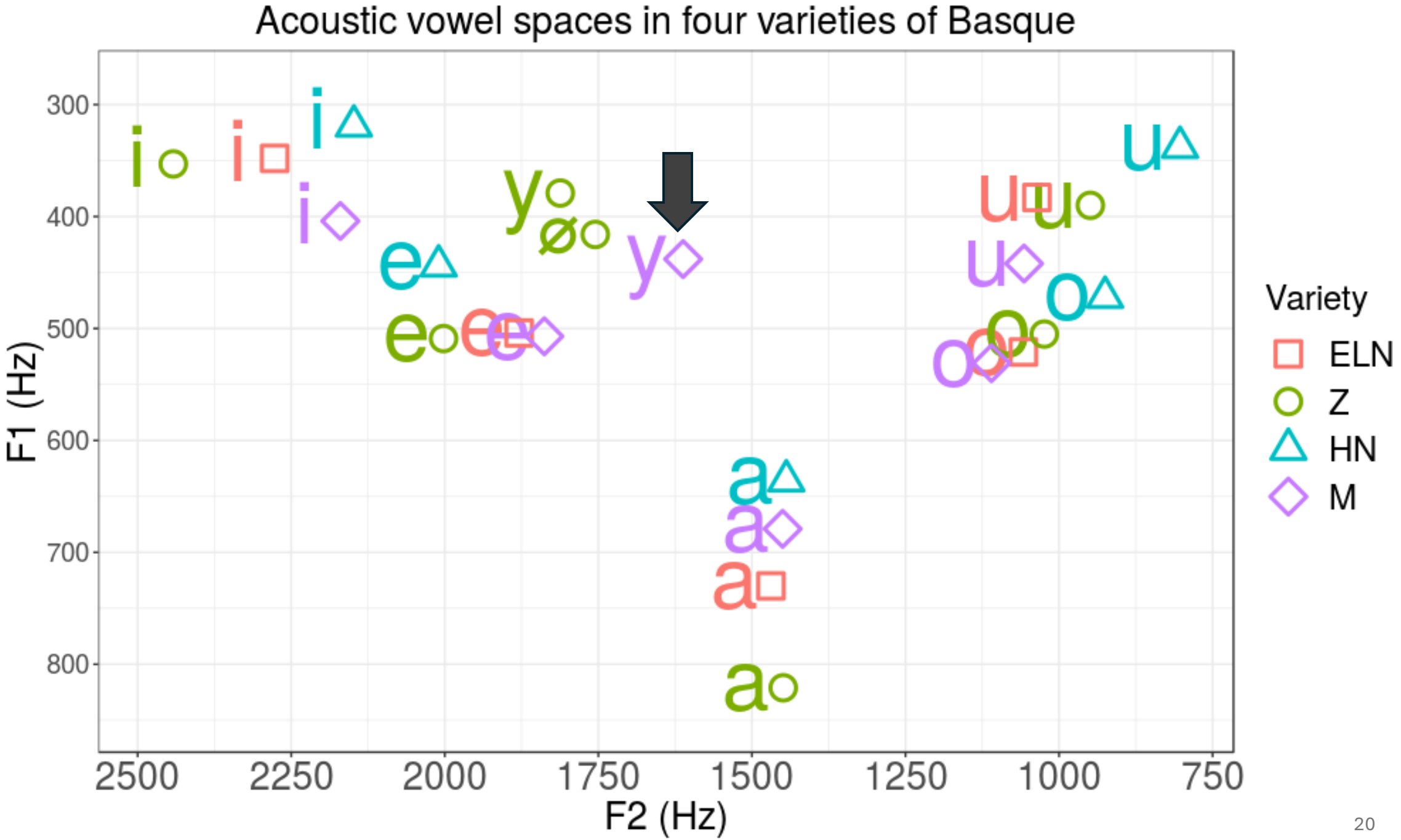

Speaker-normalized F1 (Hz)
200
300
400
500
600
700
800
900
1000
3000
2750
2500
2250
2000
1750
1500
1250
1000
750
500
Speaker-normalized F2 (Hz)
i
y
u
e
o
a

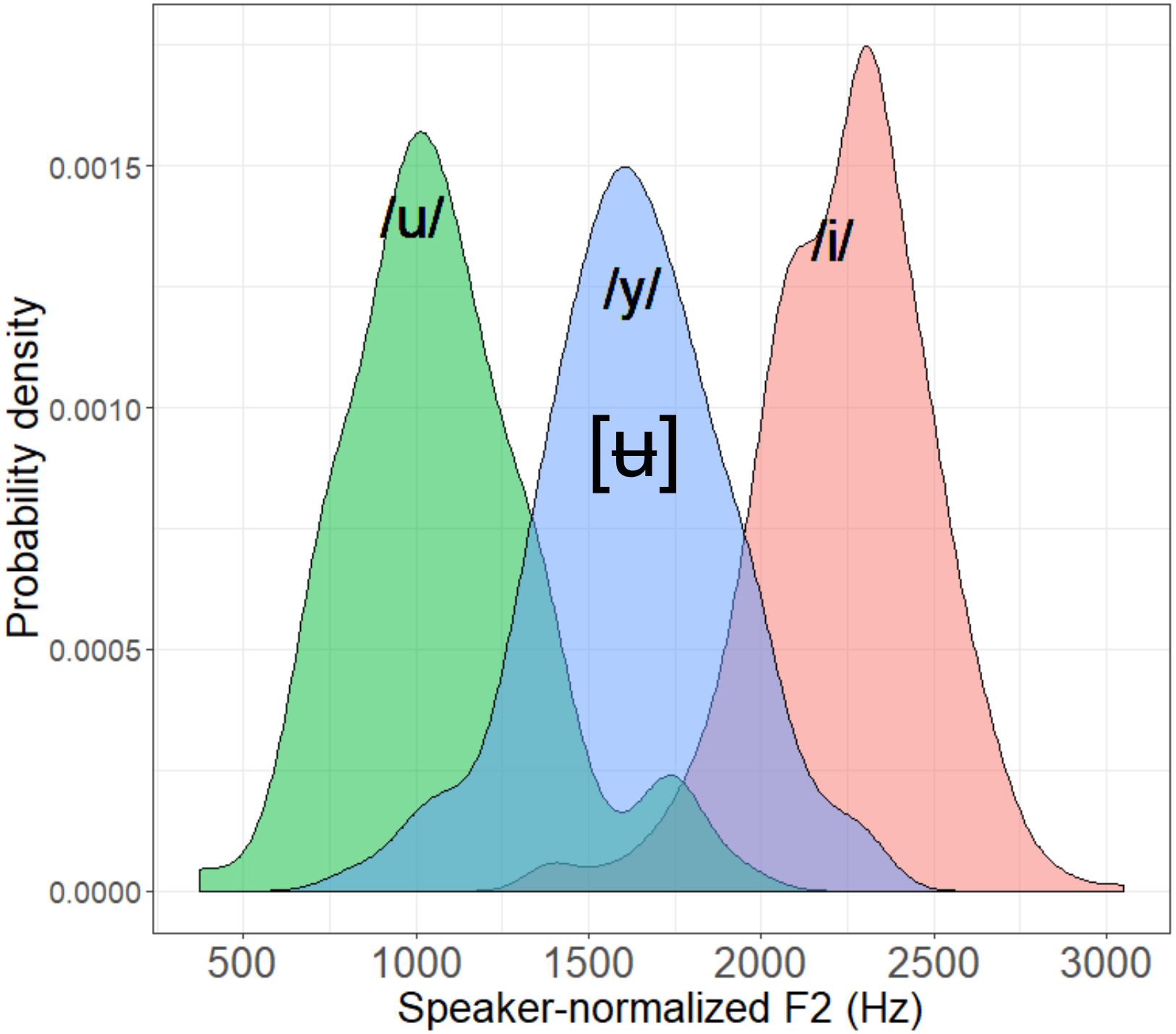
/y/ or /ʉ/ in Zuberoan and Mixean?

Table 1: Vowel formant summary from Urrutia et al. (1995), Pagola (1992), and the current study.

Variety	Vowel													
	/i/		/e/		/a/		/o/		/u/		/y/		/ø/	
	F1	F2	F1	F2	F1	F2	F1	F2	F1	F2	F1	F2	F1	F2
East. Low Navarrese (Urrutia et al., 1995)	348	2277	504	1879	730	1469	521	1058	383	1036				
Zuberoan (Urrutia et al., 1995)	353	2442	509	2002	821	1449	505	1024	390	949	379	1812	416	1755
High Navarrese (Pagola, 1992)	319	2148	444	2010	636	1444	472	925	338	803				
Mixean	404	2170	507	1838	679	1450	531	1110	442	1057	438	1612		

Egurtzegi & Carignan 2020: “An acoustic description of Mixean Basque”. *Journal of the Acoustical Society of America* 147.4, 2791–2802.


Acoustic vowel spaces in four varieties of Basque
F1 (Hz)
300
400
500
600
700
800
2500
2250
2000
1750
1500
1250
1000
750
F2 (Hz)
Variety
ELN
Z
HN
M


/u/
/y/
[ʉ]
/i/
Probability density
0.0015
0.0010
0.0005
0.0000
500
1000
1500
2000
2500
3000
Speaker-normalized F2 (Hz)

Nasal vowels in Zuberoan (Egurtzegi 2015)

- 4 nasal vowel qualities:
  - High: /ĩ, ỹ, ũ/
  - Low: /ã/
- No mid vowels:
  - /ẽ, õ/ raised to /ĩ, ũ/

Table 5. Contrastively nasalized vowels in the Zuberoan inherited lexicon.

Zuberoan	Trans.	Std. Bsq.	Gloss
ardű	/ar.ˈdũ/	*ardo*	'wine'
hügű̃	/hy.ˈgỹ/	*higuin*	'repugnance'
gorriű	/go.ˈrjũ/	–	'reddish mushroom'
hazkű	/haʂ.ˈkũ/	*azko(i)n*	'badger'
Xiberű	/ʃi.be.ˈrũ/	*Zuberoa*	'(region)'

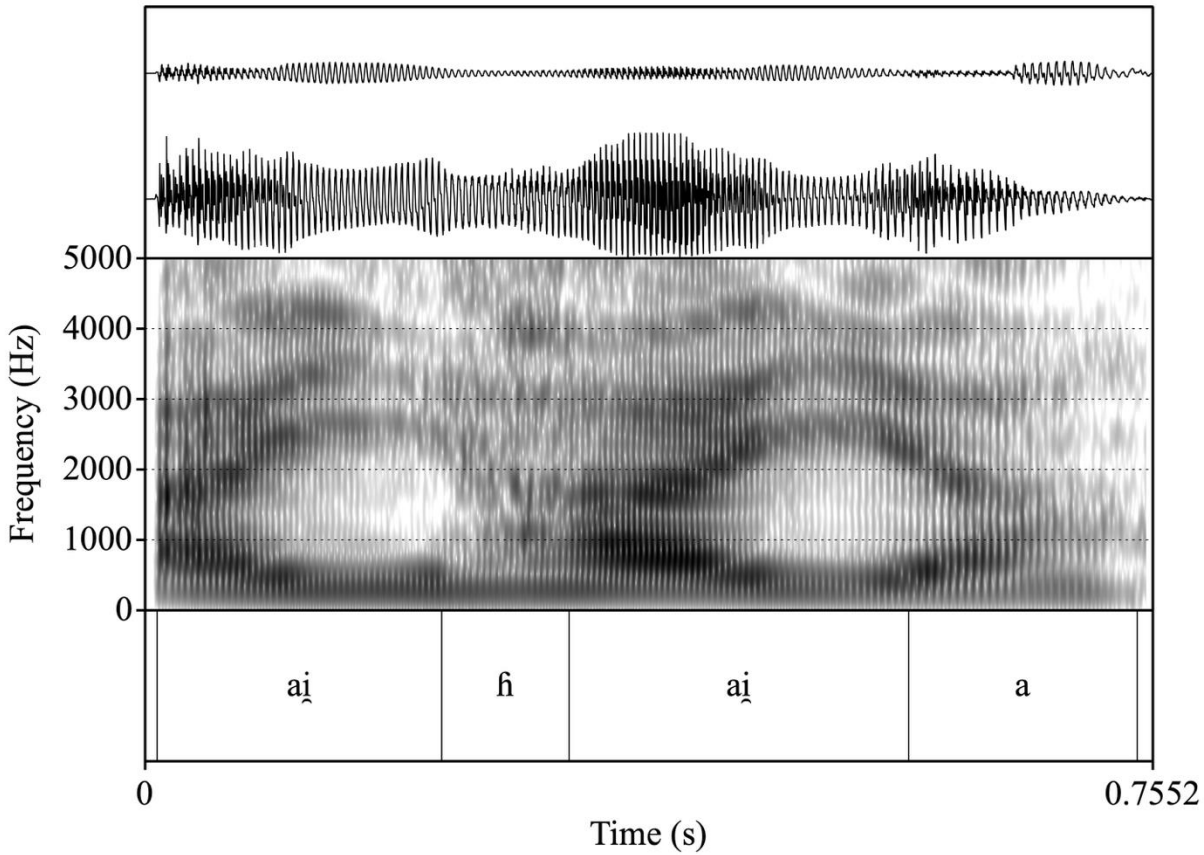
Nasal vowels in Bearnese Gascon

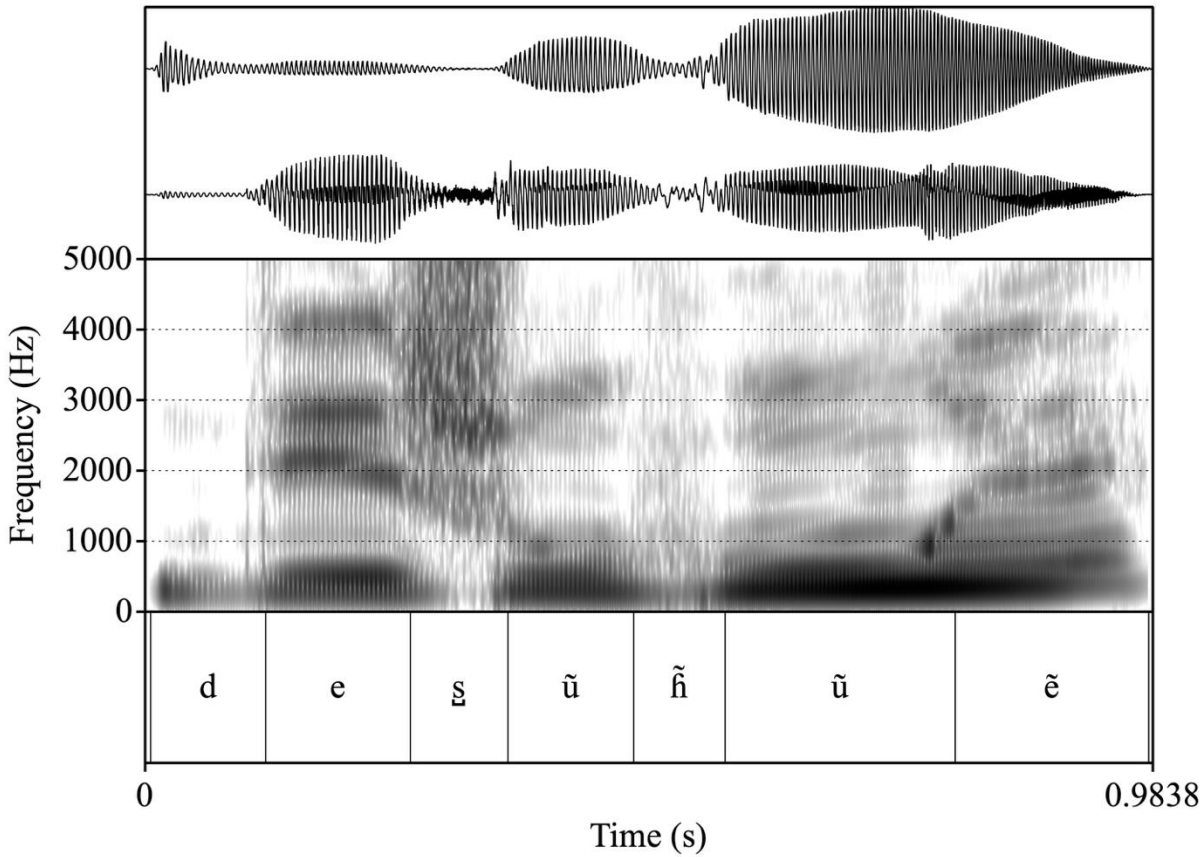
ĩ	*bî*	‘wine’	ã	*pâ*	‘bread’
	[bĩ]			[pã]	
ỹ	*û*	‘one’	ũ	*boû*	‘good’
	[ỹ]			[bũ]	
ẽ	*hê*	‘hay’			
	[hẽ]				

Vowel nasality is receding

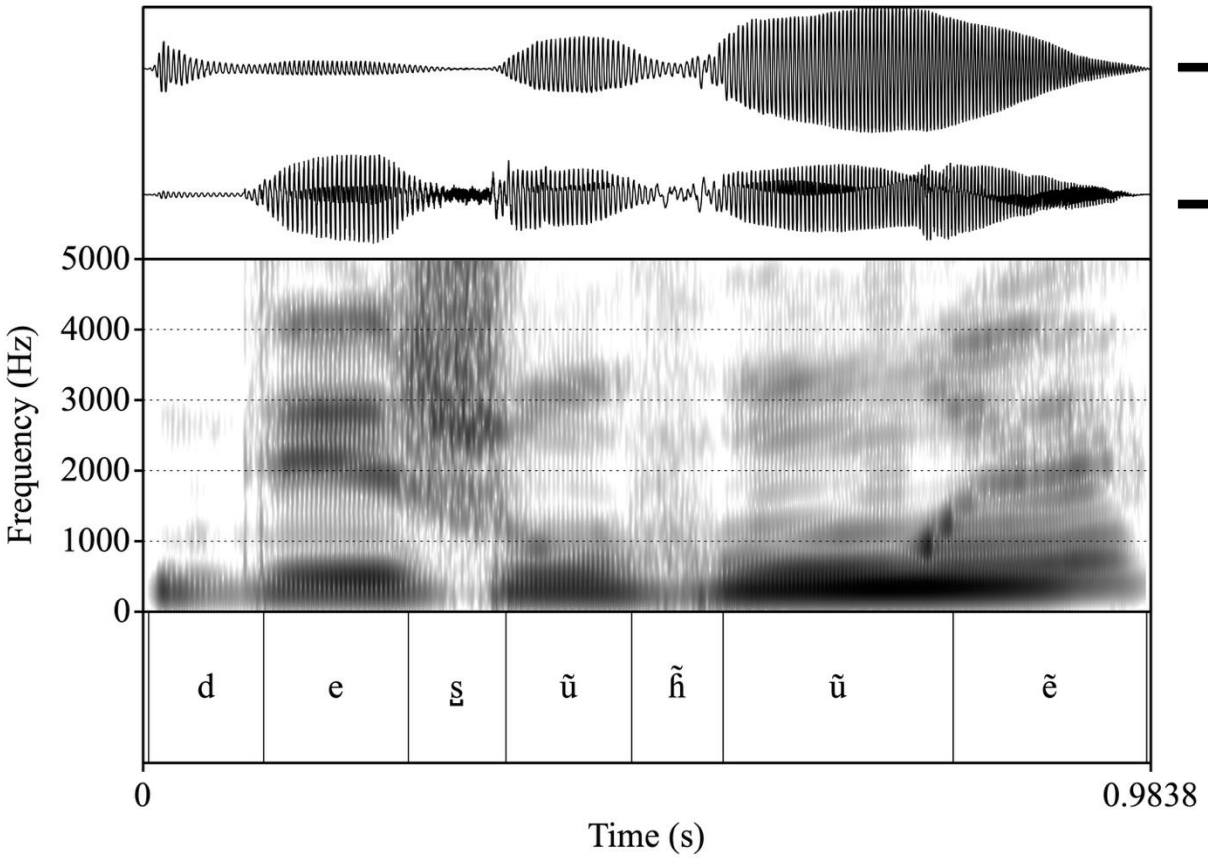
- Mixean does not maintain it.
- Some Zuberoan varieties don’t show it any longer.
- Do younger speakers produce contrastively nasalize vowels?
  - No studies.

Nasalance


5000
4000
3000
2000
1000
0
Frequency (Hz)
aĩ
ɦ̃
aĩ
a
0
0.7552
Time (s)


5000
4000
3000
2000
1000
0
Frequency (Hz)
d
e
s̃
ũ
ñ̃
ũ
ẽ
0
0.9838
Time (s)

Nasalance



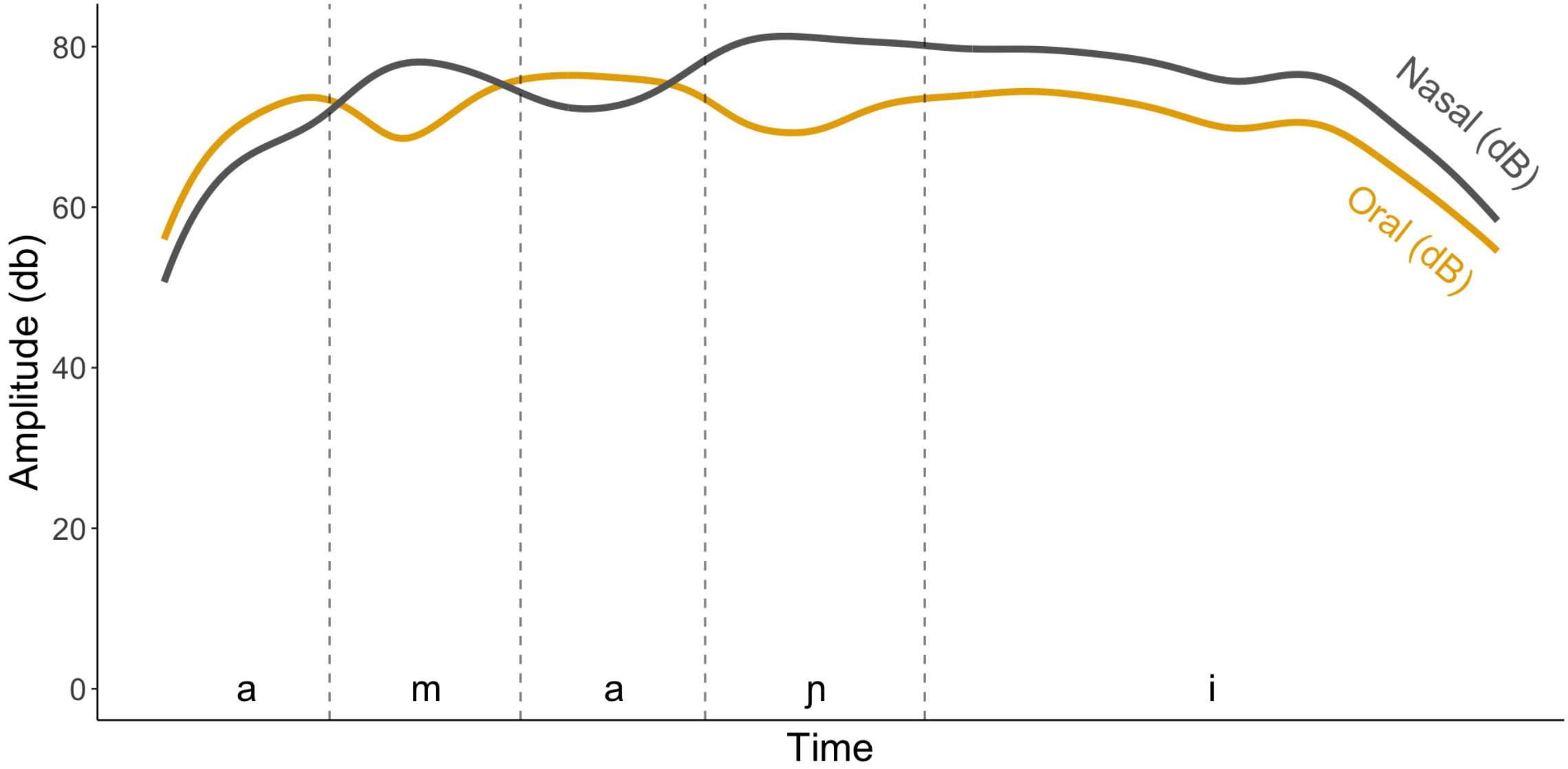
Amplitude

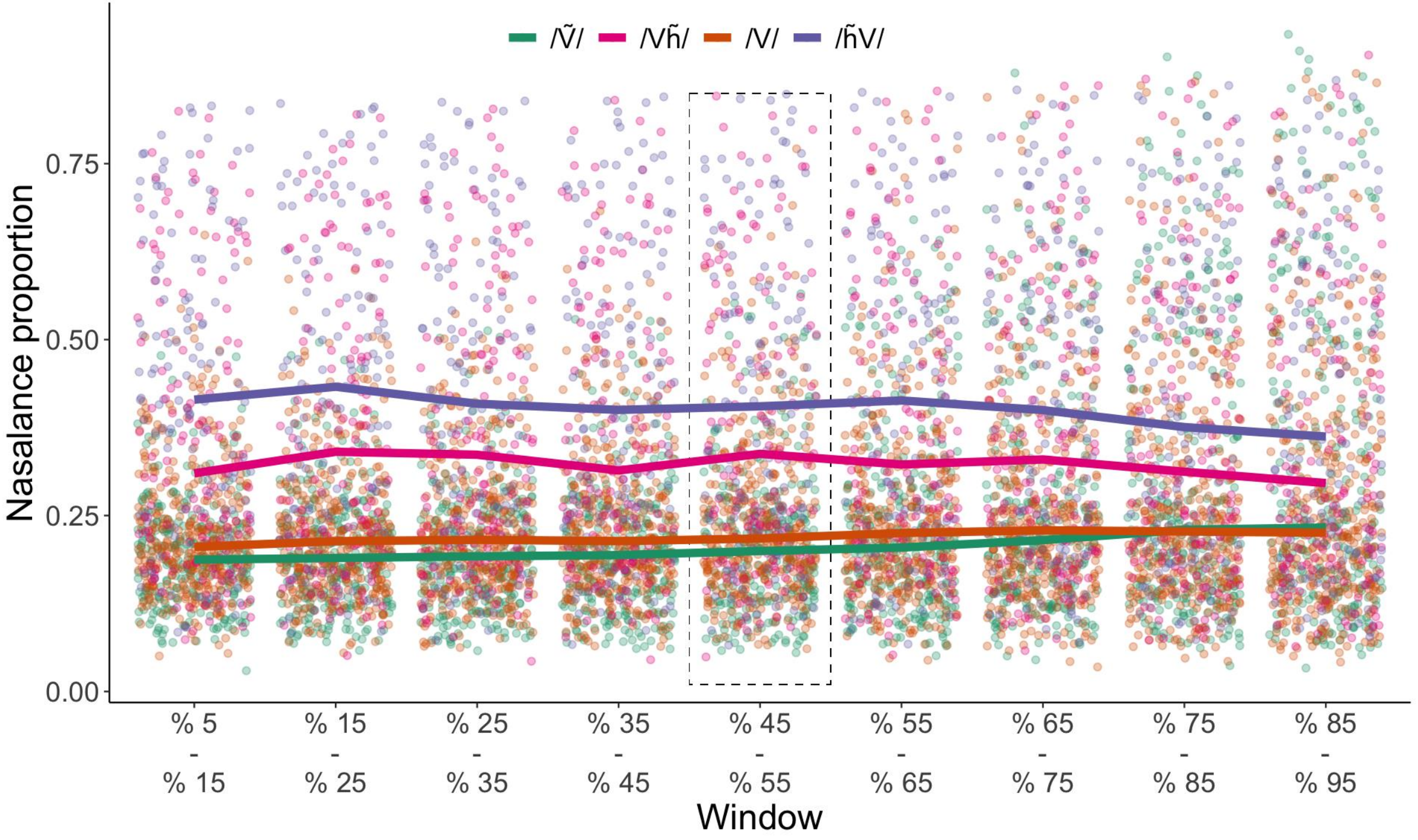
A_n

A_o

$$\frac{A_n}{A_n + A_o}$$

Nasalance proportion




/Ṽ/
/Vñ/
/V/
/ñV/
Nasalance proportion
0.00
0.25
0.50
0.75
% 5 - % 15
% 15 - % 25
% 25 - % 35
% 35 - % 45
% 45 - % 55
% 55 - % 65
% 65 - % 75
% 75 - % 85
% 85 - % 95
Window

Bayesian hierarchical beta regression model with brms

$$\text{Nasalance} \sim 0 + \text{group} : \text{place} + (0 + \text{group} : \text{place} \mid \text{speaker}) + (1 \mid \text{word})$$

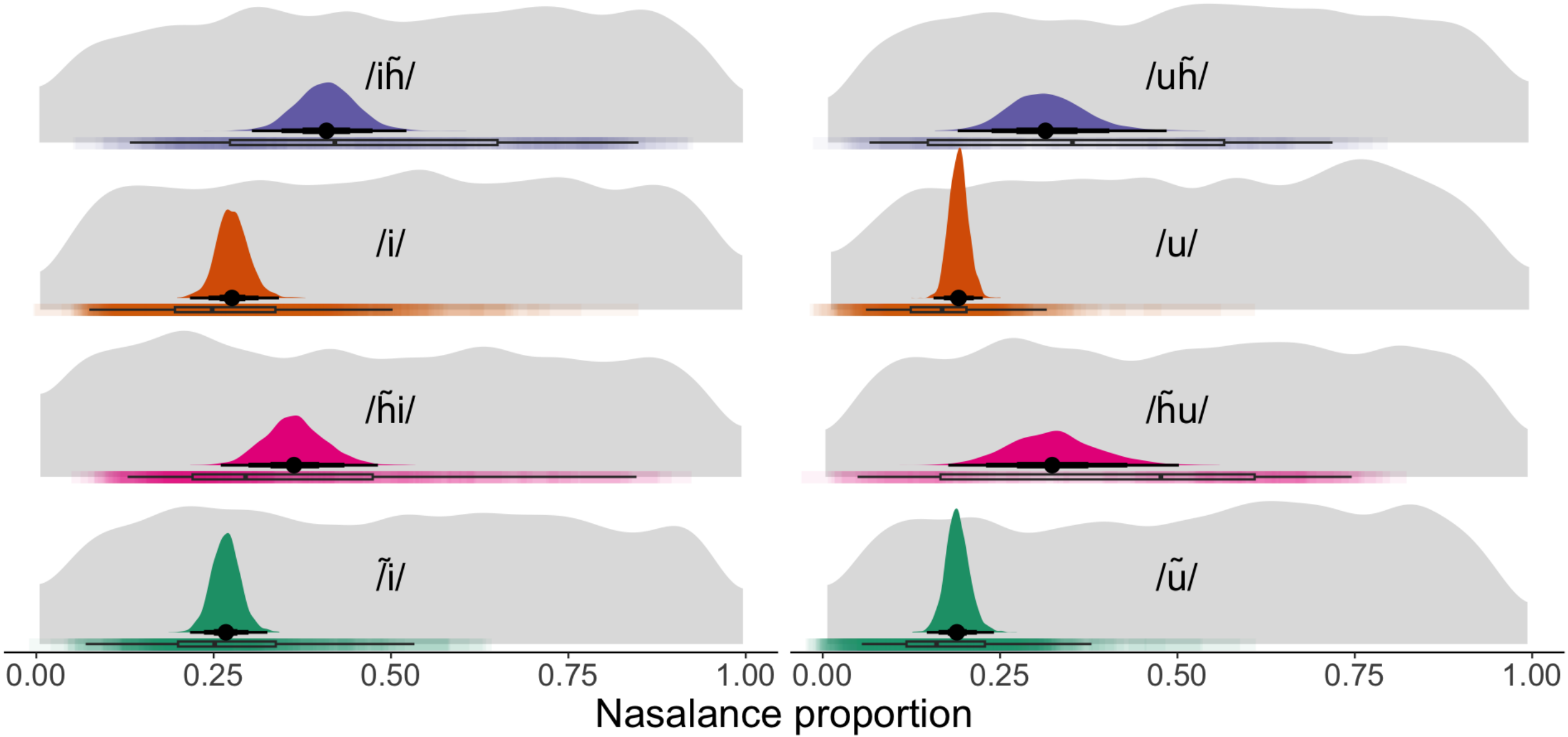
Priors:

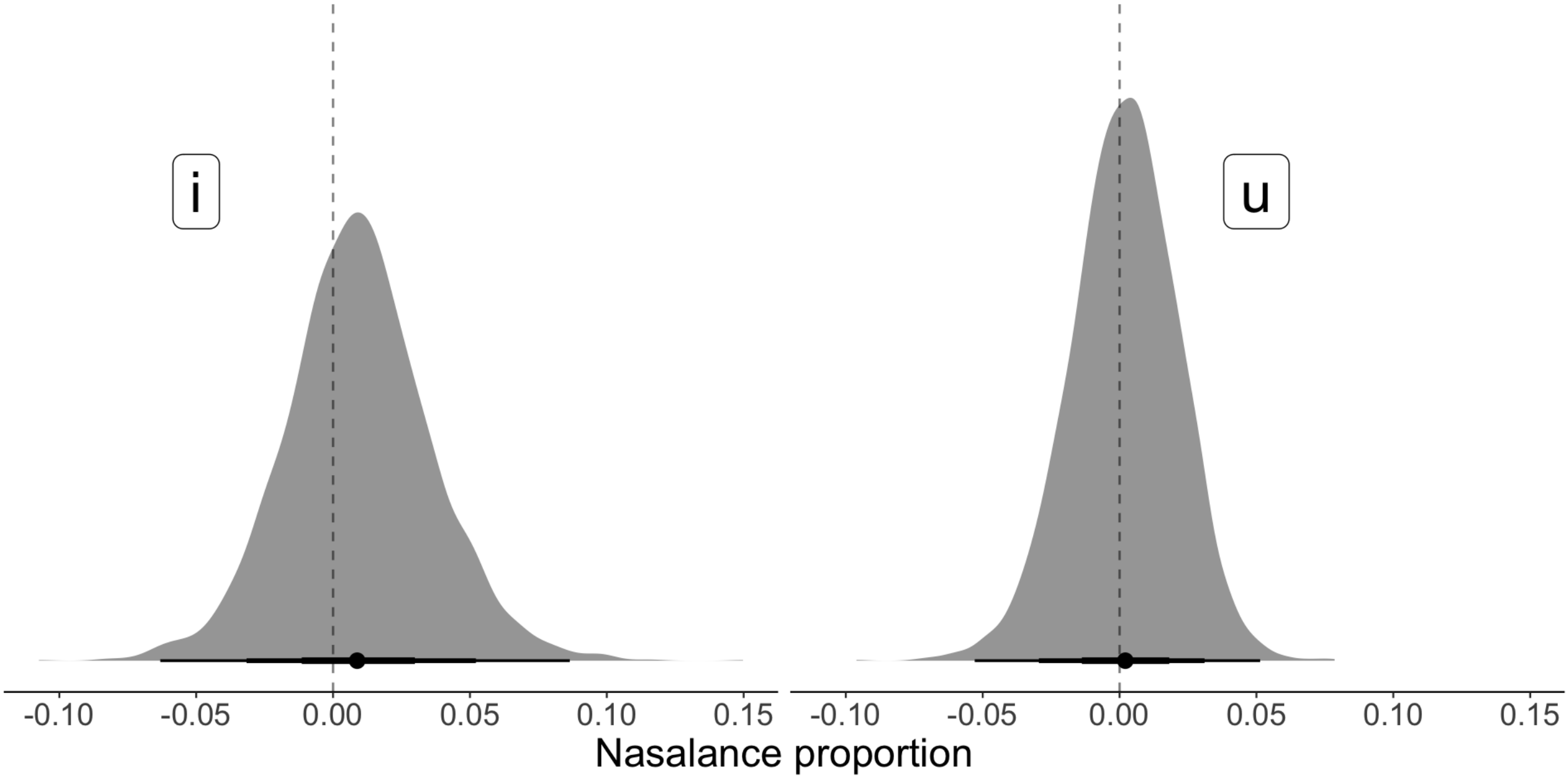
$\beta \sim \text{Normal}(0,1.5)$

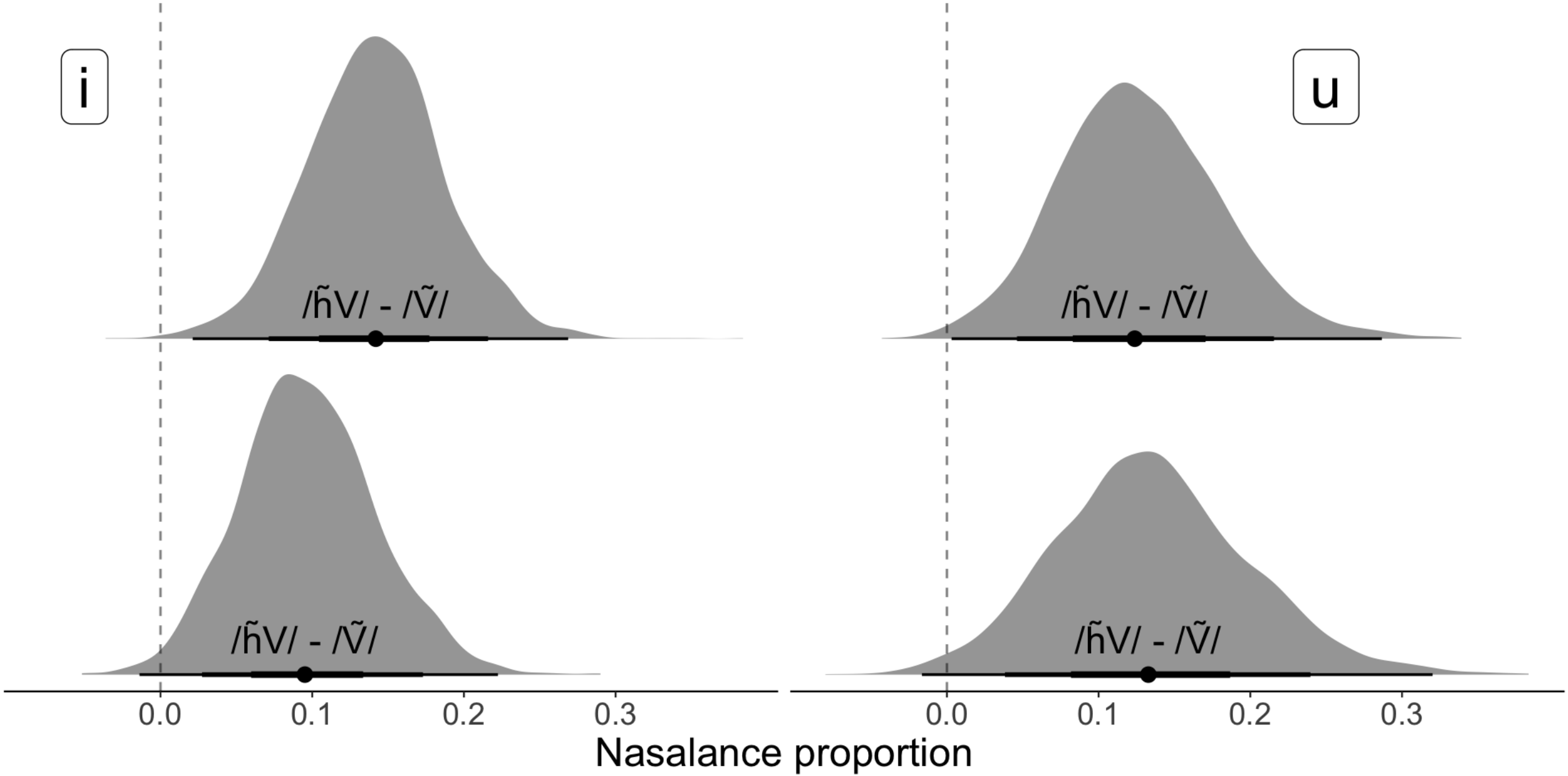
$\varphi \sim \text{Normal}(0,1.2)$

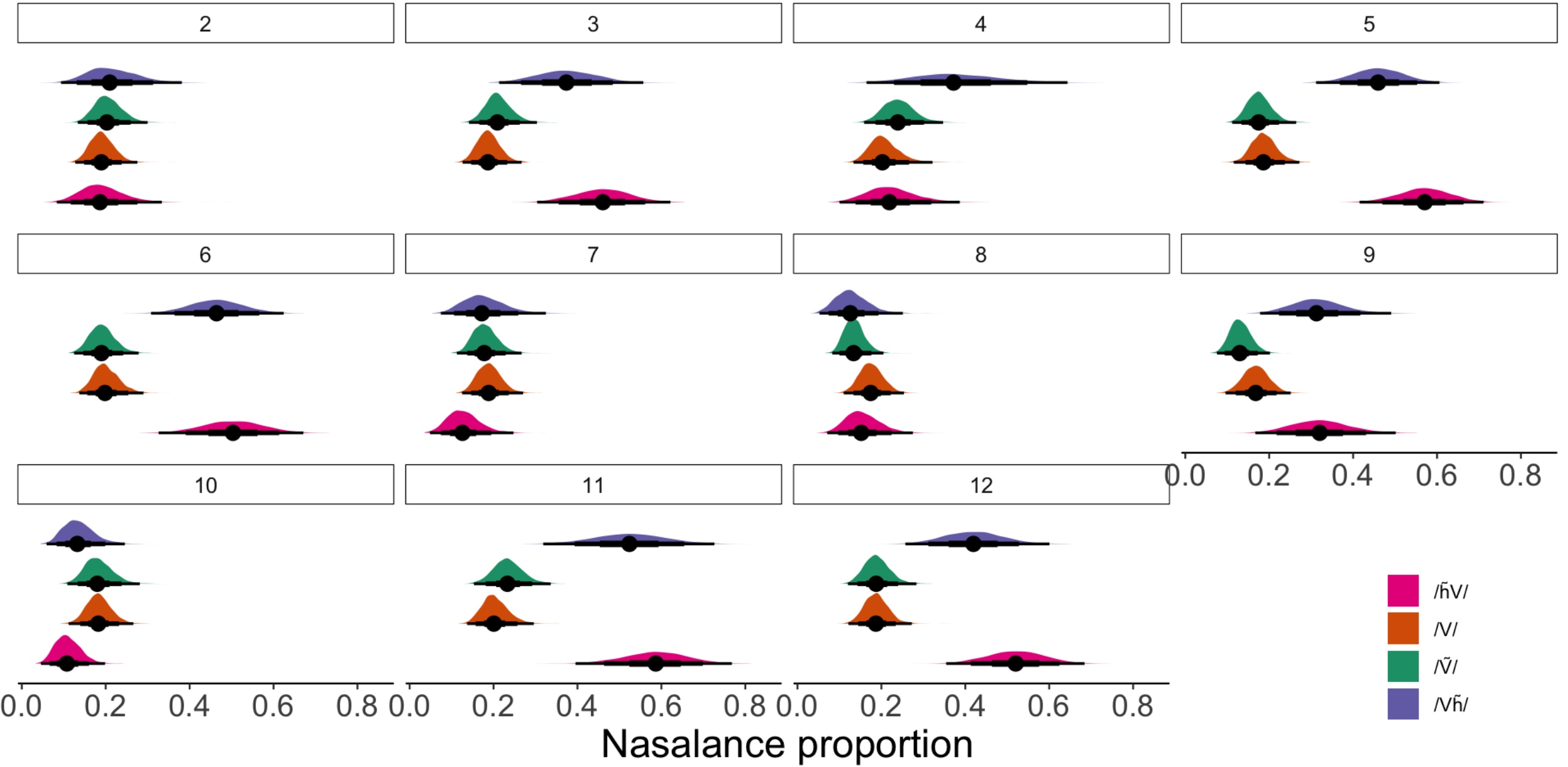
$\text{sd} \sim \text{Gamma}(0.01,0.01)$

$\rho \sim \text{LKJ}(2)$

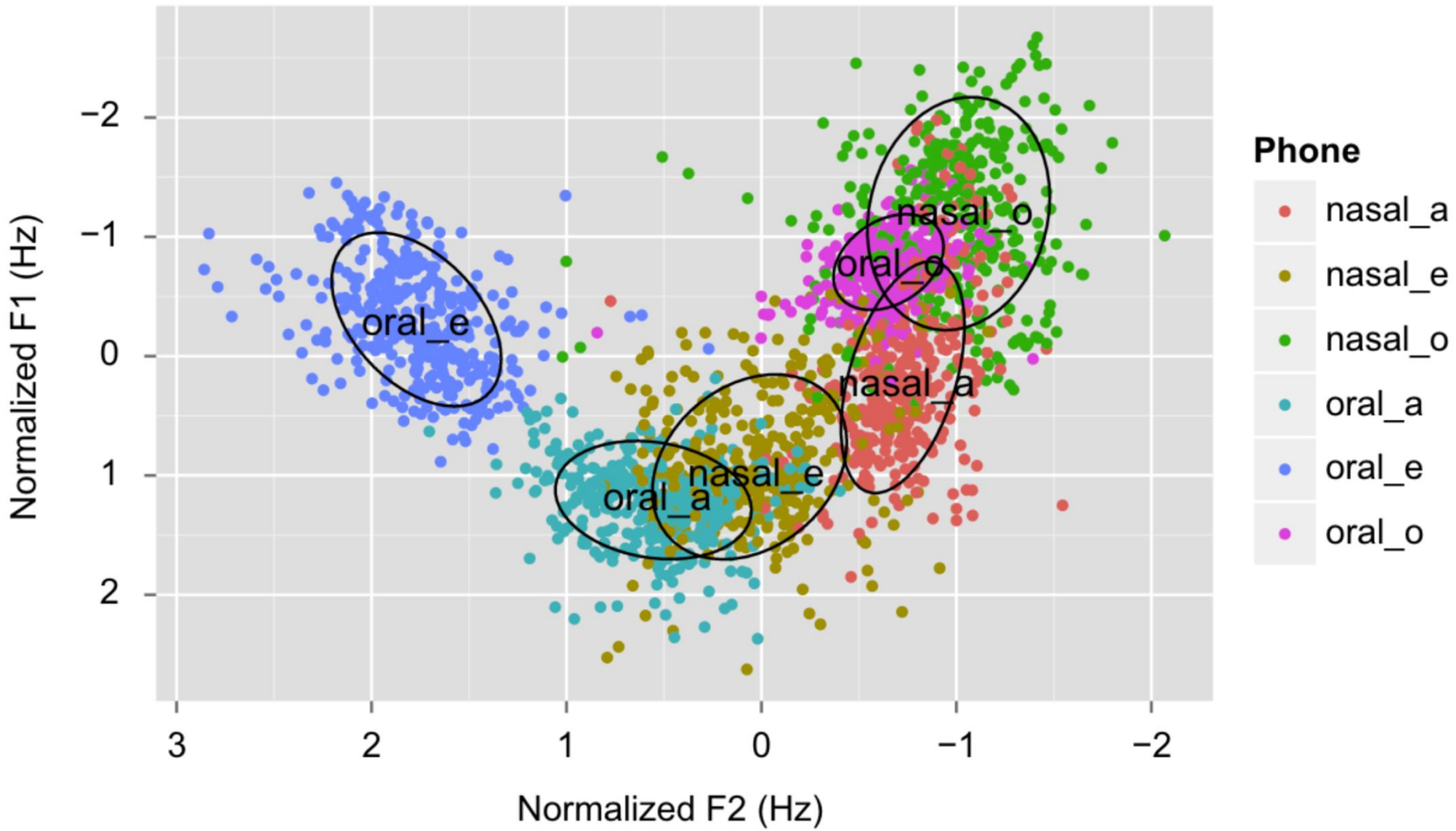

/iɦ/
/uɦ/
/i/
/u/
/ɦi/
/ɦu/
/ĩ/
/ũ/
0.00
0.25
0.50
0.75
1.00
0.00
0.25
0.50
0.75
1.00
Nasalance proportion


i
u
-0.10
-0.05
0.00
0.05
0.10
0.15
-0.10
-0.05
0.00
0.05
0.10
0.15
Nasalance proportion


i
u
/ñV/ - /Ṽ/
/ñV/ - /Ṽ/
/ñV/ - /Ṽ/
/ñV/ - /Ṽ/
0.0
0.1
0.2
0.3
0.0
0.1
0.2
0.3
Nasalance proportion


2
3
4
5
6
7
8
9
10
11
12
0.0
0.2
0.4
0.6
0.8
Nasalance proportion
/ɦV/
/V/
/Ṽ/
/Vɦ/

/o/ ≠ /õ/, /e/ ≠ /ẽ/…



Carignan, C. (2014). An acoustic and articulatory examination of the 'oral' in 'nasal': The oral articulations of French nasal vowels are not arbitrary. *J. of Phonetics*, 46, 23–33. 10.1016/j.wocn.2014.05.001

Potential transphonologization?

- Larraine Basque has lost the opposition fairly recently.

- No studies to confirm the merger between oral and (formerly) nasal vowels.

Bayesian hierarchical 4-variate Gaussian regression model with brms

$$\begin{pmatrix} \log(F1) \\ \log(F2) \\ \log(F3) \\ \log(\text{duration}) \end{pmatrix} \sim 0 + \text{group} : \text{place} + (0 + \text{group} : \text{place} \mid \text{speaker}, \text{word})$$

Bayesian hierarchical 4-variate Gaussian regression model with brms

Priors:

$\beta_{F1} \sim \text{Normal}(5.5,0.5)$

$\beta_{F2,i} \sim \text{Normal}(7.5,0.5)$, $\beta_{F2,u} \sim \text{Normal}(7,0.5)$

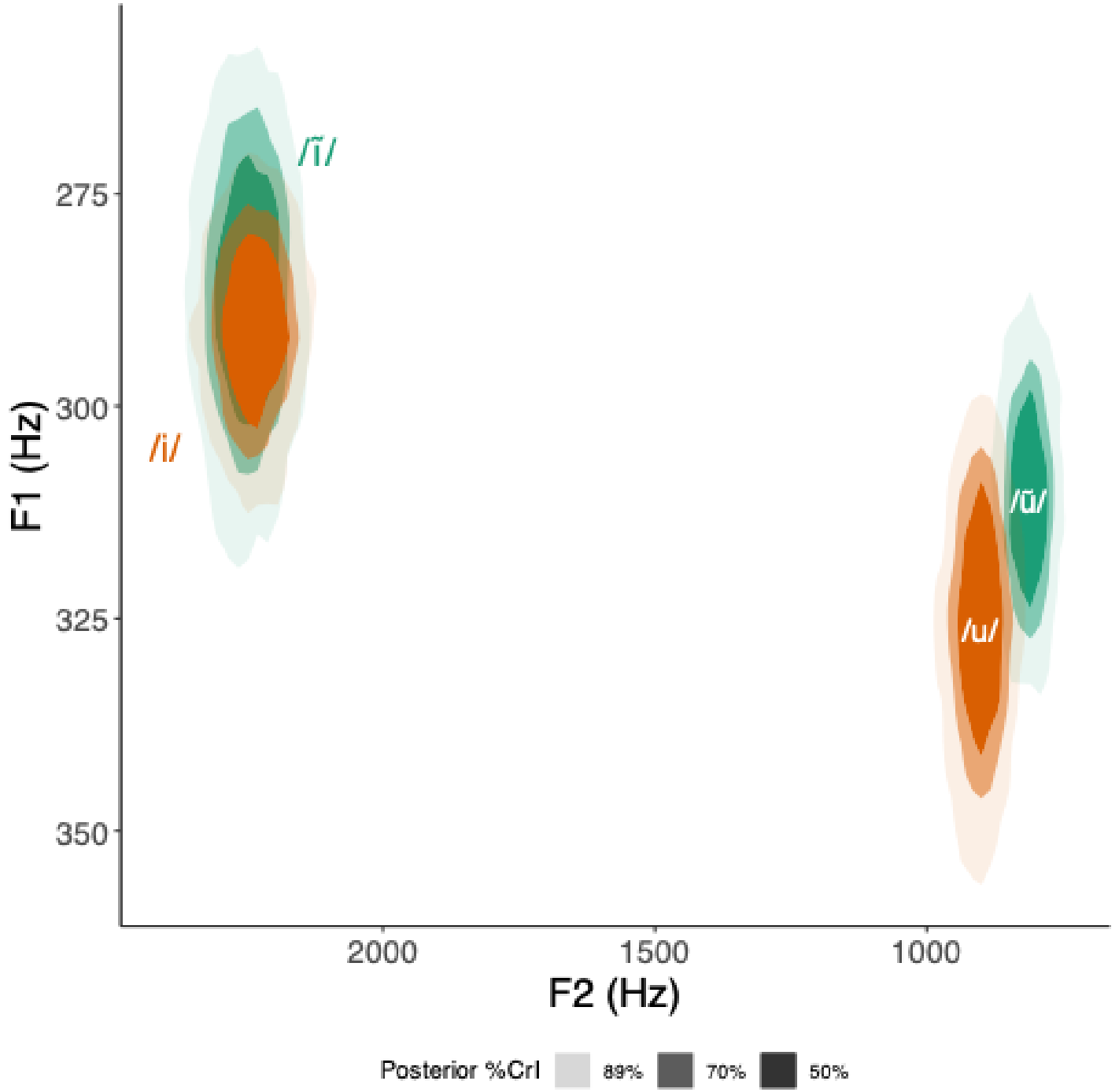
$\beta_{F3,i} \sim \text{Normal}(8,0.5)$, $\beta_{F3,u} \sim \text{Normal}(7.9,0.5)$

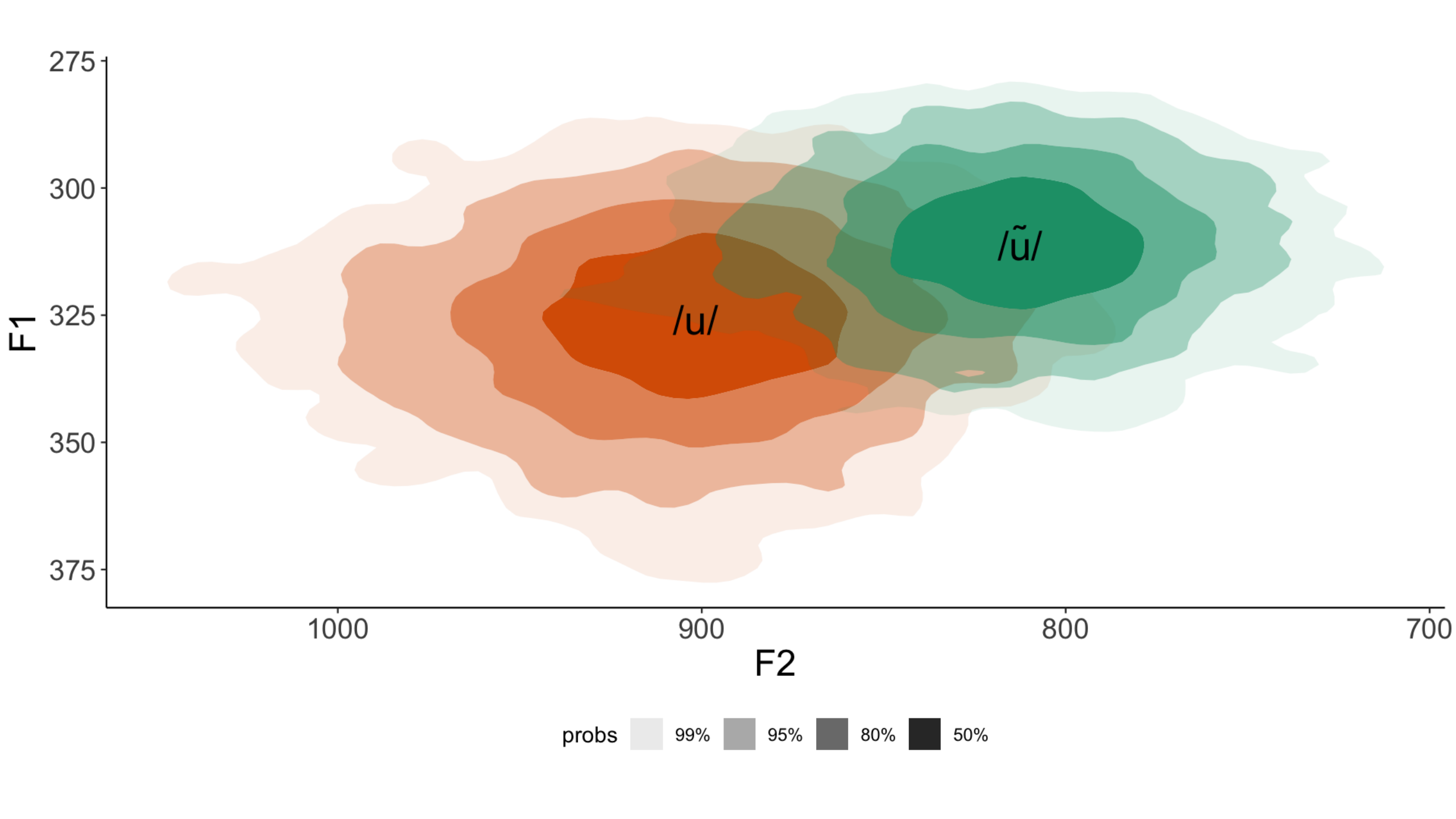
$\beta_{duration} \sim \text{Normal}(-2,0.5)$

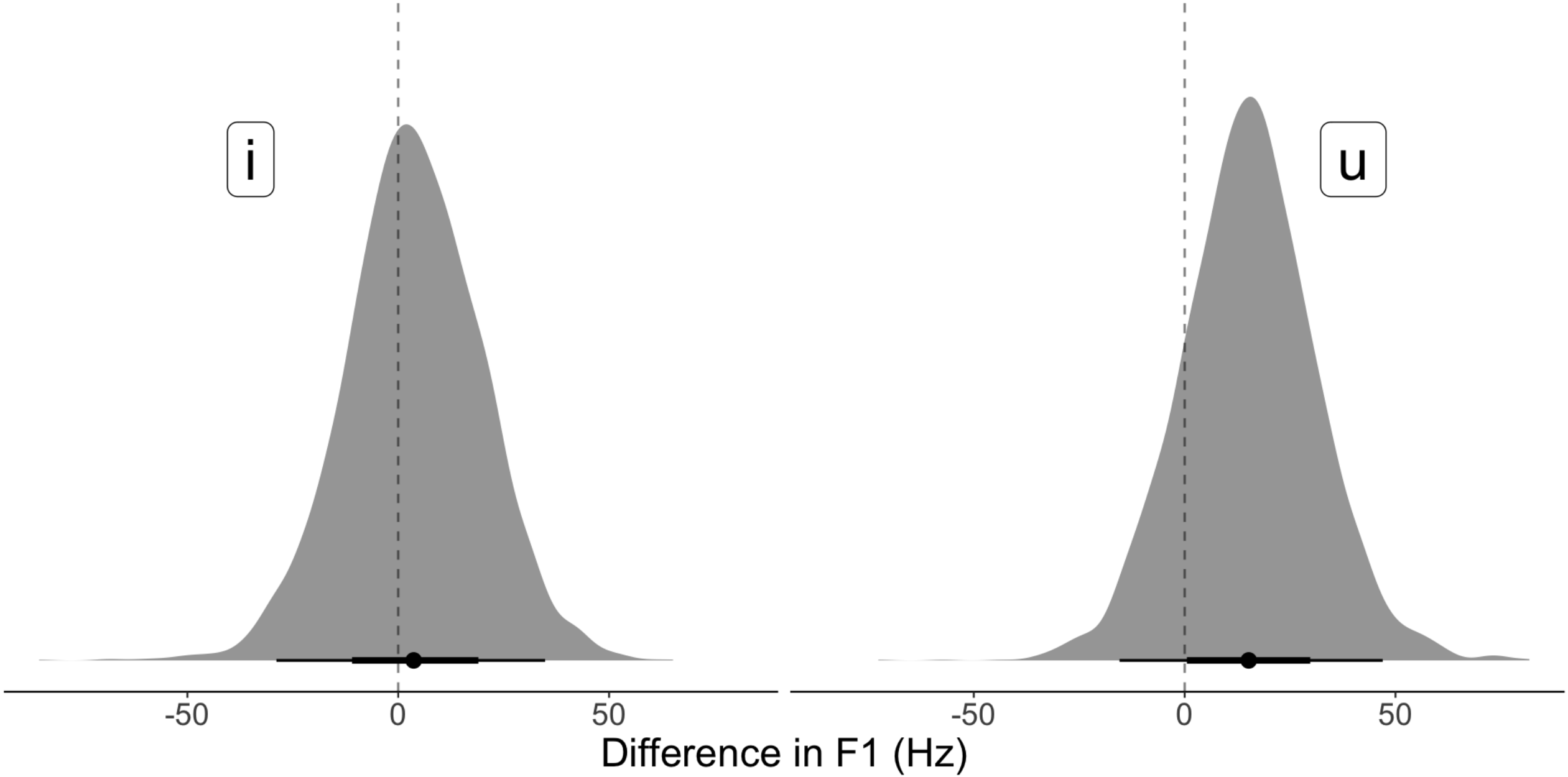
$\sigma_{F1,F2,F3} \sim \text{Normal}(0,0.5)$, $\sigma_{duration} \sim \text{Normal}(0,0.25)$

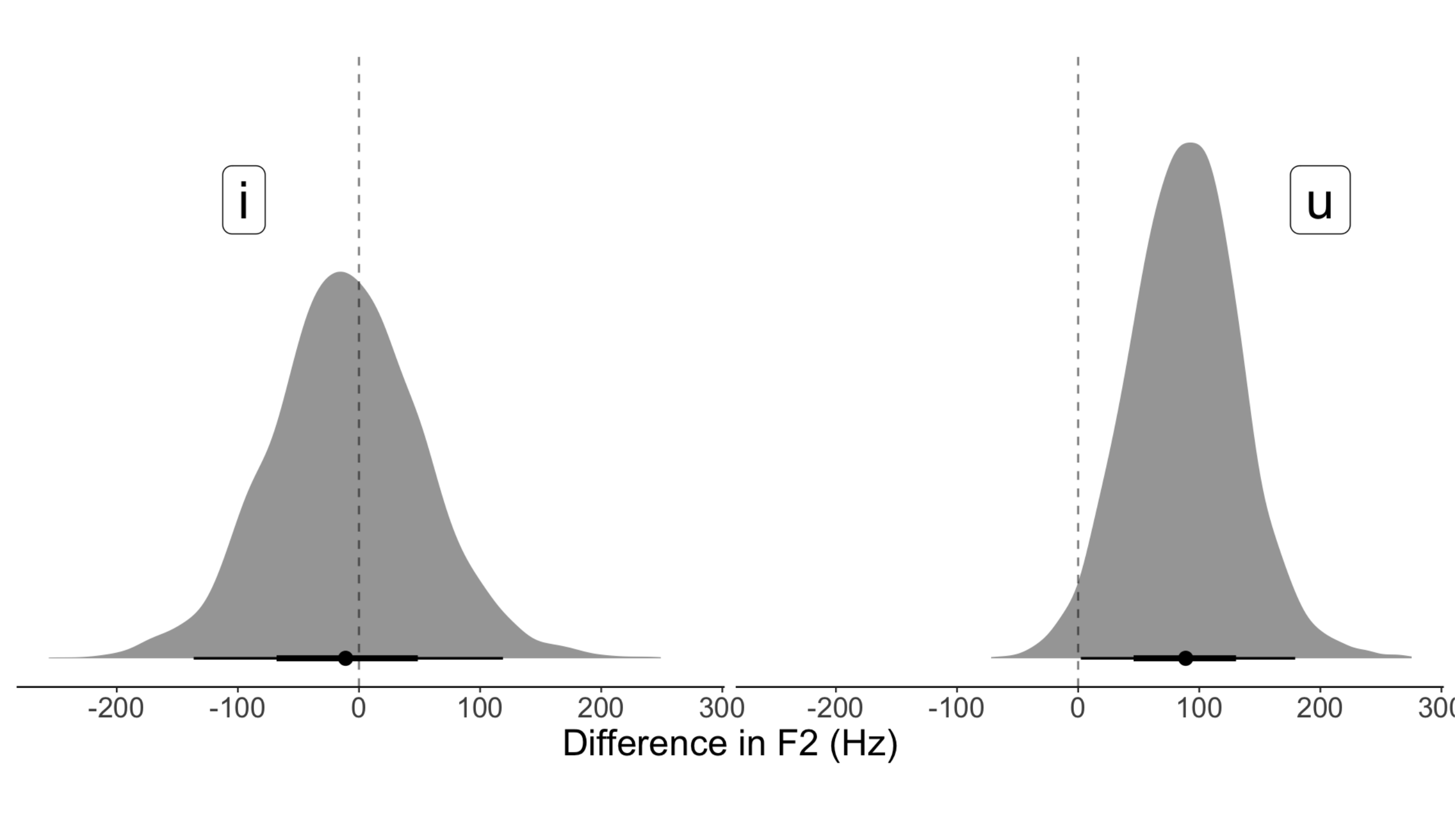
$sd_{F1,F2,F3} \sim \text{Normal}(0,0.5)$, $sd_{duration} \sim \text{Normal}(0,0.25)$

$\rho \sim \text{LKJ}(2)$

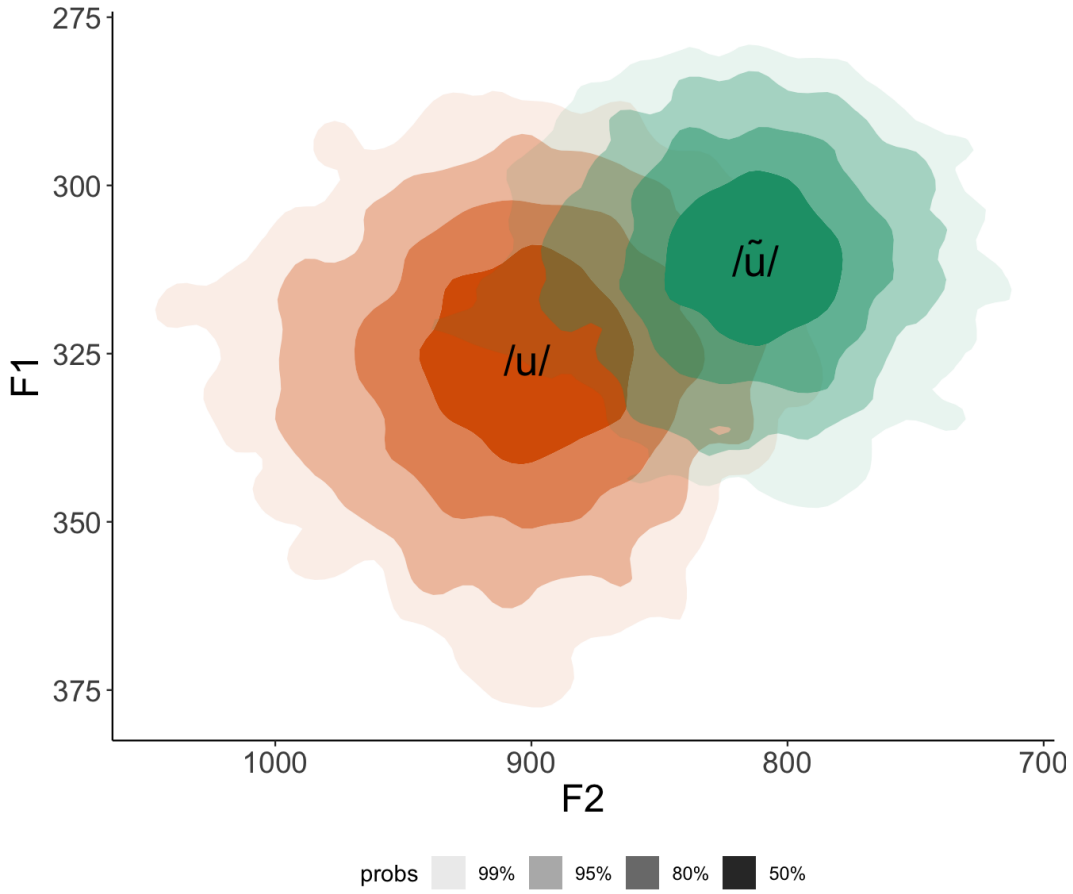

/ĩ/
/i/
/ũ/
/u/
275
300
325
350
F1 (Hz)
2000
1500
1000
F2 (Hz)
Posterior %CrI
89%
70%
50%

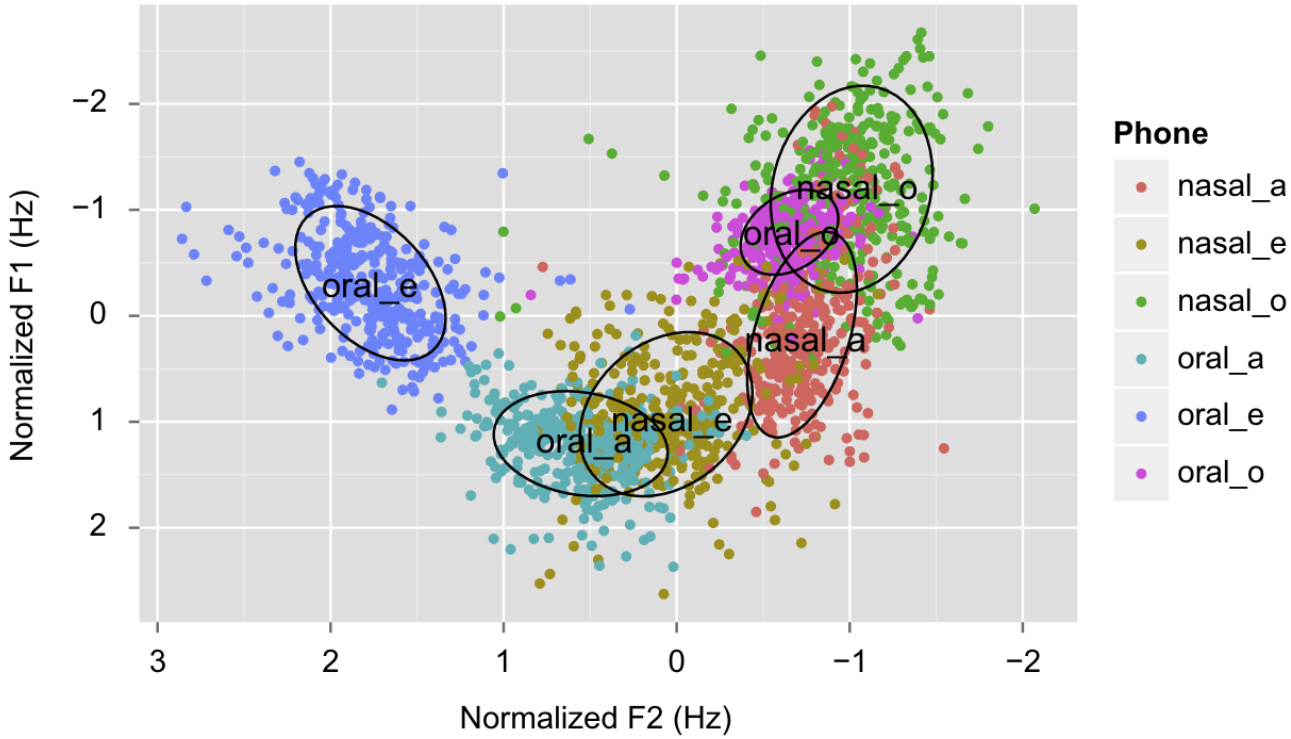

275
300
325
350
375
F1
1000
900
800
700
F2
/u/
/ũ/
probs
99%
95%
80%
50%


i
u
-50
0
50
-50
0
50
Difference in F1 (Hz)


i
u
-200
-100
0
100
200
300
-200
-100
0
100
200
300
Difference in F2 (Hz)

Transphonologization of formerly nasalized vowels?





Stops

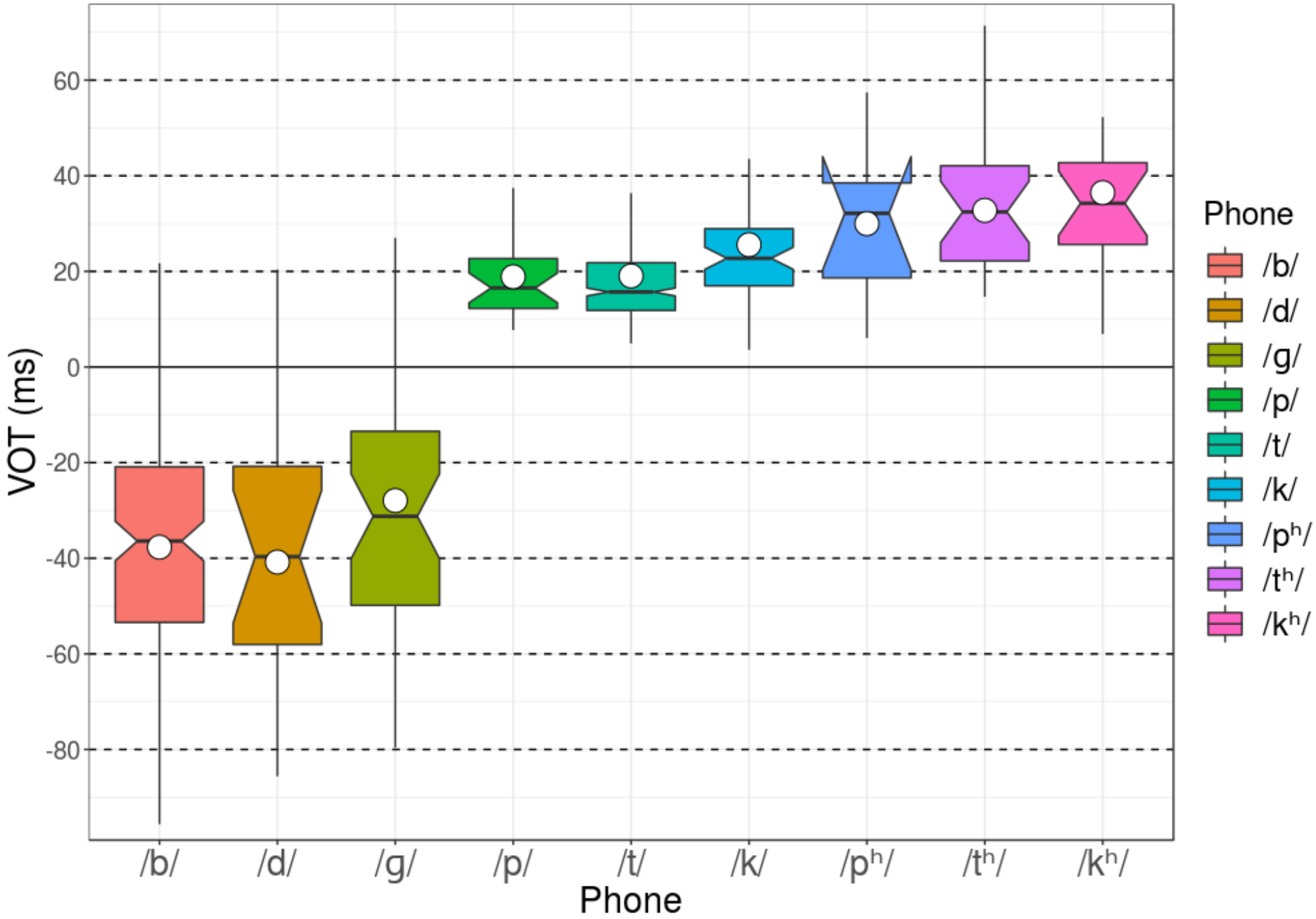
Stops

- 3 (+1) places of articulation:
  - Labial (/p, b/)
  - Alveolar (/t, d/)
  - Velar (/k, *g*/)
  - Palatal (/c/ *tt*, /ɟ/ *dd*)

- 3 series:
  - Voiced (common to all varieties)
  - Plain voiceless (common to all varieties)
  - Voiceless aspirated (limited to the North-eastern varieties).

Distribution of stops

- All stops are contrastive:
  - Intervocalically
  - Word-initially
- Deaspiration:
  - No aspiration after the second syllable (with rare exceptions)
  - Only one aspirated stop in each word
- Neutralization to the plain voiceless:
  - Word-finally
  - After a sibilant

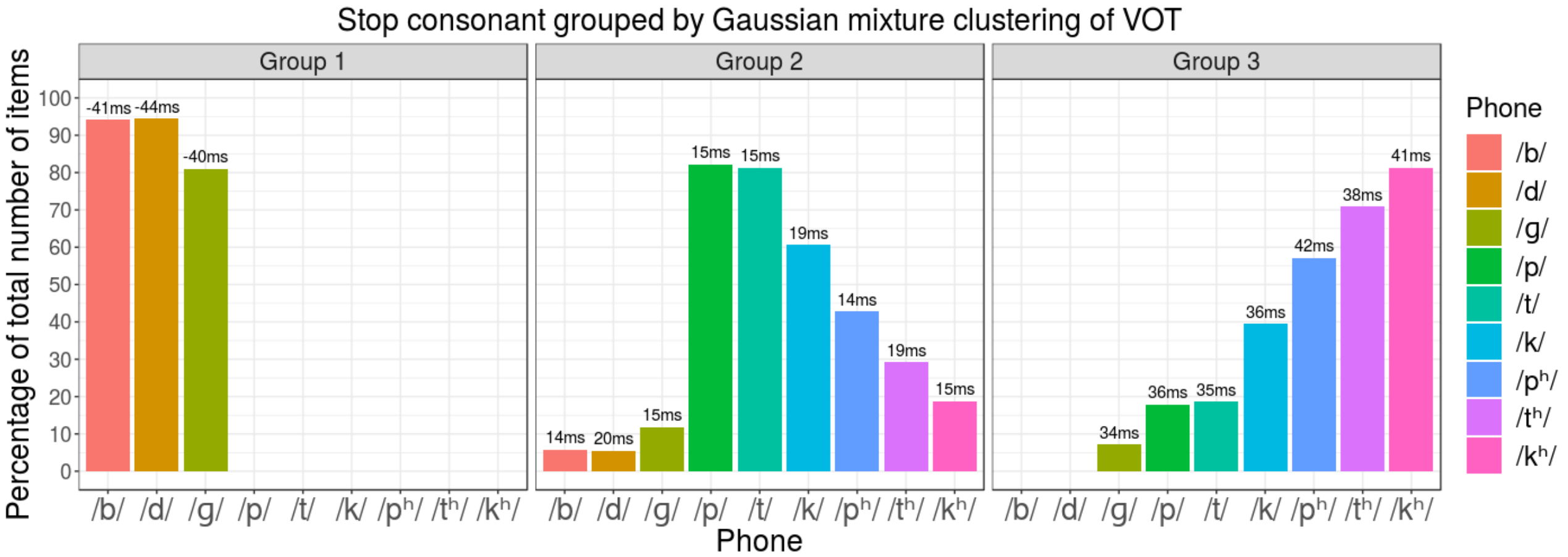

VOT (ms)
60
40
20
0
-20
-40
-60
-80
/b/
/d/
/g/
/p/
/t/
/k/
/pʰ/
/tʰ/
/kʰ/
Phone
Phone
/b/
/d/
/g/
/p/
/t/
/k/
/pʰ/
/tʰ/
/kʰ/

2 or 3 series of stops?

Table 3: Stop consonant voice onset time (VOT; ms) from Gaminde et al. (2002), Mounole (2004), and the current study.

Variety	Stop consonant								
	/b/	/p/	/p^h/	/d/	/t/	/t^h/	/g/	/k/	/k^h/
Zuberoan (Gaminde et al., 2002)	-102	20	61	-105	24	67	-101	27	83
Zuberoan (Mounole, 2004)		14	47		20	52		28	67
Mixean	-38	19	30	-41	19	33	-28	26	36

Egurtzegi & Carignan 2020: “An acoustic description of Mixean Basque”. *Journal of the Acoustical Society of America* 147.4, 2791–2802.



Egurtzegi & Carignan 2020: “An acoustic description of Mixean Basque”. *Journal of the Acoustical Society of America* 147.4, 2791–2802.

Sibilants

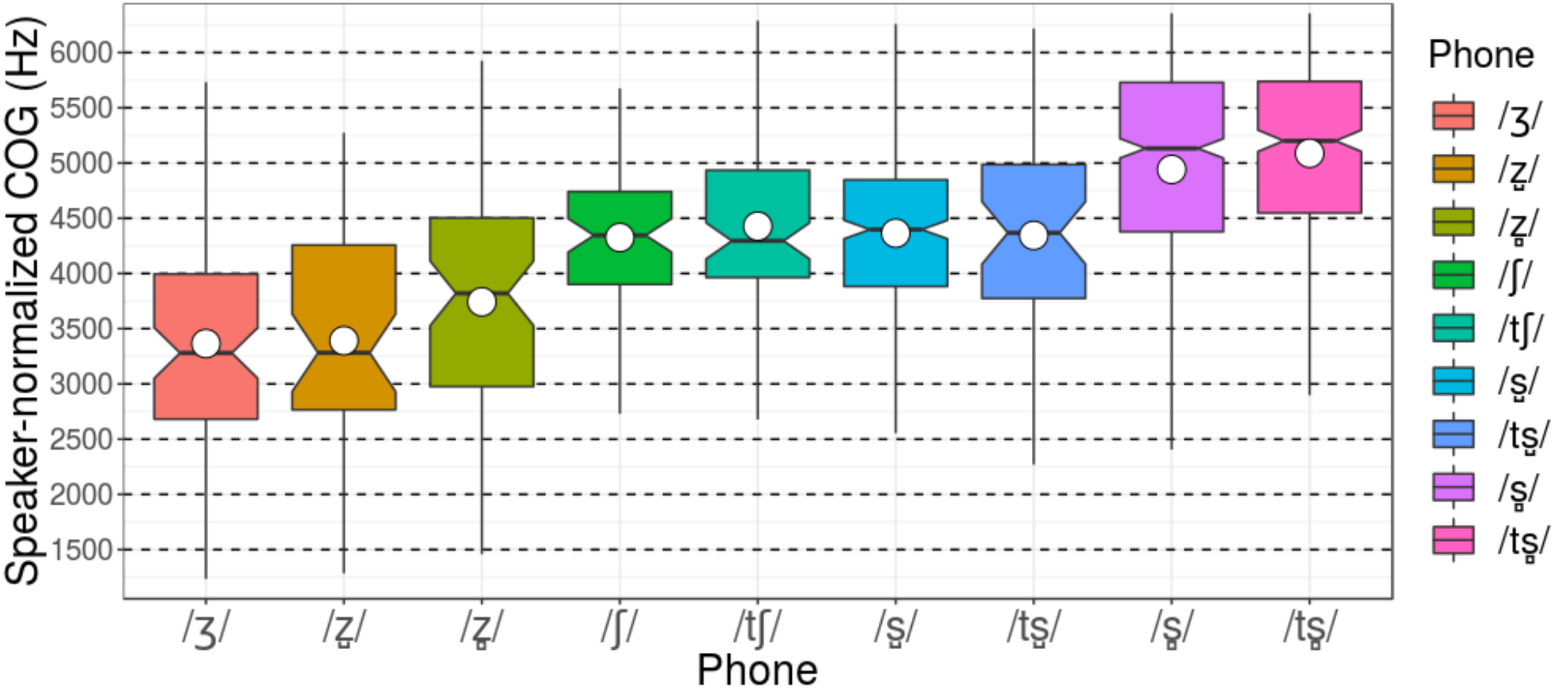
Sibilants

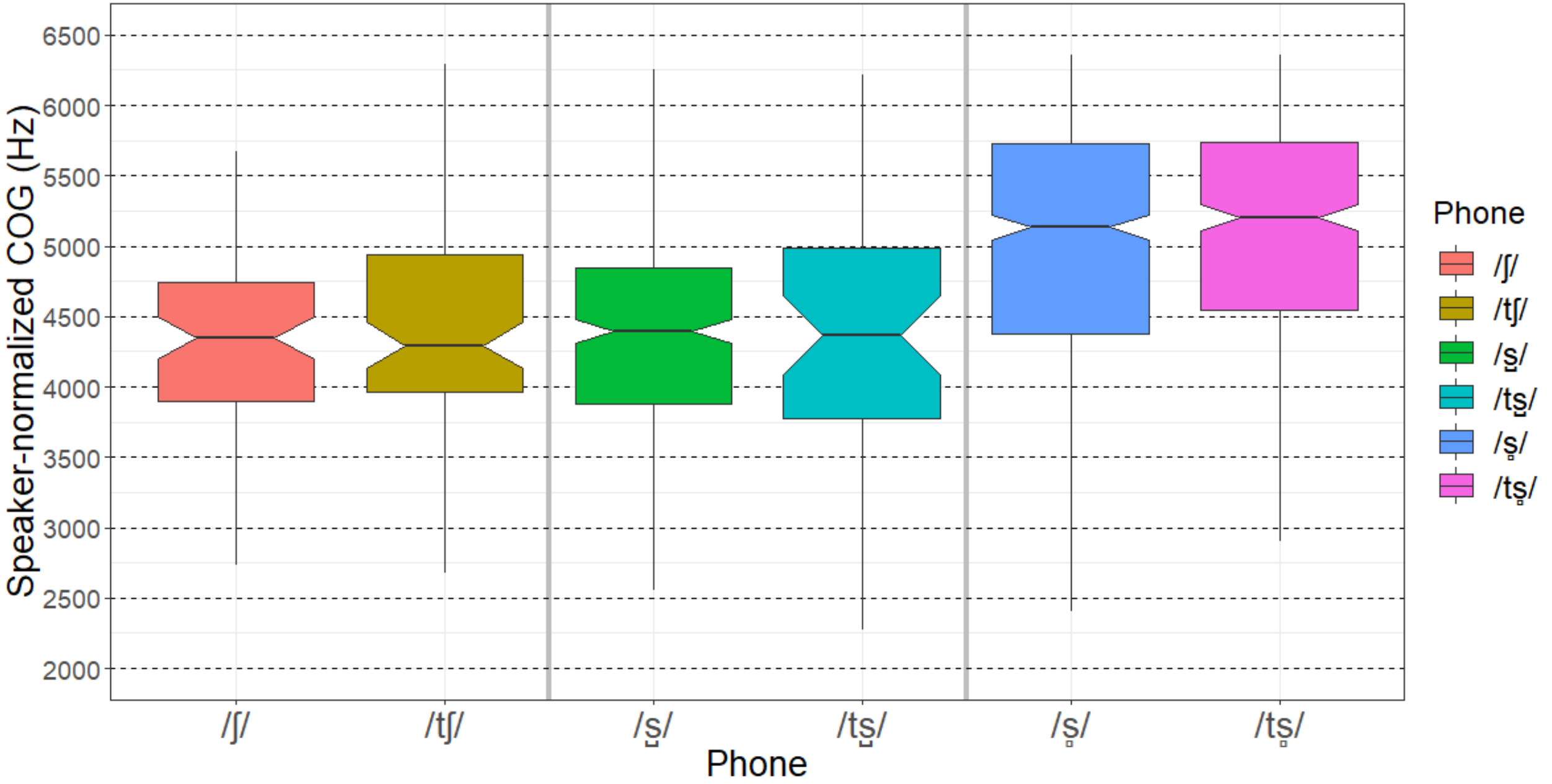
- As in other Basque varieties, 3 places of articulation:
  - Apico-alveolar: /s̻/, /t͡s̻/, /z̻/, /d͡z̻/
  - Lamino-alveolar: /s̺/, /t͡s̺/, /z̺/
  - Post-alveolar: /ʃ/, /t͡ʃ/, /ʒ/

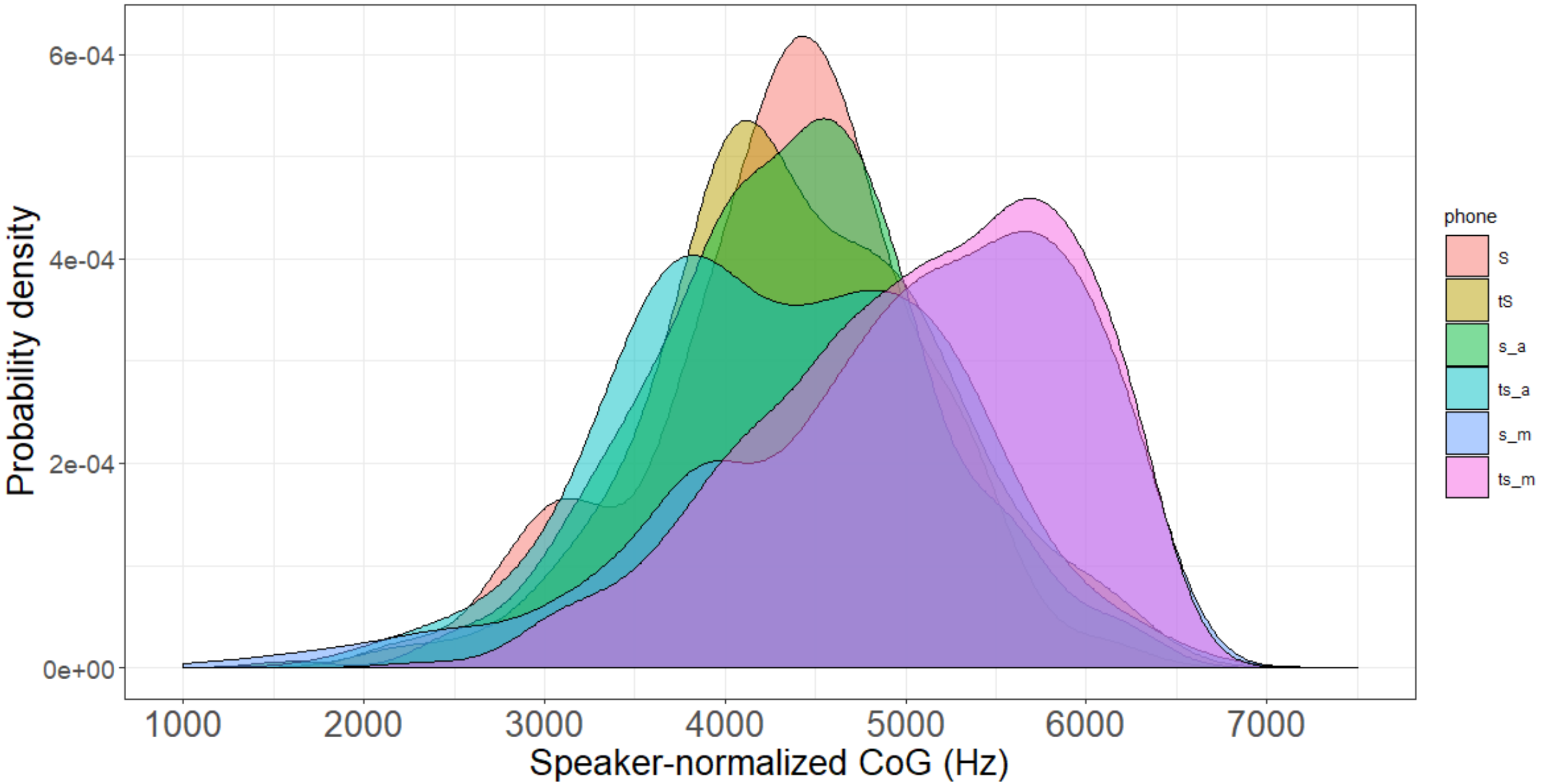
- 4 series:
  - Voiceless fricatives (common to all varieties)
  - Voiceless affricates (common to all varieties)
  - Voiced fricatives (only found in varieties historically in contact with Gascon)
  - At least one voiced affricate (only in varieties in contact with Gascon)

Voiced sibilants

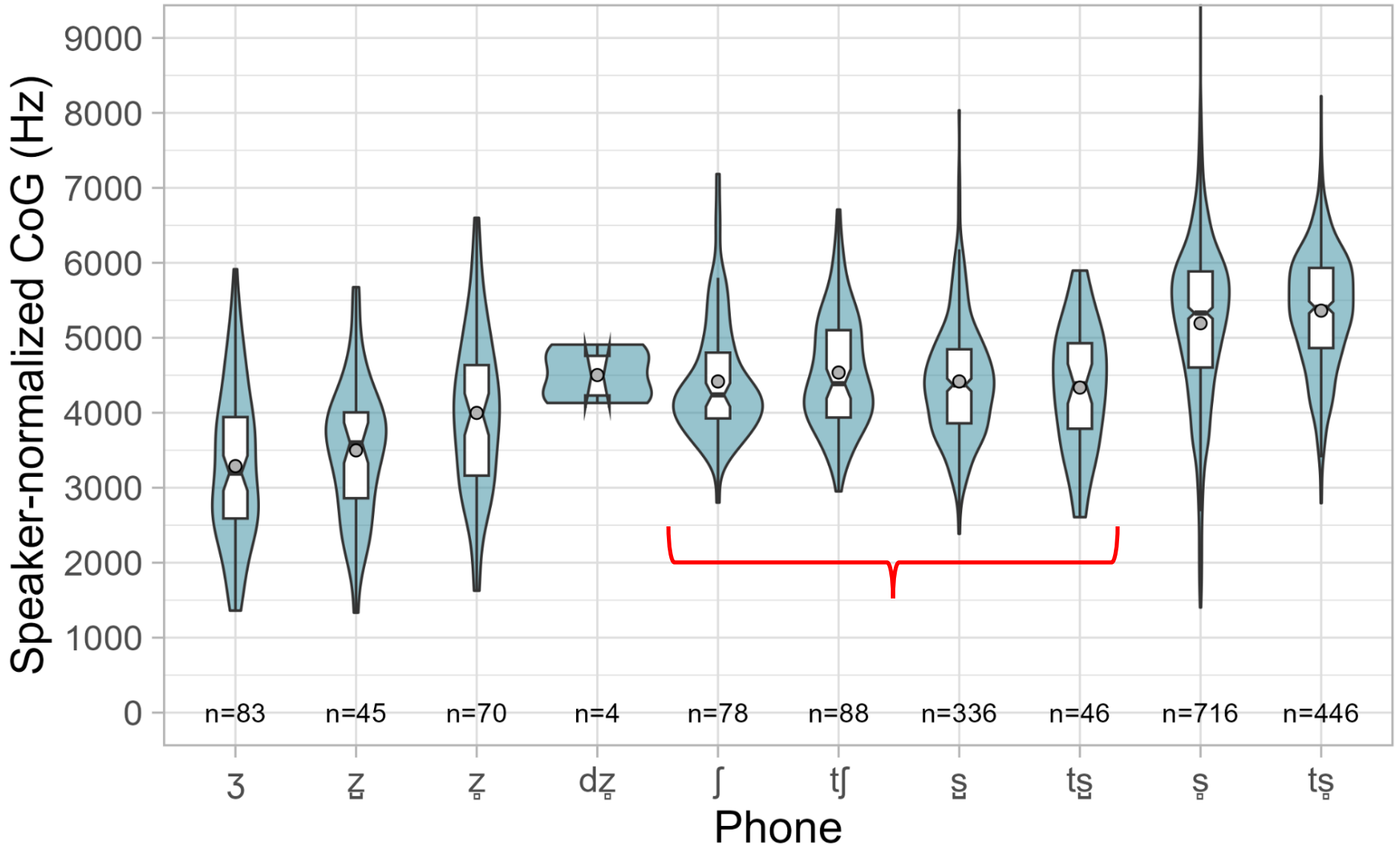
- Voiced sibilants are predictable allophones in most varieties of Basque:
  - Before a voiced consonant: *esne* [ez̪n̪ẽ], *desberdin* [dez̪β̪erð̪ĩn].
- Contrastive voiced sibilants are only found in the Eastern varieties.
  - Contact with Gascon / French.
  - Gascon has the contrast in alveolar & post-alveolar sibilants (Mooney 2014).
- Two main contexts of development:
  - In Bearnese loanwords: *bedezĩ* /bedeˈz̪ĩ/, *aizina* /aiz̪ina/
  - Morpheme boundary: *deuse* /deuz̪e/, *ezaxola* /ez̪aʃola/


Speaker-normalized COG (Hz)
6000
5500
5000
4500
4000
3500
3000
2500
2000
1500
/ʒ/
/ʐ/
/ʐ̪/
/ʃ/
/tʃ/
/ʂ/
/tʂ/
/ʂ̪/
/tʂ̪/
Phone
Phone
/ʒ/
/ʐ̪/
/ʐ̪/
/ʃ/
/tʃ/
/ʂ/
/tʂ/
/ʂ̪/
/tʂ̪/


Speaker-normalized COG (Hz)
6500
6000
5500
5000
4500
4000
3500
3000
2500
2000
/ʃ/
/tʃ/
/ʂ/
/tʂ/
/ʂ̪/
/tʂ̪/
Phone
Phone
/ʃ/
/tʃ/
/ʂ/
/tʂ/
/ʂ̪/
/tʂ̪/


Probability density
6e-04
4e-04
2e-04
0e+00
1000
2000
3000
4000
5000
6000
7000
Speaker-normalized CoG (Hz)
phone
s
tS
s_a
ts_a
s_m
ts_m

2 or 3 places of articulation in sibilants?



Egurtzegi, Krajewska, Carignan & Urrestarazu-Porta 2024: "An acoustic exploration of sibilant contrasts and sibilant merger in Mixean Basque". *Journal of the International Phonetic Association*.

No CoG difference between alveolar sibilants

- CoG ~ phone + (1 | word) + (phone | speaker)
- Weakly informative priors.

- Decision rule:

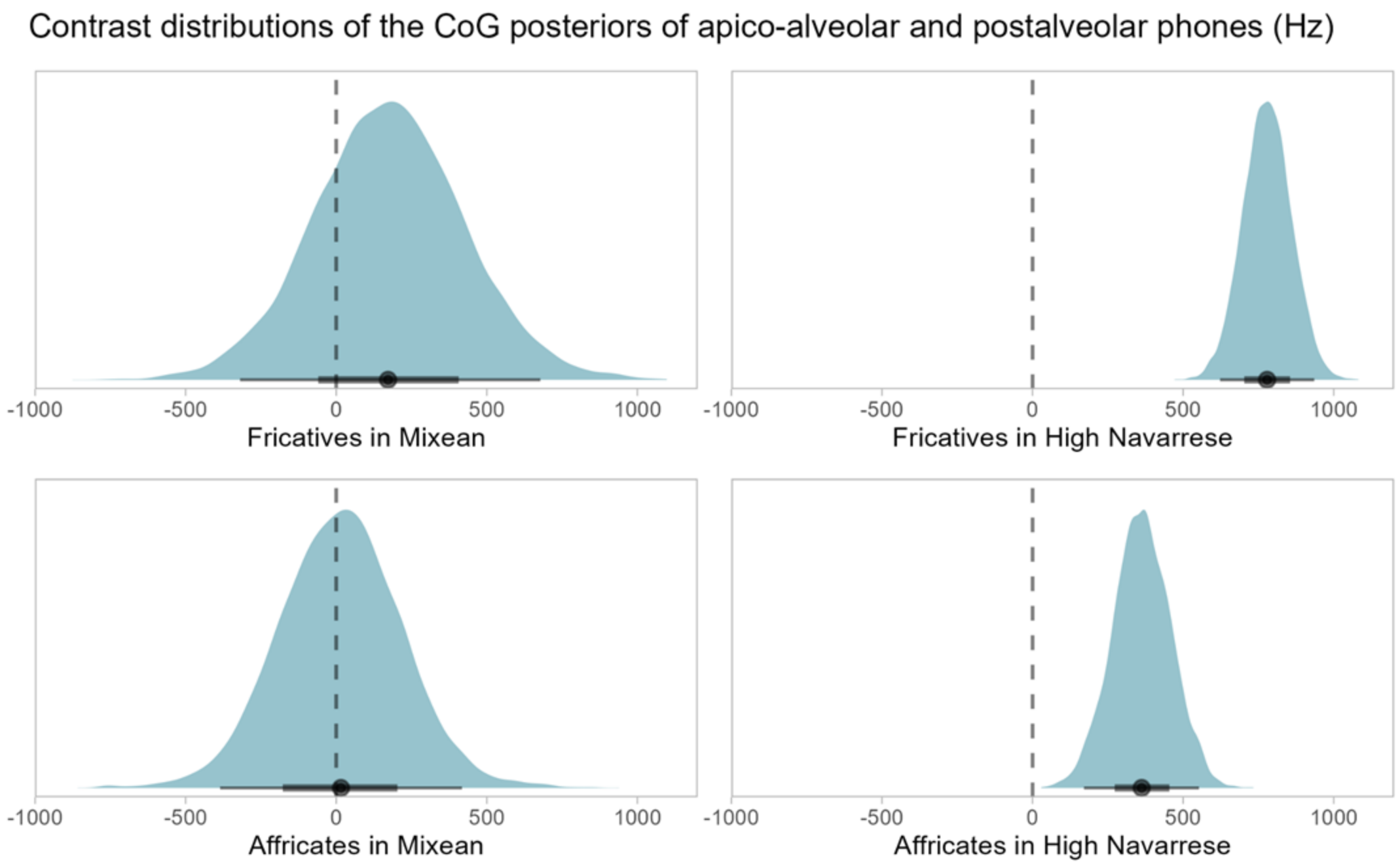
  < 5% HDI in ROPE

Strong evidence of a difference

Table 4. Contrasts between the values of PHONE within each manner category

	Estimate	Lower HDI	Upper HDI	ROPE
/s̪/–/ʃ/	809.9	466.2	1156.4	0.00
/s̪/–/s̺/	817.8	477.4	1145.3	0.00
/ʃ/–/s̺/	7.0	–395.8	424.7	0.52
/t͡ʃ/–/t͡s̪/	–864.5	–1322.0	–404.9	0.00
/t͡s̺/–/t͡s̪/	–1029.1	–1466.2	–620.9	0.00
/t͡ʃ/–/t͡s̺/	165.9	–316.5	700.0	0.35
/z̺/–/z̪/	–618.4	–1227.4	–0.9	0.04
/ʒ/–/z̺/	–34.6	–661.2	594.8	0.35
/ʒ/–/z̪/	–653.8	–1198.0	–69.3	0.01

Egurtzegi, Krajewska, Carignan & Urrestarazu-Porta 2024: “An acoustic exploration of sibilant contrasts and sibilant merger in Mixean Basque”. *Journal of the International Phonetic Association*.



Egurtzegi, Krajewska, Carignan & Urrestarazu-Porta 2024: “An acoustic exploration of sibilant contrasts and sibilant merger in Mixean Basque”. *Journal of the International Phonetic Association*.

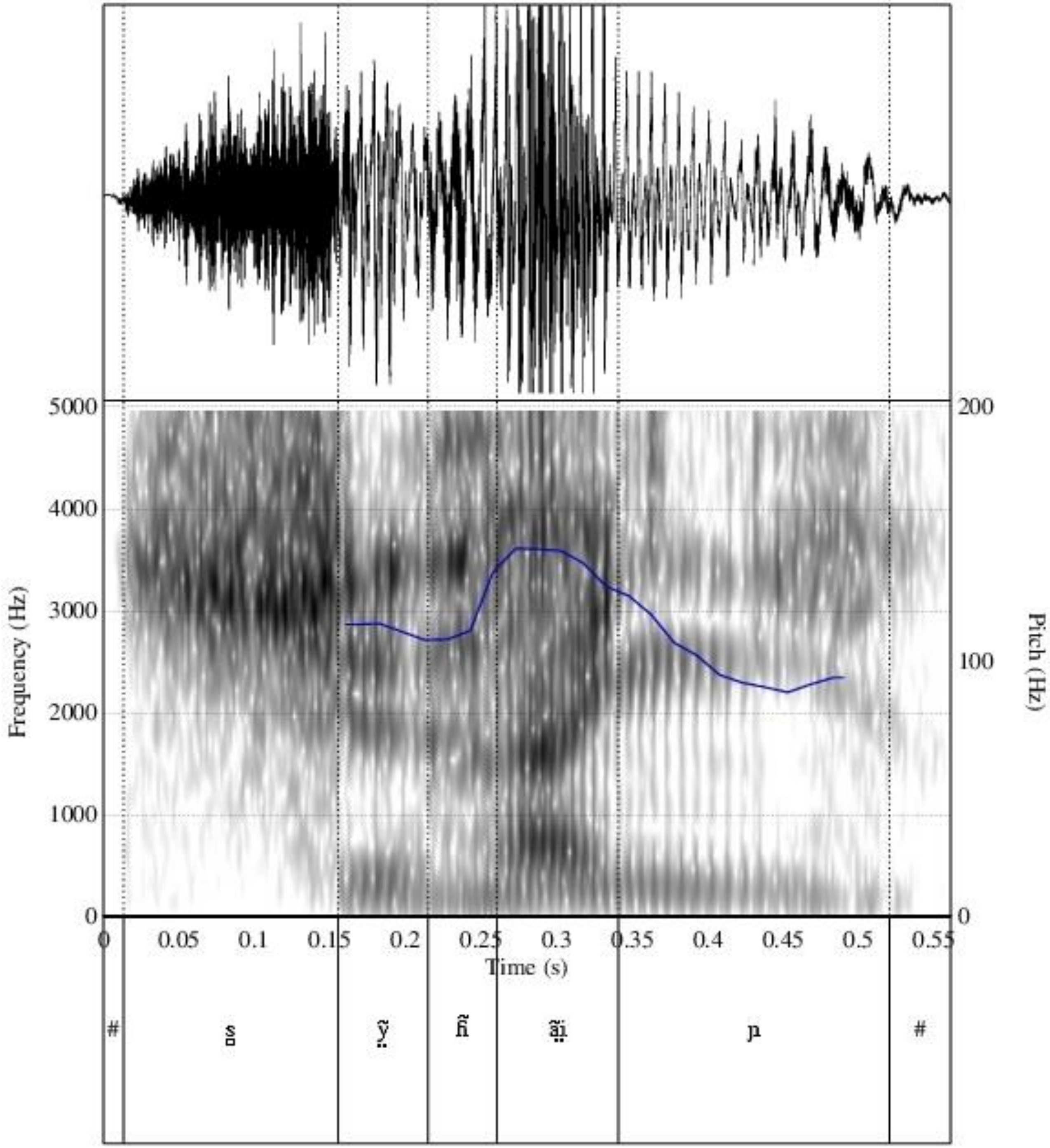
Laryngeals

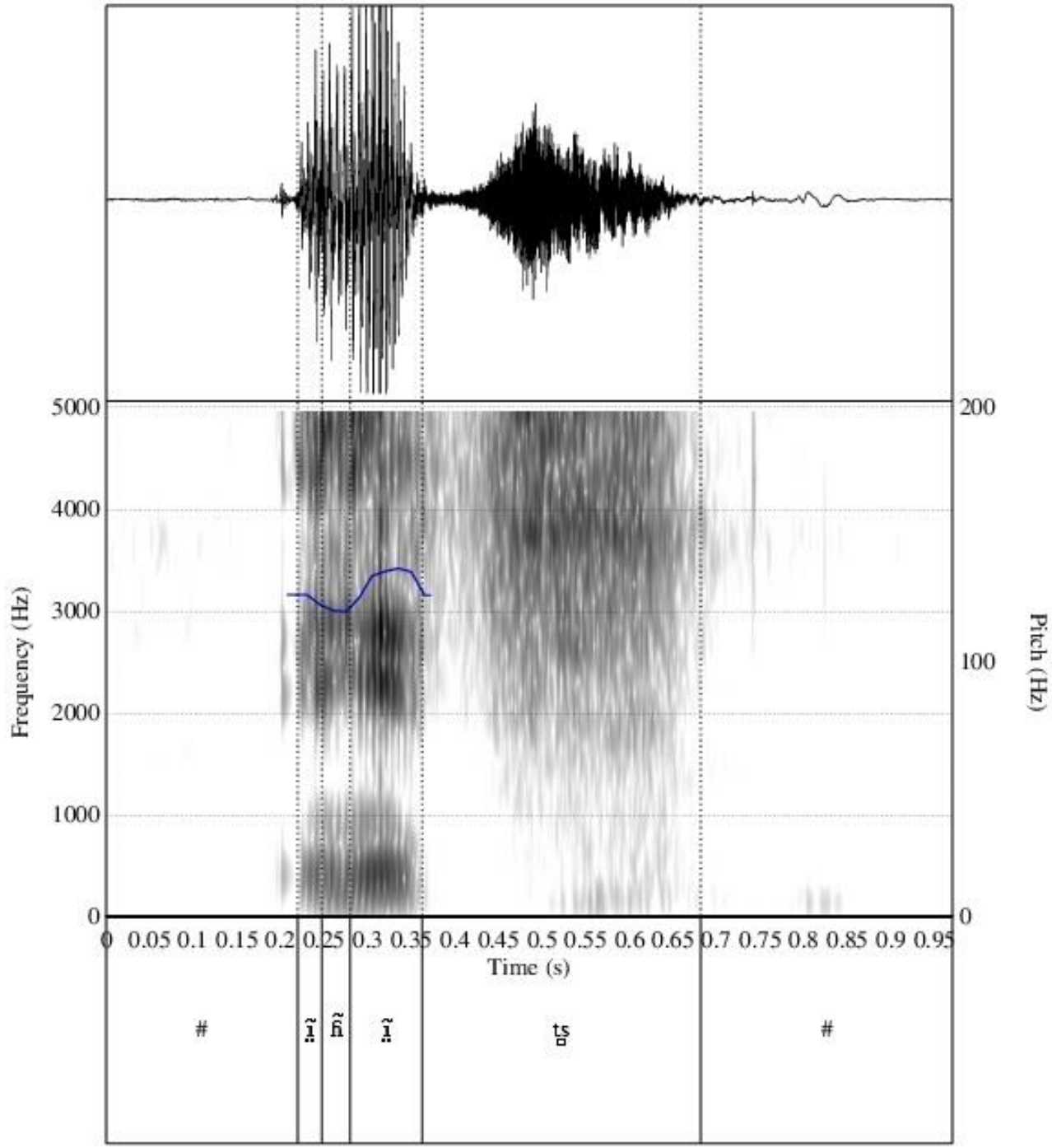
Laryngeal approximants

- Two aspirates / laryngeal approximants:
  - Oral /h/, potentially present in Proto-Basque
  - Nasalized /h̃/, from historical *n
- Geographical distribution:
  - /h/ -> Only in Eastern varieties
  - /h̃/ -> Only in Zuberoan & Mixean Basque
- Restrictions:
  - Onset only
  - First 2 syllables only
  - Only 1 aspirated segment in each word

Laryngeal approximants in Gascon

- One aspirate / laryngeal approximant:
  - Oral /h/
- It evolved from historical *f.
- No nasal aspirate, but same phonological context of change:
  - n > h/ø intervocalically (/V_V)


5000
4000
3000
2000
1000
0
Frequency (Hz)
200
100
0
Pitch (Hz)
0
0.05
0.1
0.15
0.2
0.25
0.3
0.35
0.4
0.45
0.5
0.55
Time (s)
#
s̪̻
ỹ̤
ɦ̃
ãi̤̯
ɲ
#


5000
4000
3000
2000
1000
0
Frequency (Hz)
200
100
0
Pitch (Hz)
0 0.05 0.1 0.15 0.2 0.25 0.3 0.35 0.4 0.45 0.5 0.55 0.6 0.65 0.7 0.75 0.8 0.85 0.9 0.95
Time (s)
#
ĩ
ñ̃
ĩ
ʦ
#

Nasal aspiration

Aquitanian *Se**n**i*- > Basque *se**h**i*	Zuberoan [sẹ̃ɦiʇ̃ ‘boy, servant’
*na**n**-i > Basque *na**h**i*	Zuberoan [nãɦiʇ̃ ‘to want’
Latin *a**n**ăte*(*m*) > Basque *a**h**ate*	Zuberoan [ãɦãte] ‘duck’

- /h/ vs. /h̃/ opposition
  - Phonetically unexpected.
  - Attested in just a handful of languages.
- What is the actual result of nasal aspiration?
- What is its status in the modern language?

Aspiration in Basque: Categories

Oral /h/	Nasal /h̃/	Assimilated /h/ [h̃]
behi ‘cow’	*ahate* ‘duck’	*uñhu* ‘onion’
bihotz ‘heart’	*ihaute* ‘carnival’	*lehen* ‘first, before’
ehi ‘finger’	*ehi* ‘easy’	*nihaur* ‘me, myself’

Posterior distribution

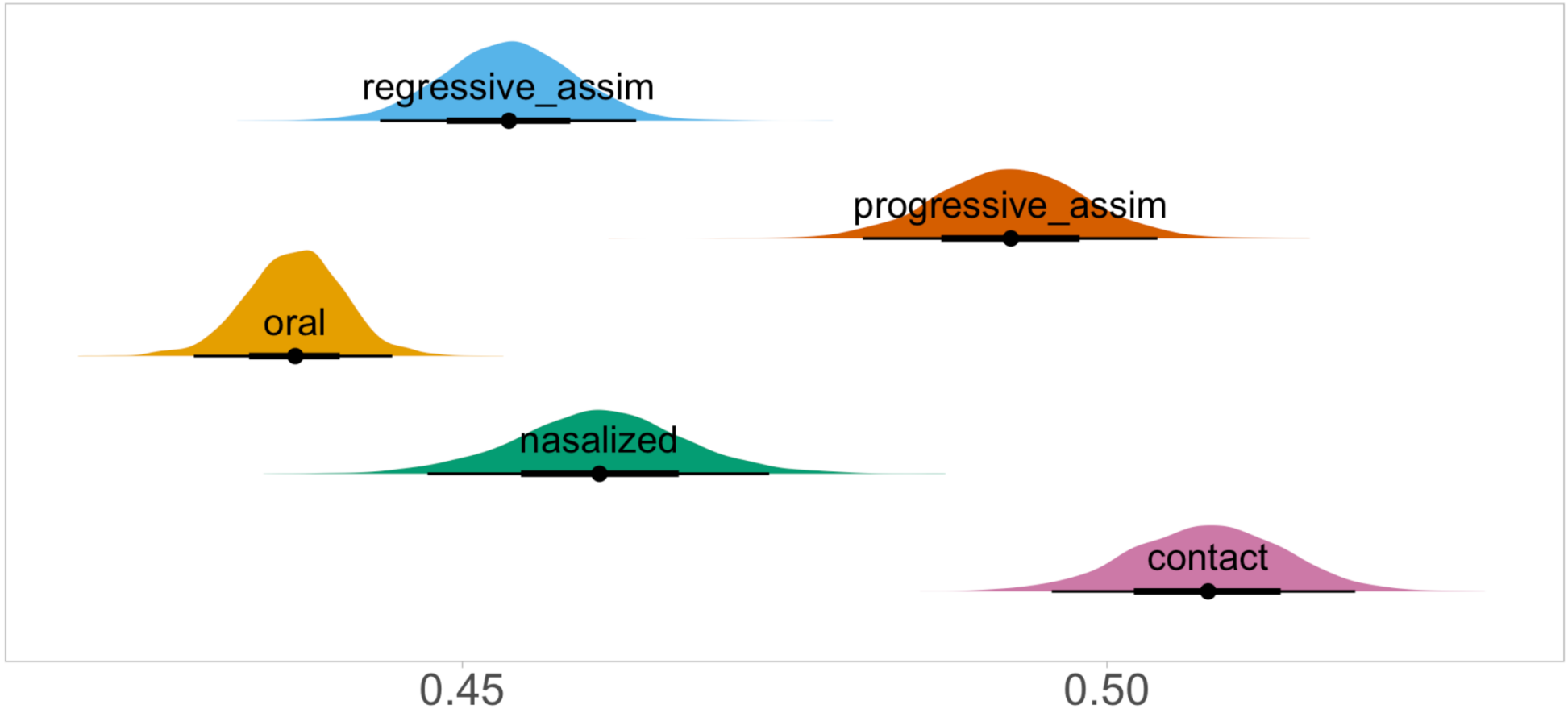
Dependent variable: nasalance

Independent variables: aspirate category

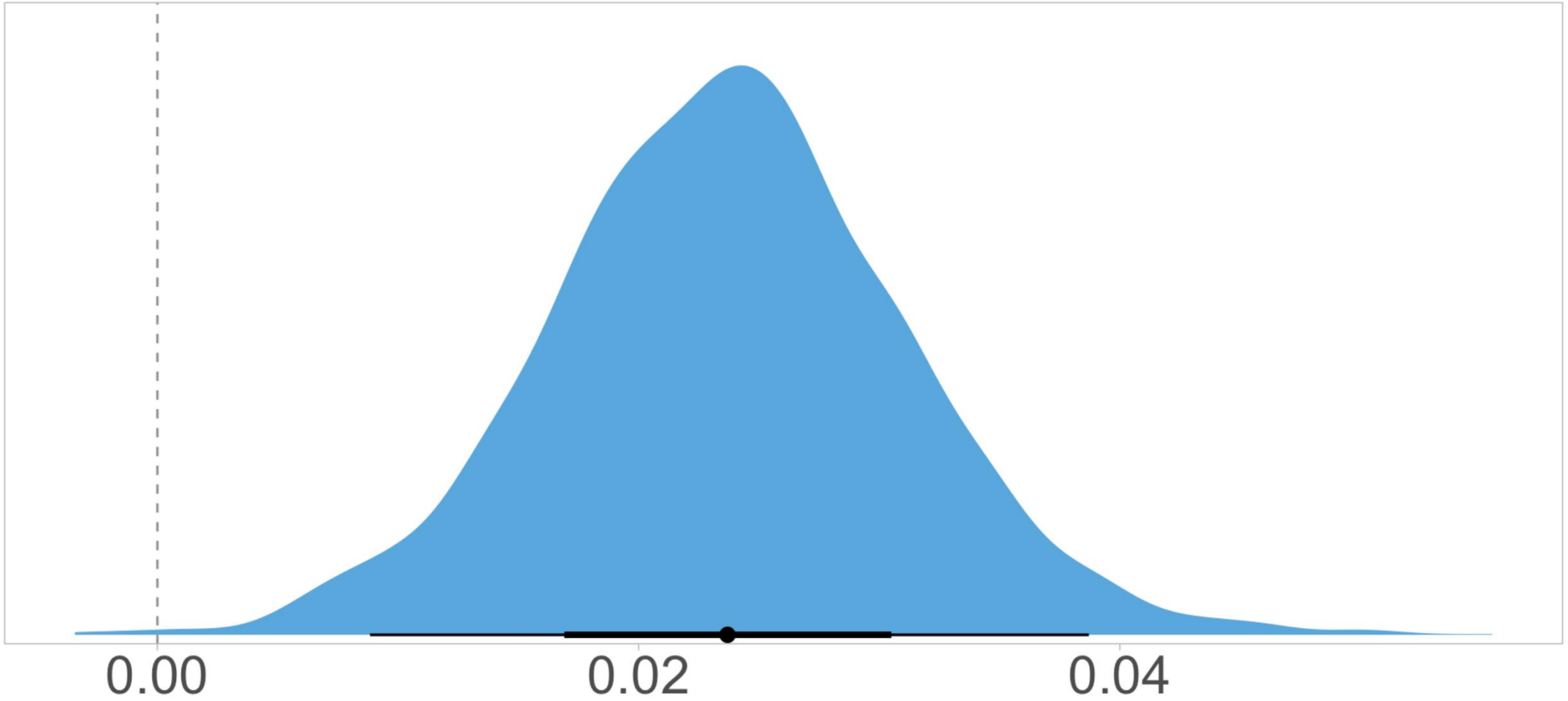
Family: Beta

Correlated varying intercept & slope: speaker, word

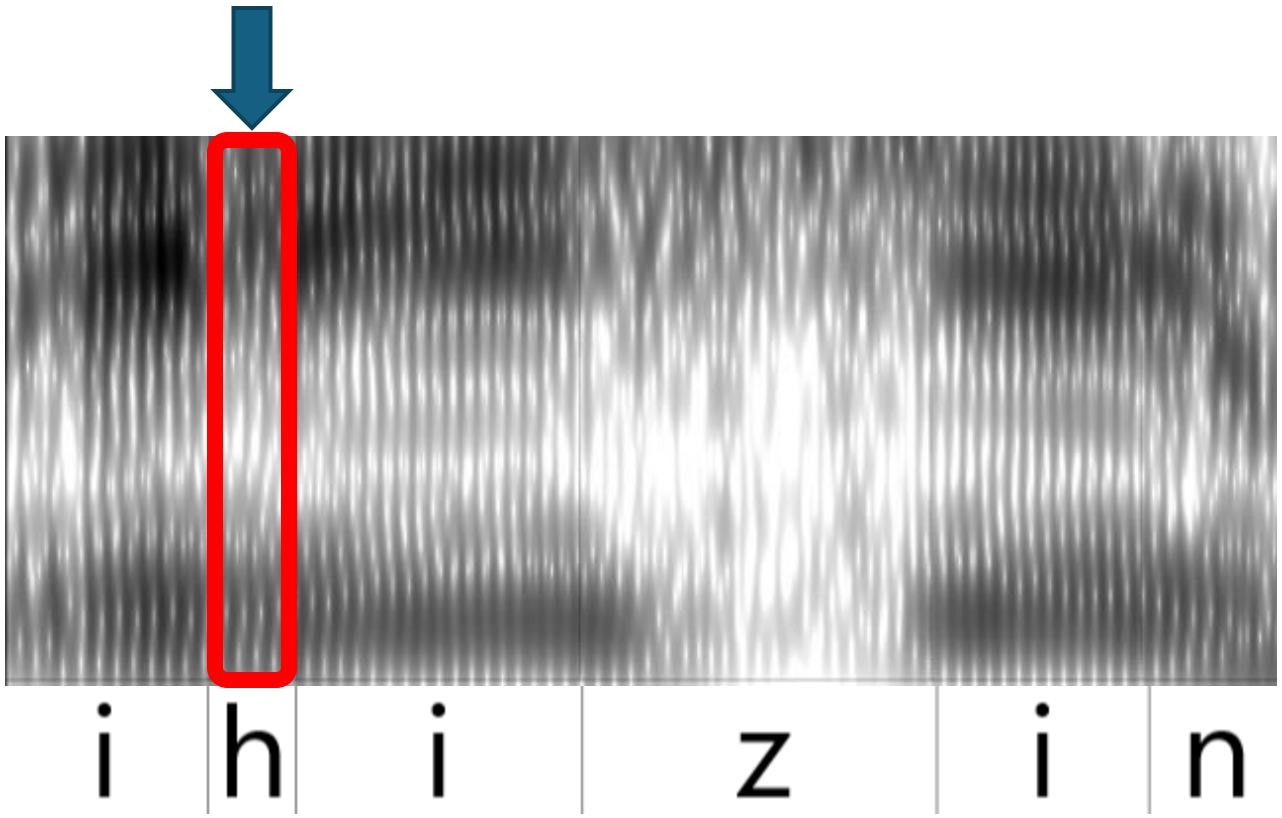
Weakly informative priors



Posterior contrast distribution: /h̃/ — /h/



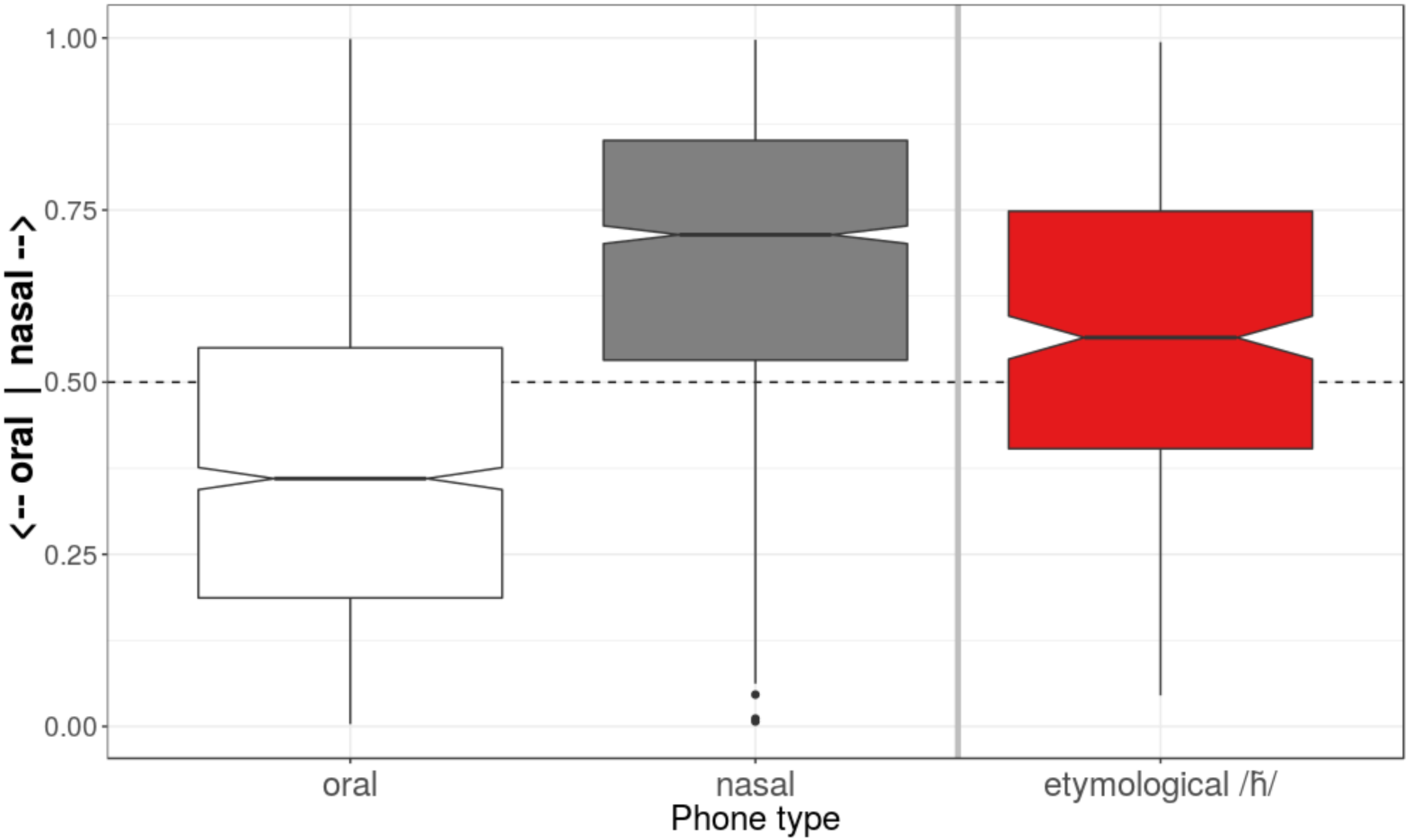
/h̃/ Phonetic experimentation

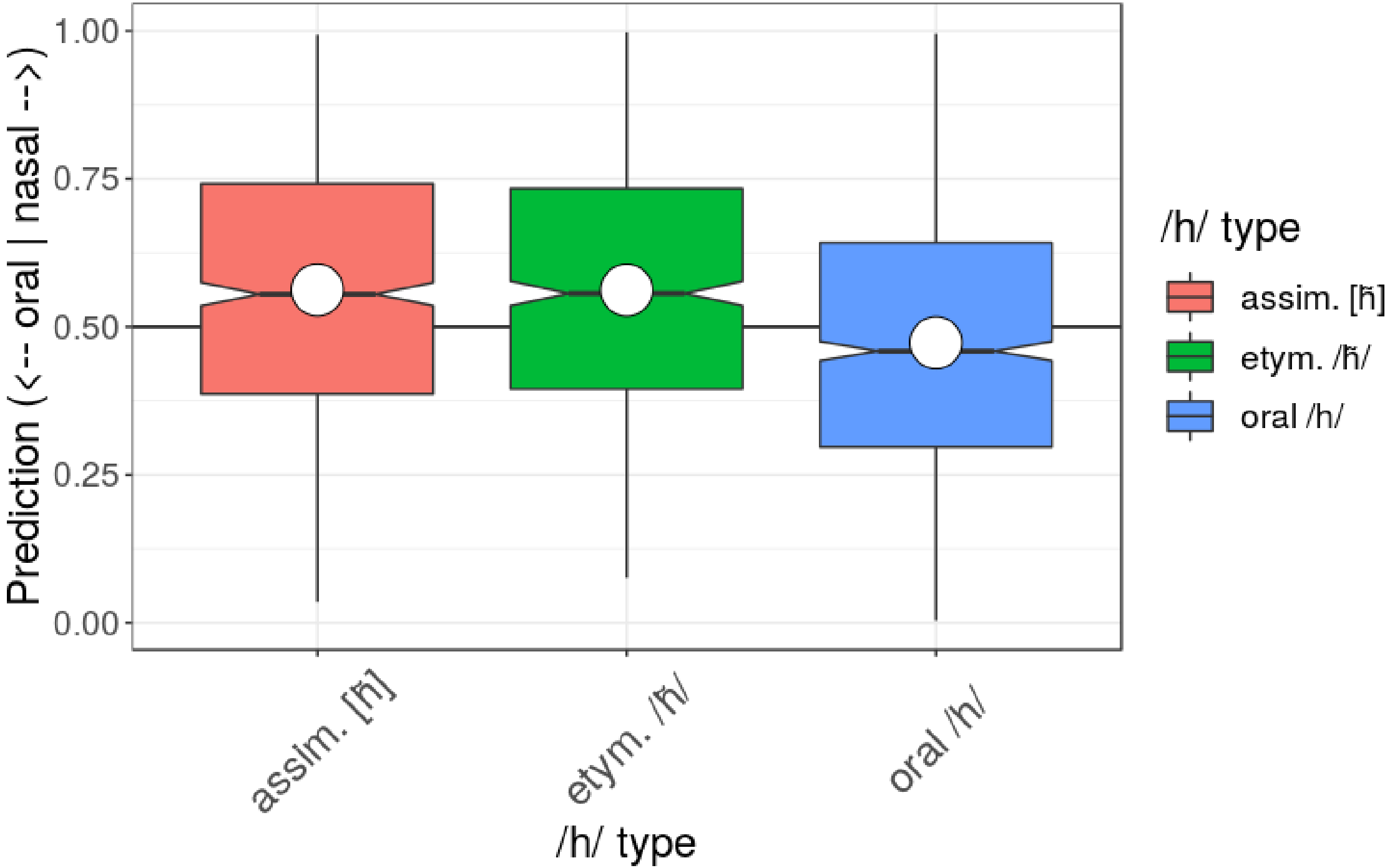


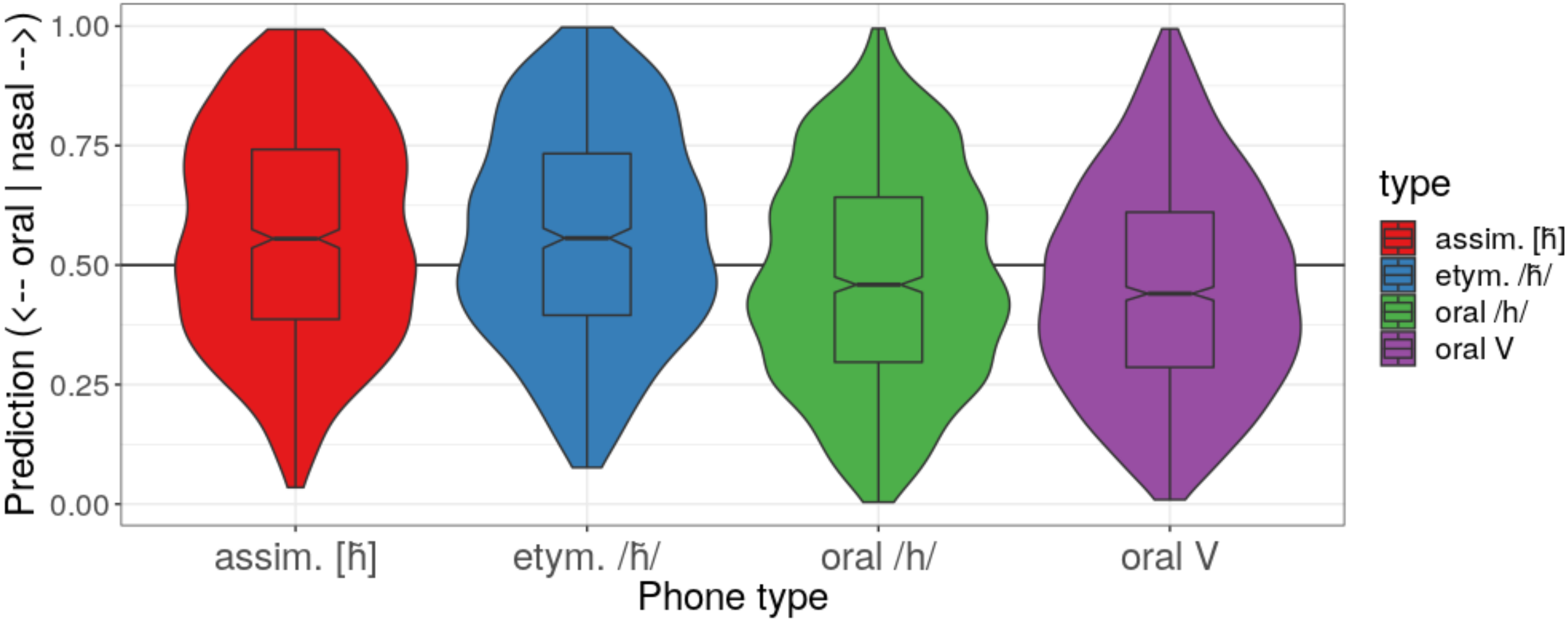
- Nasality is the only feature that differentiates /h/ and /h̃/.
- No reliable way of measuring acoustic nasality.
- New model to detect nasality.

ihizin ‘in the hunting’

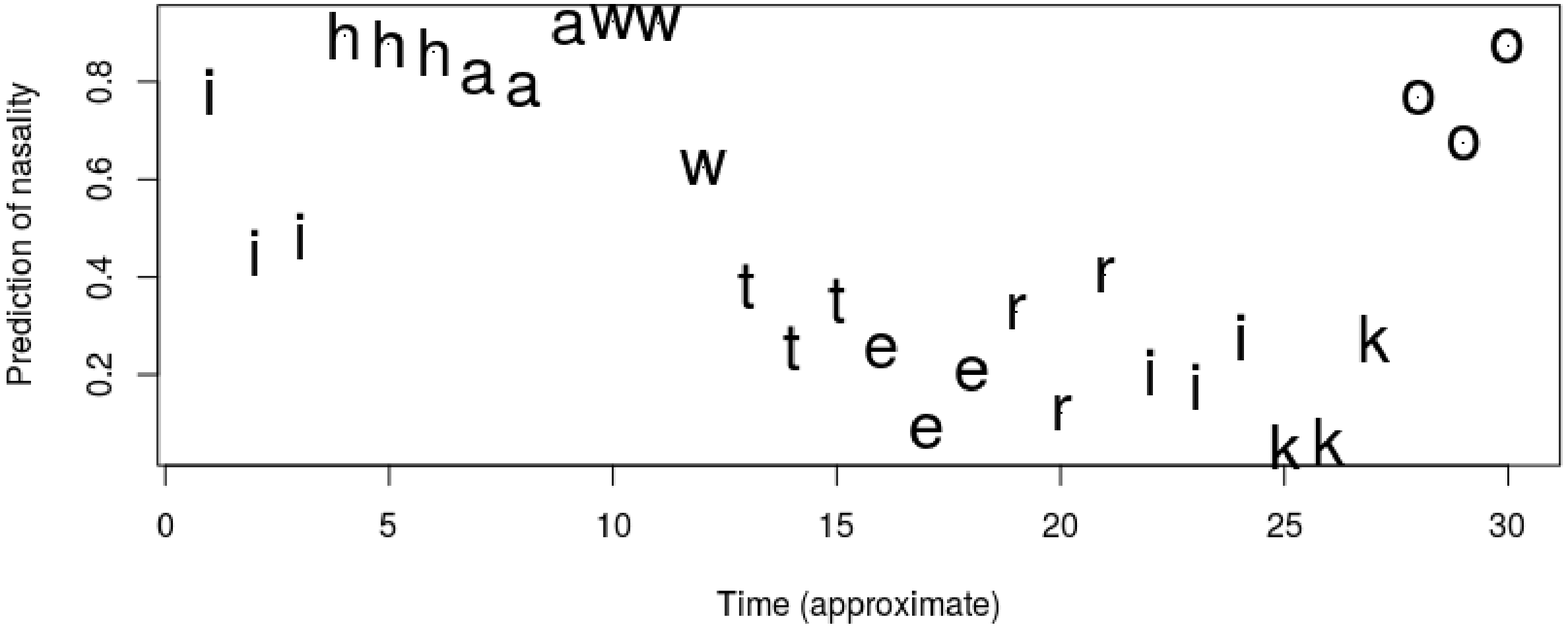
Carignan & Egurtzegi 2019: Principal components variable importance reconstruction (PC-VIR): Exploring factor importance in multicollinear acoustic data for speech. https://github.com/ChristopherCarignan/PC-VIR


<-- oral | nasal -->
1.00
0.75
0.50
0.25
0.00
oral
nasal
etymological /ħ/
Phone type


Prediction (<-- oral | nasal -->)
1.00
0.75
0.50
0.25
0.00
assim. [ħ]
etym. /ħ/
oral /h/
/h/ type
/h/ type
assim. [ħ]
etym. /ħ/
oral /h/


Prediction (<-- oral | nasal -->)
1.00
0.75
0.50
0.25
0.00
assim. [ħ]
etym. /ħ/
oral /h/
oral V
Phone type
type
assim. [ħ]
etym. /ħ/
oral /h/
oral V

Nasalized /h̃/ in a word:
ihauteriko ‘of the carnival’



Eastern accentual system

Basque prosodic systems

The diversity of prosodic systems is wide in modern Basque (cf. Hualde 1997)

- **Central:** word-level stress in the peninitial syllable, marked words +1.
- **Eastern:** word-level stress in the penultimate syllable, marked words –1.
- **Goizueta:** 2 different pitch accents that can fall in either of the first two syllables.
- **Western:** only some words are lexically accented, phrasal pitch accent.

Eastern accentuation

- Unmarked stress: penultimate syllable of the word
  - *gízun* ‘man’, *gizúna* ‘the man’, *néska* ‘girl’, *alhába* ‘daughter’…

- Marked stress: last syllable
  - *alhabá* ‘the daughter’, *neská* ‘the girl’, *ardű* ‘wine’, *añái* ‘ram’
  - monosyllabic suffixes (cf. *-ñí*, *-xkót*, *-liár*, *-tiár*, *-(t)ár*, *-kór* or the borrowed *-ús*).
  - compounds with a monosyllable: *gibel-mín* ‘bile, gall’, *giza-txár* ‘bad man’…

- Plural -e- also marked: attracts stress
  - *gizunék* ‘the men (erg.)’, *gizunér* ‘to the men’, *gizunéna* ‘of the men’, *gizunéki* ‘with the men’, *gizunéntako* ‘for the men’…

From the Central to the Eastern system

emakume

e***ma***kume

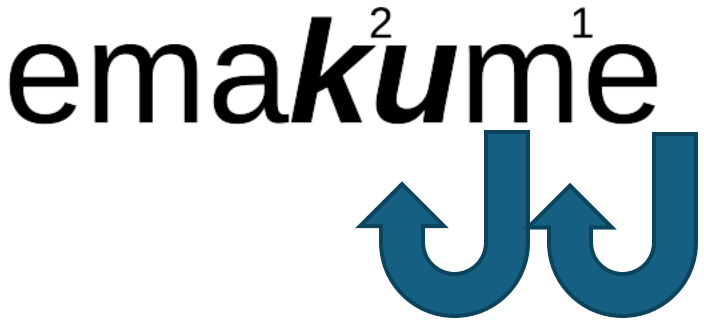

1
emakume


1
2
emakume

emakume

ema***ku***me


emakume
1


emakume
2
1

gizona

gizona


1.
gizona


1
2
gizona

gizona


gizona
1


gizona

From the Central to the Eastern system

- A reinterpretation of the peninitial stress in trisyllabic words as originating in the penultimate would give rise to the Eastern pattern (Michelena 1961/77).

$$[\sigma\ \sigma]'([\sigma\ \sigma\ \acute{\sigma}]) > [\sigma\ \acute{\sigma}]$$

- This is only possible at a time when most words were trisyllabic: after the grammaticalization of the determiner -a < *ha(r).

From the Central to the Eastern system

- After years of Gascon influence, trisyllabic words were ambiguous. This ambiguity was resolved in an innovative way due to Gascon influence.

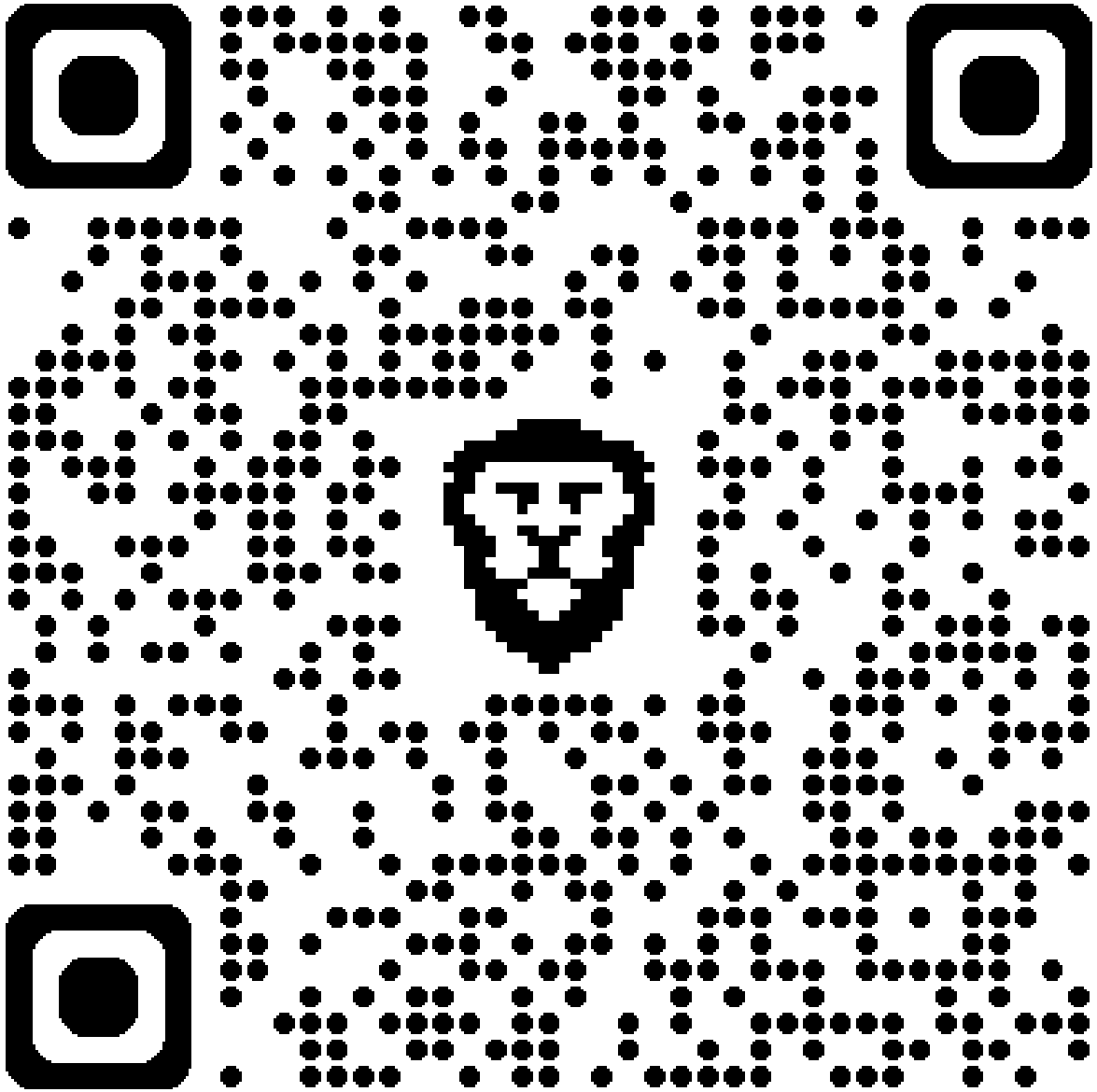
$$[\sigma\ \sigma]'([\sigma\ \sigma\ \acute{\sigma}]) > [\sigma\ \acute{\sigma}]$$

- Bearnese accentuation:
  - Words are either oxytonous or paroxytonous.
  - Accent is assigned based on a number of rules (Mooney 2016).

Today's paper:

Egurtzegi, A. & C. Carignan. 2020. An acoustic description of Mixean Basque. *Journal of the Acoustical Society of America* 147.4, 2791-2802.

Open access here:
https://doi.org/10.1121/10.0000996

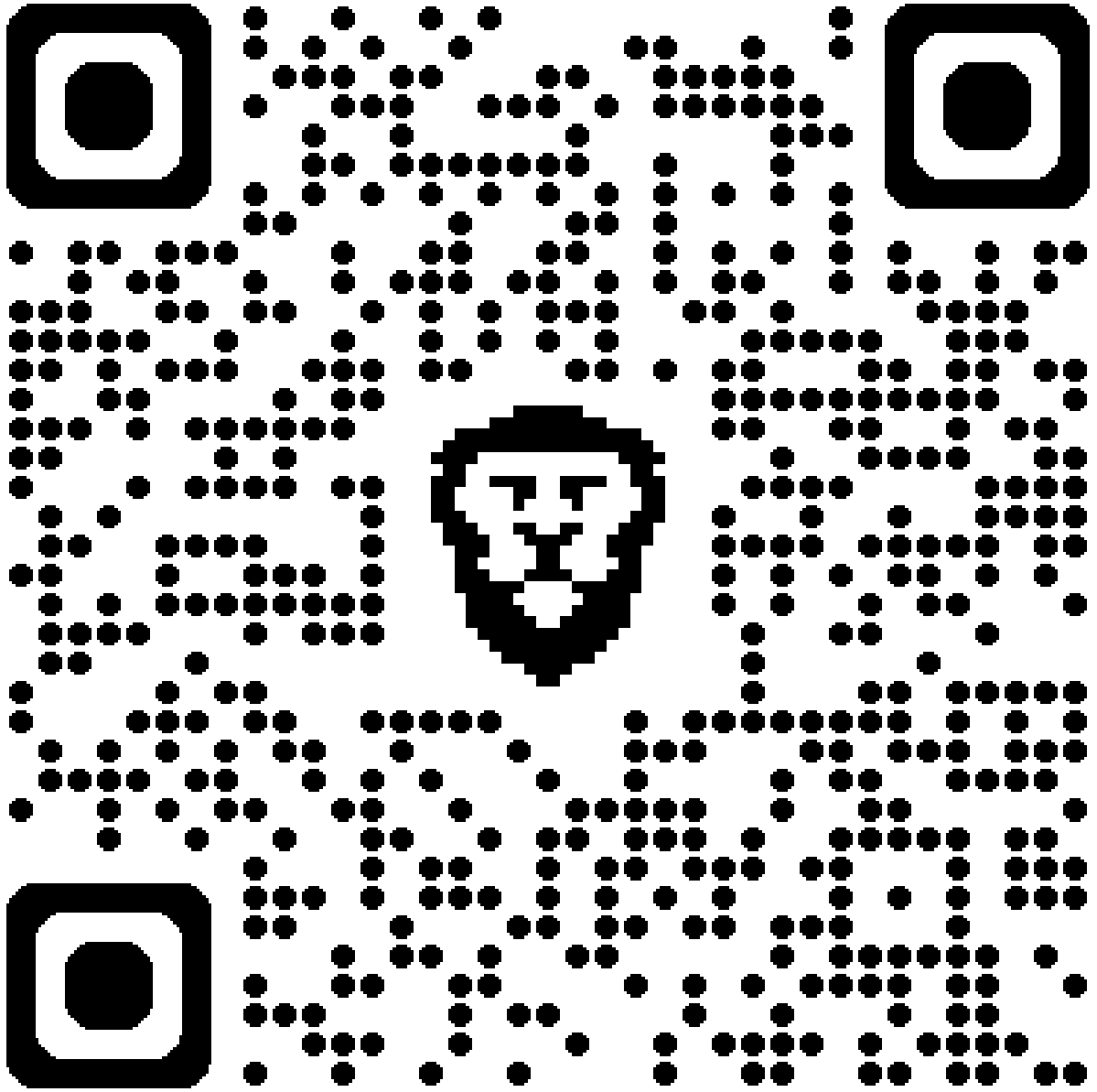


All papers are freely accessible here: egurtzegi.github.io/publications

Next paper:

Egurtzegi, A. 2025. Metathesis. In Ledgeway et al. (eds.), *The Wiley Blackwell Companion to Diachronic Linguistics*. Wiley-Blackwell.

Open access here:
https://egurtzegi.github.io/papers/MetathesisDiaComEgurtzegi.pdf



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