Synchronic variation as the seed of sound change: Palatalization

Ander Egurtzegi (CNRS-IKER)

Advanced course in Sound Change with a focus on Basque

University of Chicago, 2025/04/28

Obstruent-lateral cluster palatalization in Romance (and its borrowing into Basque)

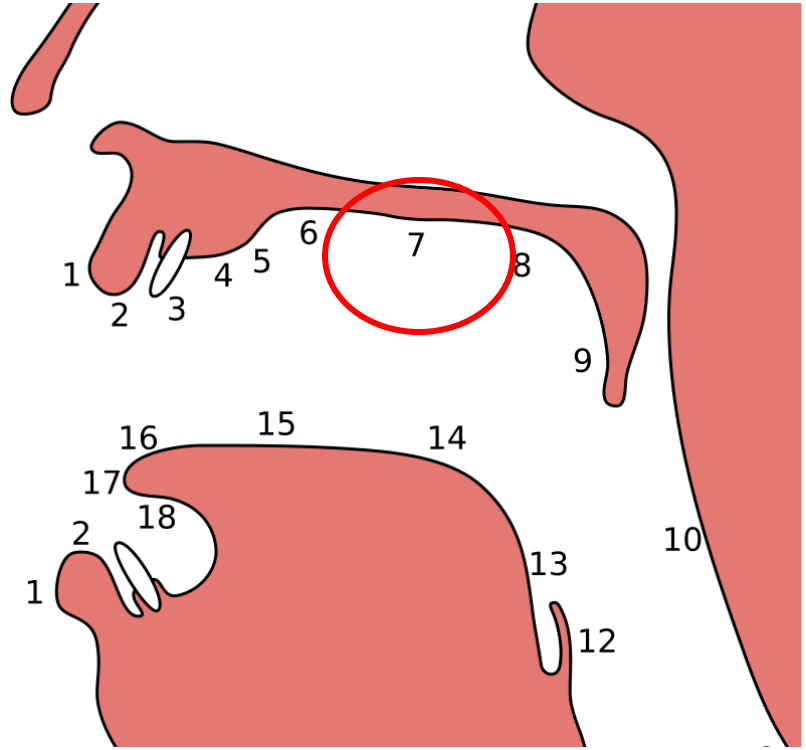
What is palatalization?

= a sound shifts its place of articulation towards the palatal region

Common triggers: /i, e, j/

Lat. GENTEM > Gal. *xente*, Cat. *gent*
Lat. REGĪNAM > Gal. *raíña*, Port. *rainha*
Lat. ADIŪTĀRE > Gal. *axudar*, Sp. *ayudar*

Lat. LUPUM > Ast. *llobu*, Cat. *llop*



https://en.wikipedia.org/wiki/Phonetics#/media/File:Places_of_articulation.svg

OL palatalization in Romance

Latin
/pl fl bl kl gl/
CLĀVEM

Galician	Ribagorzan	Tuscan Italian	Catalan
[ʧ]	[kʎ]	[kj]	[kl]
chave	*cllau*	*chiave*	*clau*
palatalization (affricate)	palatalization (lateral)	palatalization (glide)	no palatalization

CL palatalization in Ibero-Romance

Old Spanish	/pl fl kl/	/gl/	/bl/
Word-initial	/ʎ/	/l/	/bl/
Post-consonantal	/ʧ/	/ɲ/	-
Post-vocalic	/ʎ/	-	-

Palatal outcome; non-palatal outcome; no historical evidence

C_1 voicing
/pl fl kl/ vs. /bl gl/

Position within the word
post-consonantal vs.
word-initial/post-vocalic
(effect of lenition?)

Origin of CL palatalization

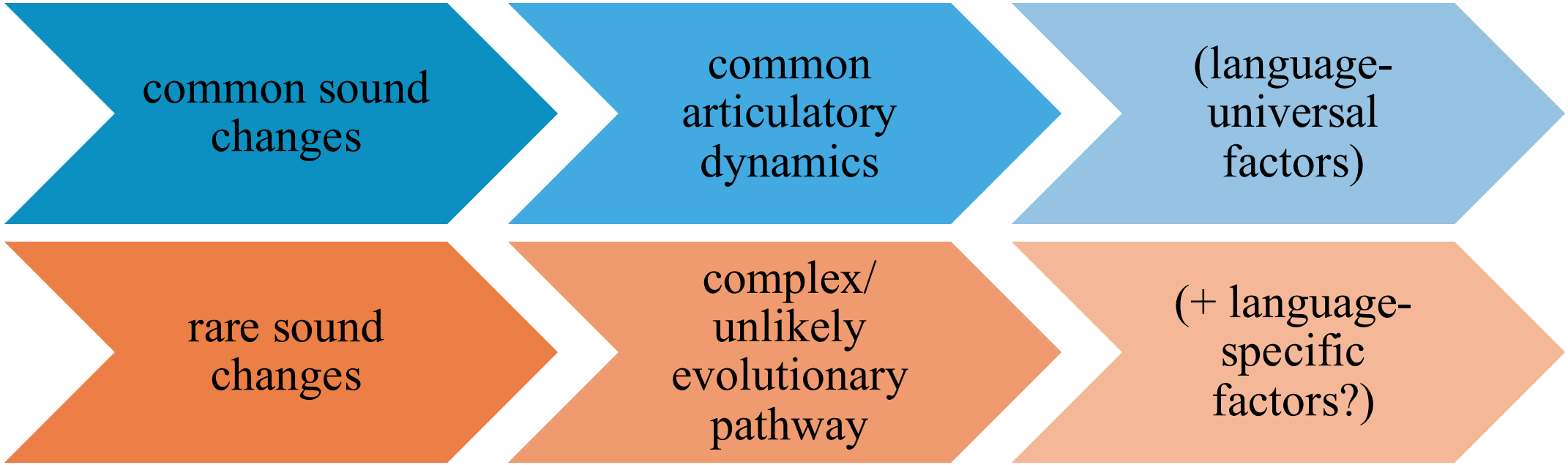
- **Widespread hypothesis**
  → first step in the process: palatalization of /l/
  → coarticulation or articulatory blending between /k, g/ and /l/

- **How was exactly this coarticulatory process?**
  - Did it affect both consonants?
  - Palatalization of labial clusters through analogy?
  - Did only coarticulation play a role?
    → If only coarticulation were necessary, OL palatalization would be a more common sound change

Müller, D. 2011. *Developments of the lateral in Occitan dialects and their Romance and cross-linguistic context*. PhD dissertation. Universitat de Tolosa 2 - Lo Miralh & Ruprecht-Karls-Universität Heidelberg.
Recasens, D. 2014. Coarticulation and Sound Change in Romance. Amsterdam/Philadelphia: John Benjamins Publishing.
Recasens, D. 2018. *The Production of Consonant Clusters. Implications for Phonology and Sound Change*. Phonetics and Phonology book series: De Gruyter.
Recasens, D. 2020. *Phonetic Causes of Sound Change: the Palatalization and Assibilation of Obstruents*. Oxford: Oxford University Press.
Zampaulo, A. 2019. *Palatal Sound Change in the Romance Languages. Diachronic and Synchronic Perspectives.* Oxford: Oxford University Press.

Origin of CL palatalization

- **Only coarticulation played a role?**



Historical linguistics meets articulatory phonetics

Questions and hypothesis

- Is the tongue body during the lateral C_2 higher in clusters?
- Is the tongue body during the velar C_1 more fronted in clusters?
    - Are these affected by C_1 voicing?
    - Are these affected by the position of the cluster within the word?

	Complexity matters (in clusters, compared to singleton)	**Position matters (post-consonantally, compared to post-vocalically)**	**Voicing matters (voiceless C_1, compared to voiced C_1)**
Lateral C_2	Higher tongue body	Higher tongue body	Higher tongue body
Velar C_1	Fronter tongue body	Fronter tongue body	Fronter tongue body

Kochetov, Alexei. 2005. "Phonetic sources of phonological asymmetries: Russian laterals and rhotics". *Proceedings of the 2005 annual conference of the Canadian Linguistic Association.*

Recasens, Daniel. 2020. *Phonetic Causes of Sound Change: the Palatalization and Assibilation of Obstruents*. Oxford: Oxford University Press.

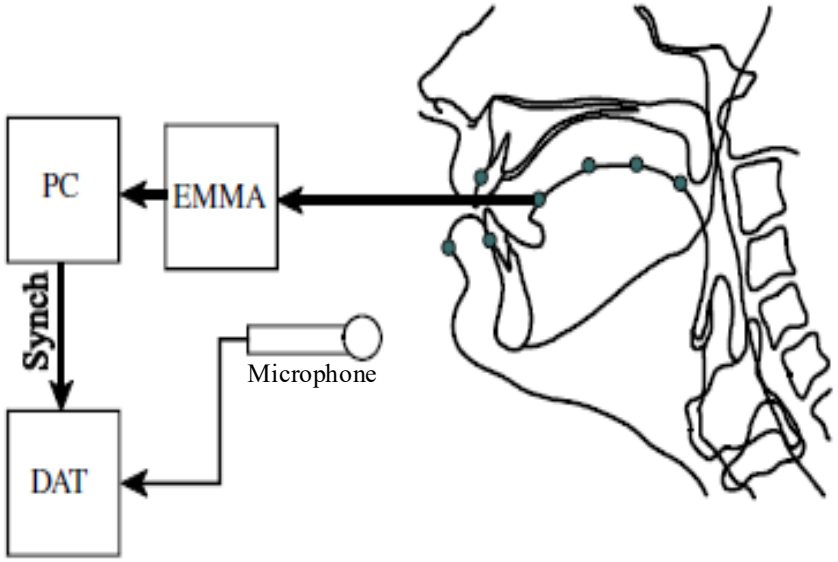
Experimental design

- **Data acquisition:** Electromagnetic Articulography (EMA)
- **Participants:** Peninsular Spanish (10 speakers)
- **Carrier phrase**: *Ahora diga* ____ *por favor* 'Now say ____ please'
- **Five repetitions per token** (words and non-words, ca. 350 tokens/speaker)

Sample stimuli

	Position	Stressed	Pre-tonic	Post-tonic
/kl/	#_	clava, cava, lava	clavaba	-
	V_	aclama, acaba, alaba	aclamaba	**macla
	C_	enclaba/anclaba, encama, enlama	enclavaba/ancladero	ancla/**pencla
/gl/	#_	glas, gas, las	glaseado	-
	V_	**aglaba, pagaba, halaga	**aglababa	**agla
	C_	tinglado/mangler, chingado, enlato,	tingladillo/bangladesí	**Pingla/**mangla

Experimental design



Harrington et al. 2011. "The physiological, acoustic, and perceptual basis of high back vowel fronting: Evidence from German tense and lax vowels". *Journal of Phonetics 39*

Carstens Medizinelektronik GmbH. Articulograph AG501 Brochure. See www.articulograph.de

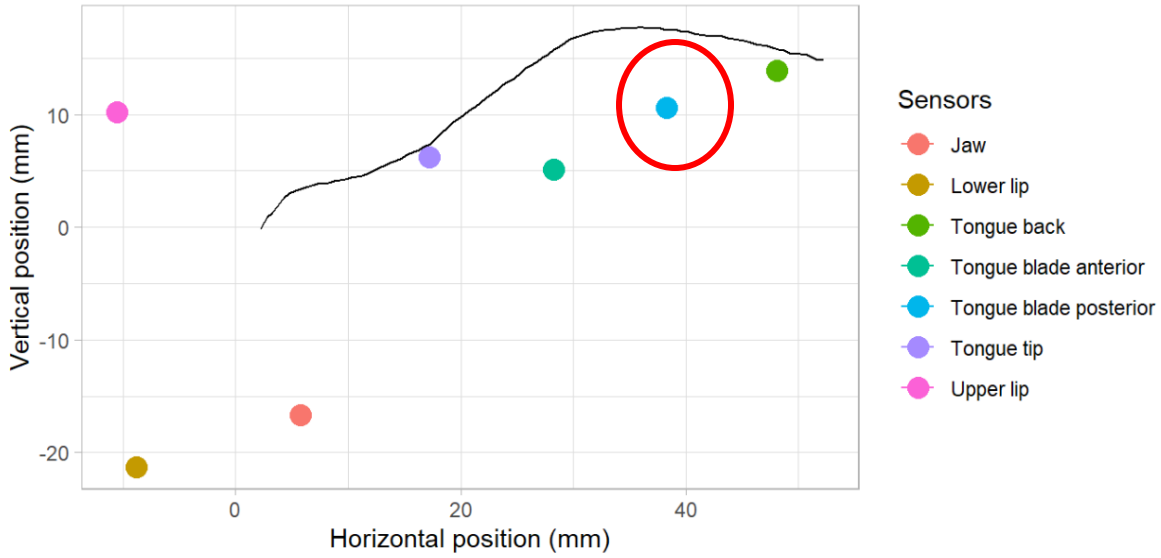
Data analysis

- **Segmentation:** mview/Matlab
  - /l/ (tongue tip sensor, TT)
  - /k g/ (tongue back sensor, TB)
- **Landmark/timepoint of reference**

  → point of maximum constriction

  → first velocity peak of TT – 25ms
- **Used sensor:** tongue blade posterior (TM2)

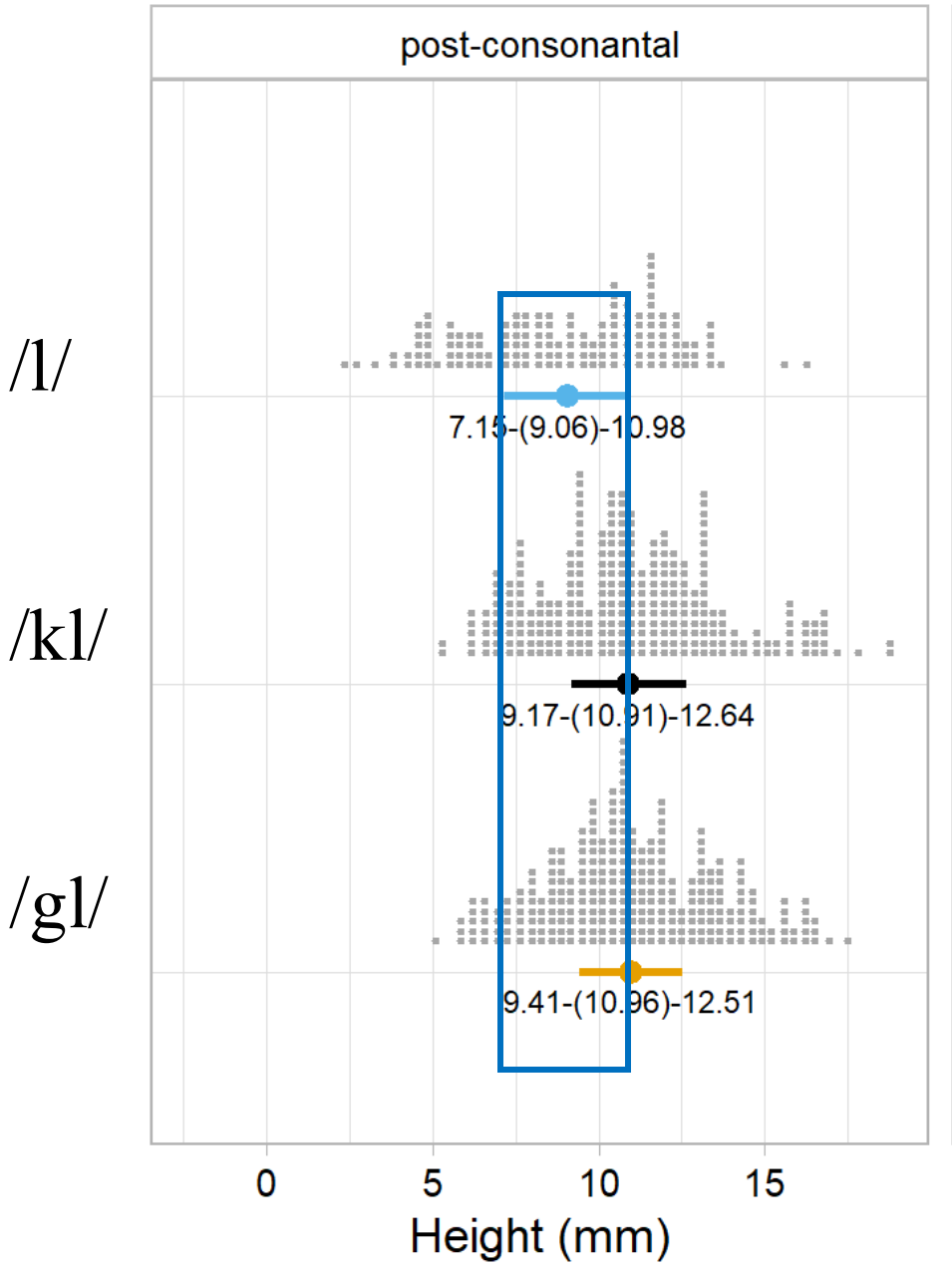
  ➔ Main sensor for the production of high vowels and palatal segments

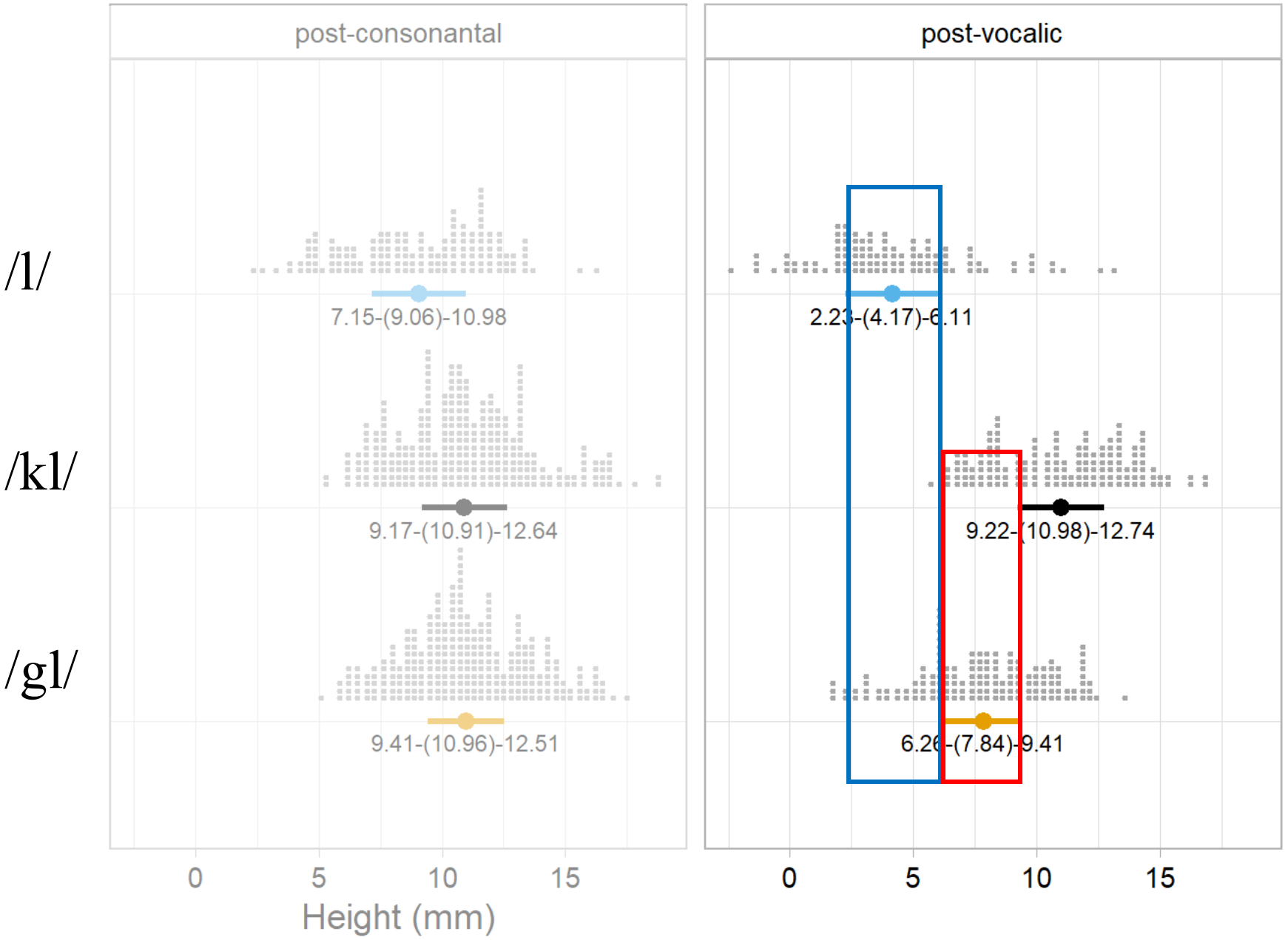


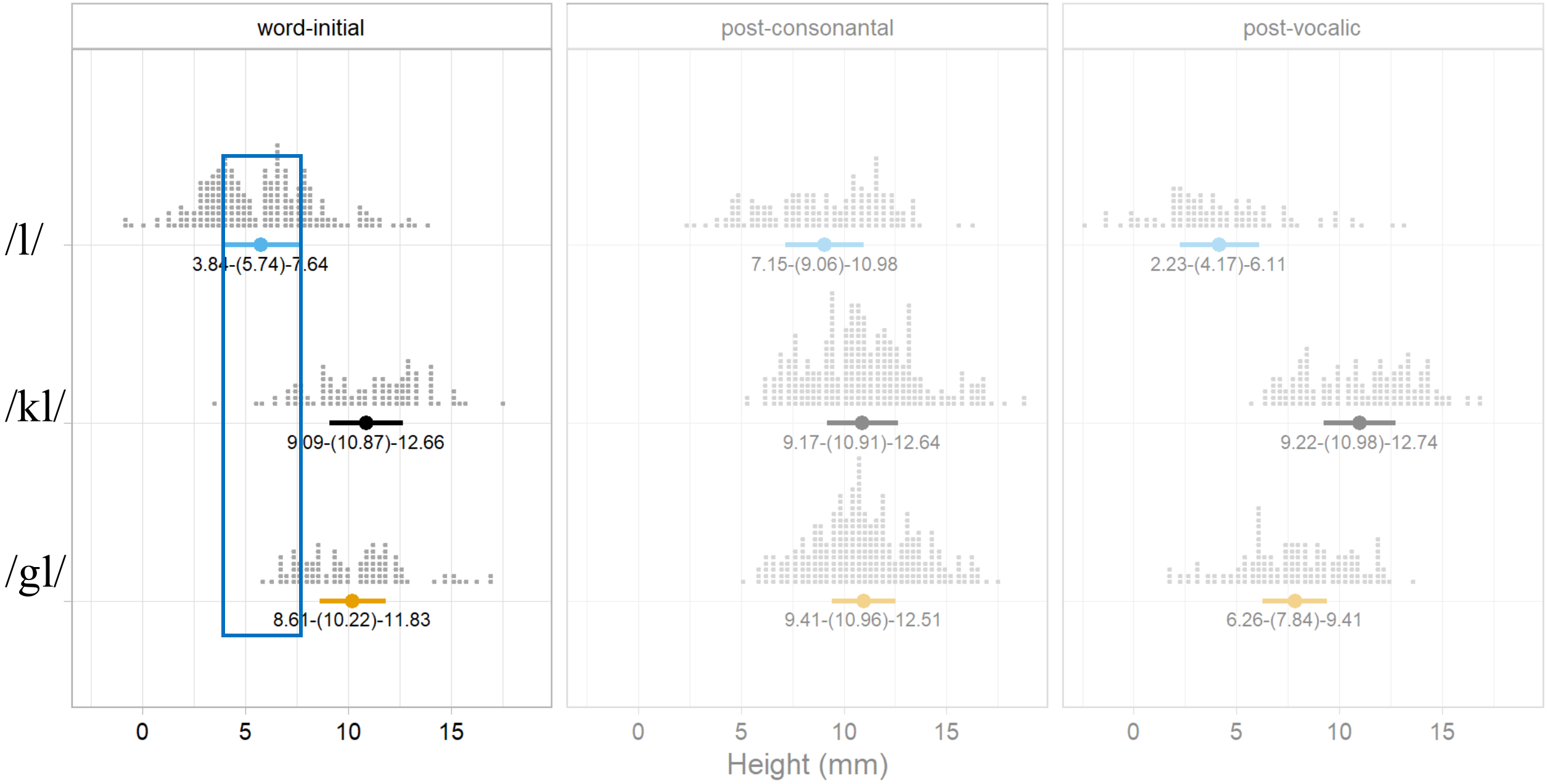
Statistical models

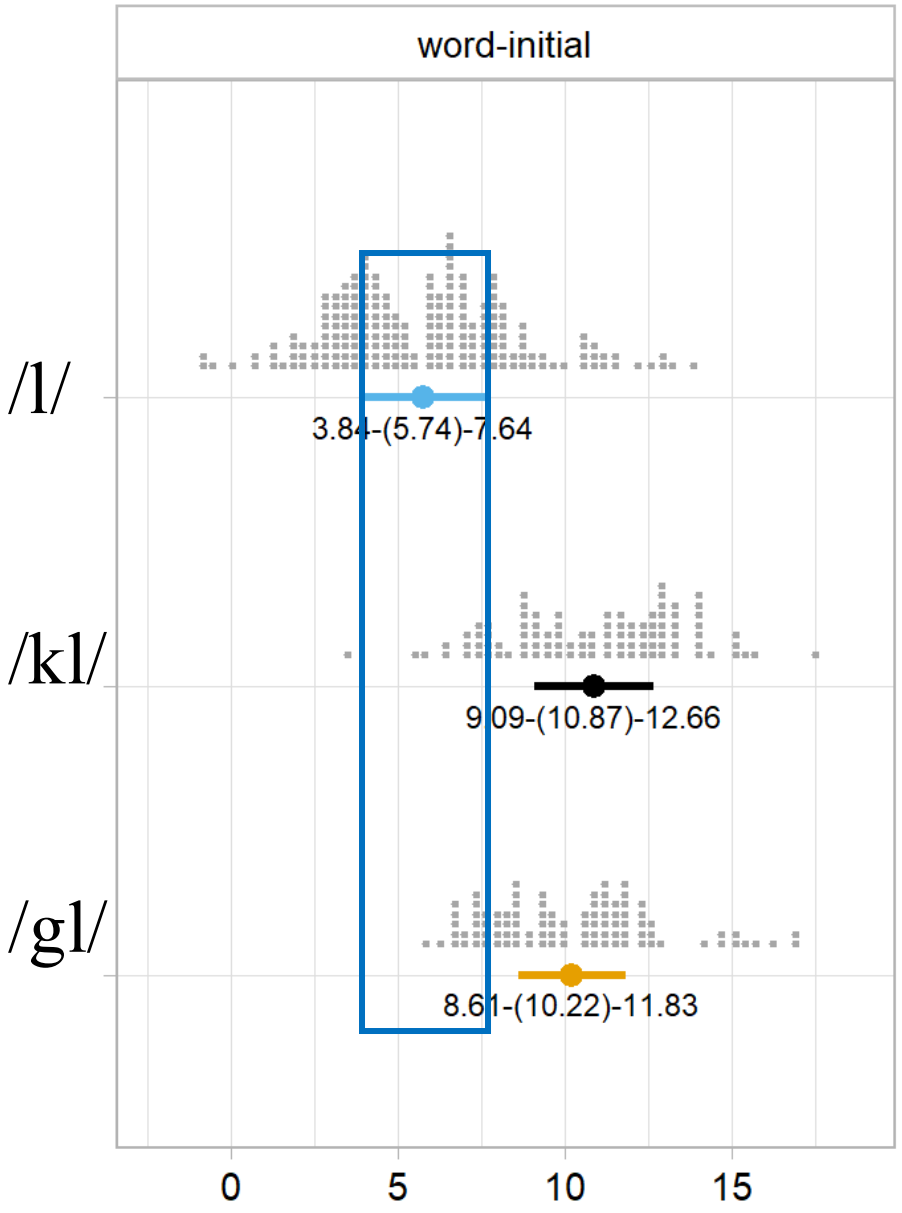
Response	Fixed effect/Predictor	Random effect
vertical position (y)	phone (l kl gl) or (k g kl gl) in **interaction with (*)** position within the word (word-initial, post-consonantal, post-vocalic) token repetition	phone|speaker 1+token
horizontal position (x)		

- Two models (x, y) for TM2 during /l/, one model (x) for TM2 during /k g/.


post-consonantal
/l/
/kl/
/gl/
7.15-(9.06)-10.98
9.17-(10.91)-12.64
9.41-(10.96)-12.51
0
5
10
15
Height (mm)


/l/
/kl/
/gl/
post-consonantal
post-vocalic
7.15-(9.06)-10.98
9.17-(10.91)-12.64
9.41-(10.96)-12.51
2.23-(4.17)-6.11
9.22-(10.98)-12.74
6.26-(7.84)-9.41
0
5
10
15
Height (mm)

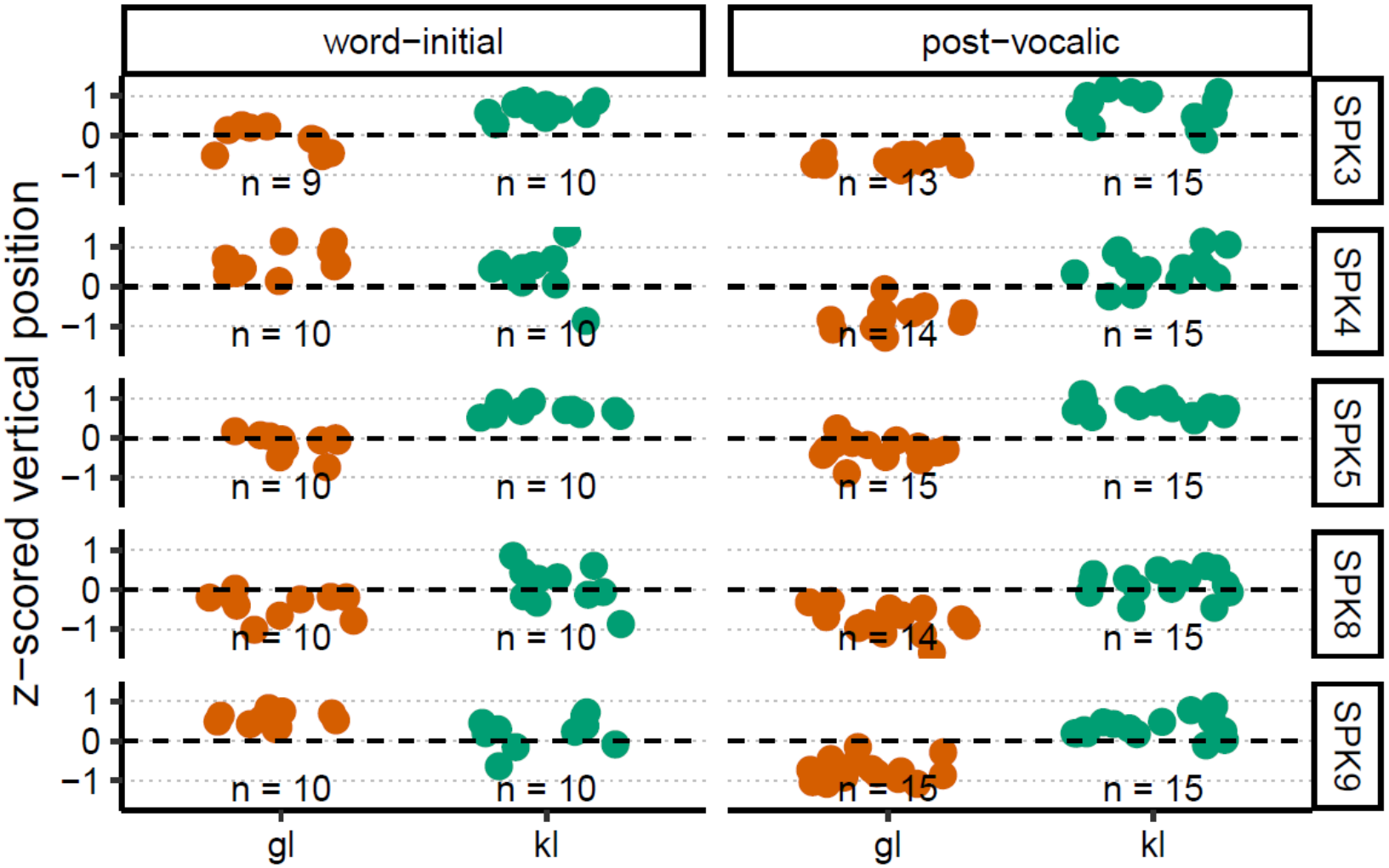

word-initial
post-consonantal
post-vocalic
/l/
/kl/
/gl/
3.84-(5.74)-7.64
9.09-(10.87)-12.66
8.61-(10.22)-11.83
7.15-(9.06)-10.98
9.17-(10.91)-12.64
9.41-(10.96)-12.51
2.23-(4.17)-6.11
9.22-(10.98)-12.74
6.26-(7.84)-9.41
0
5
10
15
Height (mm)



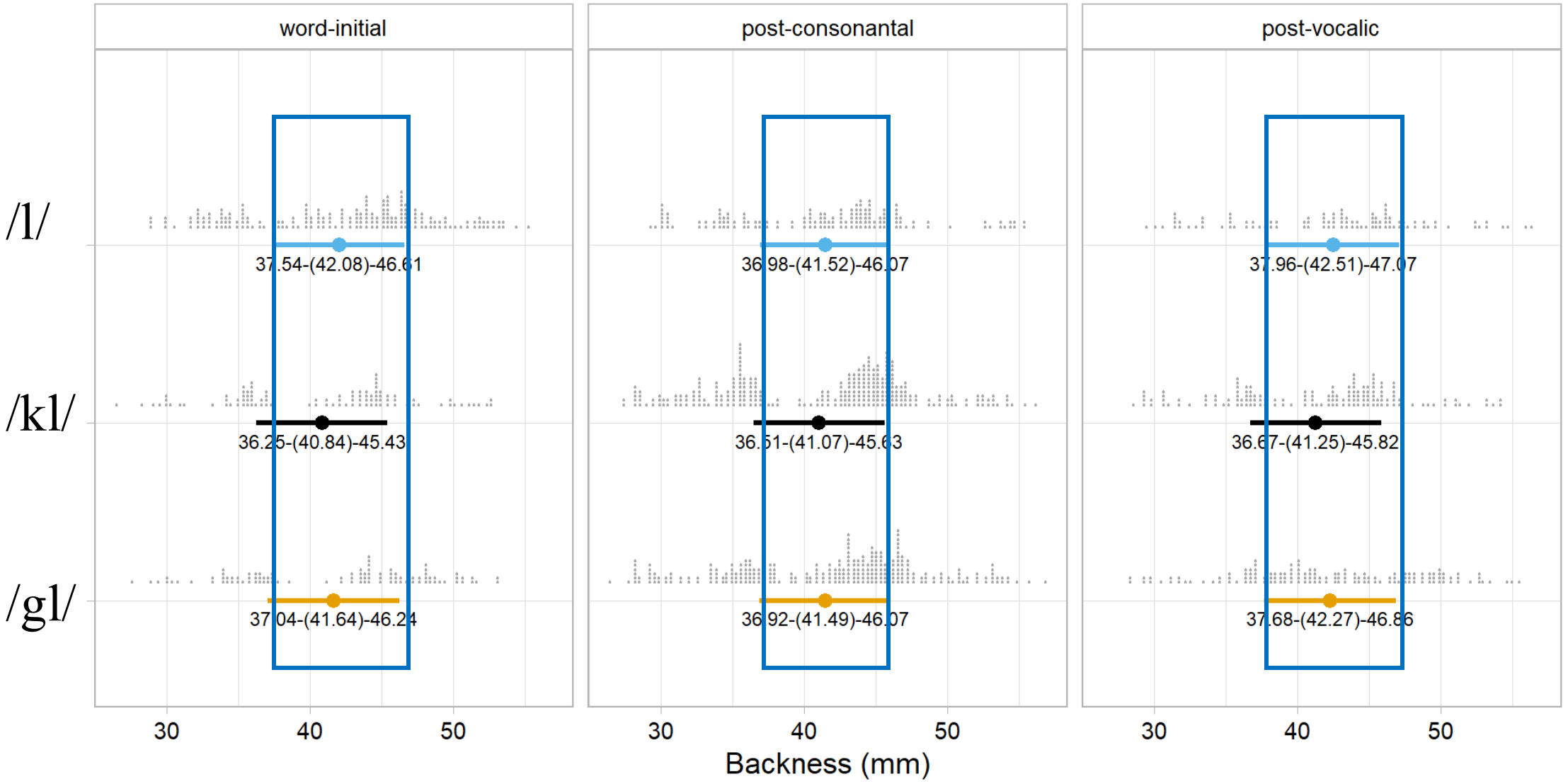
Old Spanish	/pl fl kl/	/gl/	/bl/
Word-initial	/ʎ/	/l/	/bl/
Post-consonantal	/ʧ/	/ɲ/	-
Post-vocalic	/ʎ/	-	-

The effect of voiced stop lenition in the lateral

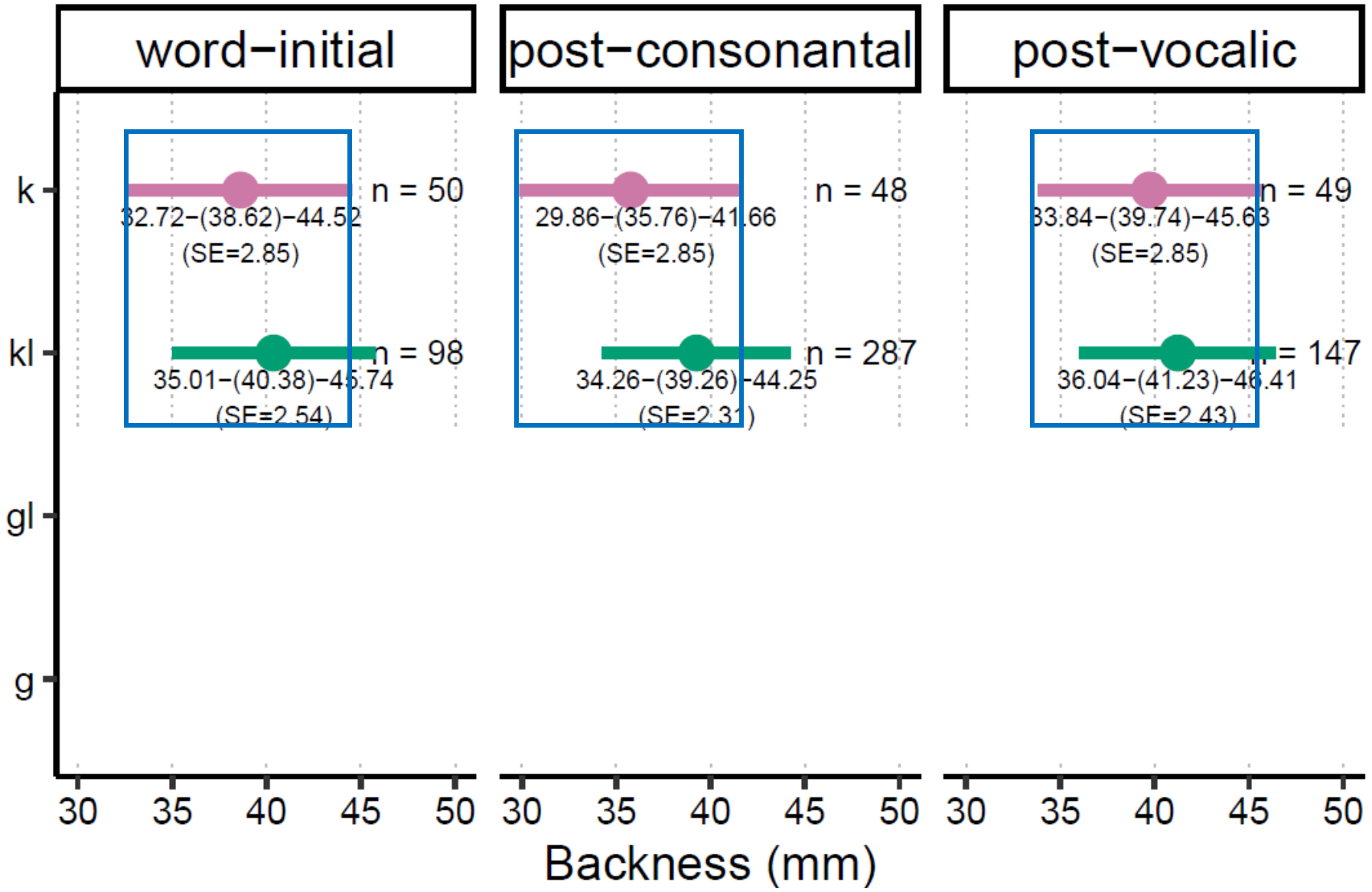
The effect of voiced stop lenition in the lateral



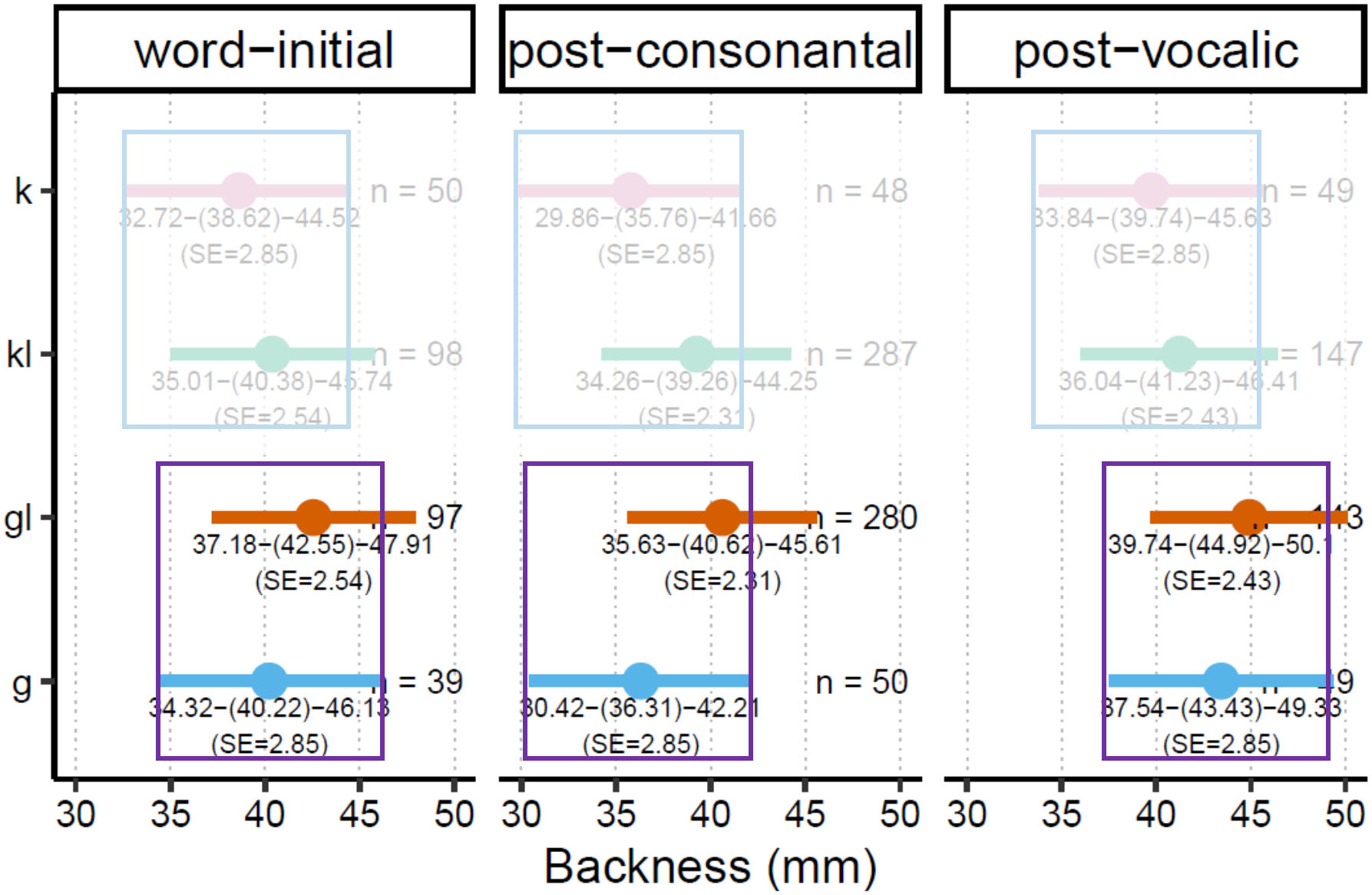
X-axis: TM2 during the lateral (C_2)



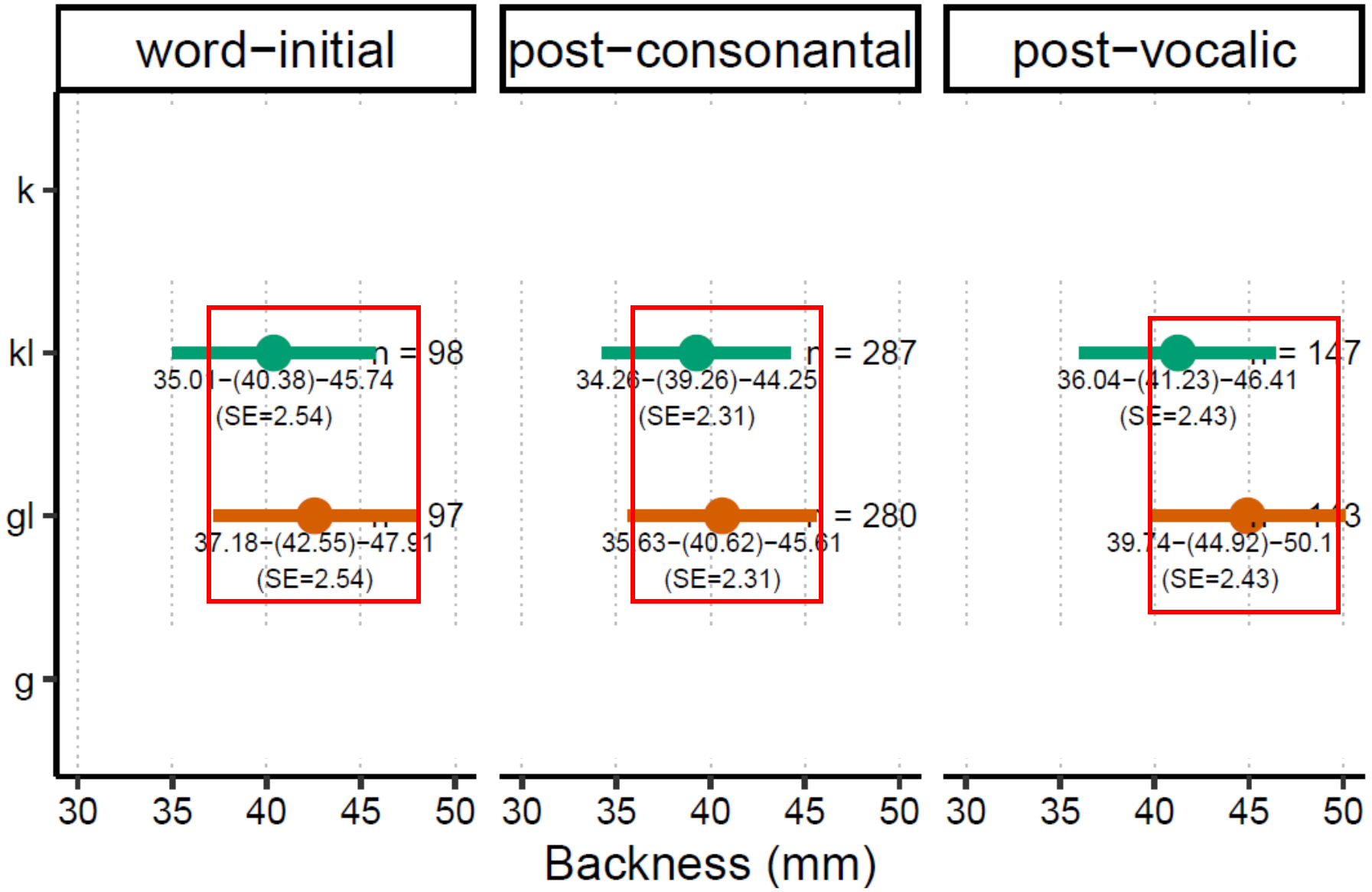
X-axis: TM2 during the velar (C_1)



X-axis: TM2 during the velar (C_1)



X-axis: TM2 during the velar (C_1)



Summary

	Complexity matters (in clusters, compared to singleton)	**Position matters (post-consonantally, compared to post-vocalically)**	**Voicing matters (voiceless C_1, compared to voiced C_1)**
Lateral C_2	Higher tongue body	Higher tongue body	Higher tongue body
Velar C_1	Fronter tongue body	Fronter tongue body	Fronter tongue body

Discussion

- Recasens (2020): a coronal segment needs raising but not backing of the tongue body to palatalize because of the shape of the palate.
- Kochetov (2005): /l^{j}/ in Russian has a higher but not fronter/backer tongue body than /l/.

→ Evidence for coarticulation as (one) triggering factor in Romance CL palatalization.

→ Coarticulation affects the lateral C_2 but not the velar C_1.

→ Lenition may have played a role in the distribution of CL palatalization in Ibero-Romance.

Kochetov, A. 2005. “Phonetic sources of phonological asymmetries: Russian laterals and rhotics”. *Proceedings of the 2005 annual conference of the Canadian Linguistic Association.*
Recasens, D. 2020. “Palatalizations in the Romance Languages”. *Oxford Research Encyclopedia of Linguistics*. Oxford University Pres

Discussion

- “Rare sound change patterns may be the endpoint of a complex or unlikely articulatory pathway.”
  - CL palatalization in Romance but not in e.g. Germanic.
    - Velar stops → high tongue dorsum.
    - Similar dynamics are expected in other languages.

→ Explore timing dynamics.

→ The acoustic and perceptual implications remain to be explored.

Synchronic variation as the seed of sound change

CL Palatalization in Ribagorzan Aragonese

CL clusters in Romance

Latin **[p k f b g] + [l]**	**Galician** **[ʧ]**	**Ribagorzan Aragonese** **[_ʎ]**	**Catalan** **[_l]**	**Tuscan Italian** **[_j]**	**Romanian** **[kʲ gʲ]**
PLŌRĀRE	*chorar*	*pllorar*	*plorar*	*plorare (piangere)*	*ploua*
CLĀVEM	*chave*	*cllau*	*clau*	*chiave*	*cheie*
FLŌREM	*†chor*	*fllor*	*flor*	*fiore*	*floare*
BLANCUM	*/br/anco*	*bllanc*	*blanc*	*bianco*	-
GLANDEM	*/l/ande*	*llan*	*gla*	*ghianda*	*ghindă*

CL clusters in Romance

Palatal results

Non-palatal results

Different distributions of palatalization

chorar	*pllorar*	*plorar*	*plorare (piangere)*	*ploua*
chave	*cllau*	*clau*	*chiave*	*cheie*
†chor	*fllor*	*flor*	*fiore*	*floare*
/br/anco	*bllanc*	*blanc*	*bianco*	-
/l/ande	*llan*	*gla*	*ghianda*	*ghindă*

CL clusters in Romance

Latin [p k f b g] + [l]	Galician [ʧ]	Ribagorzan Aragonese [_ʎ]	Catalan [_l]	Tuscan Italian [_j]	Romanian [kʲ gʲ]

Different results in different Romance varieties

The origin of palatalization of CL clusters: Historical linguistics

- Probable first step in the palatalization process: /l/ > /ʎ/

→ Linguistic evidence of geographically distant Romance varieties with the same results.

Latin	Aromanian	Ribagorzan Aragonese	Franco-Provençal
PLUMBUM	-	*pllom*	pʎõ
CLĀVIS	*kʎae*	*cllau*	*kʎa*
GLANDULAE	gʎînda	-	(a)gʎã

The origin of palatalization of CL clusters: Phonetics

- ***Communes opinio*: Articulatory origin** (e.g., Recasens 2014, 2018; Zampaulo 2019)

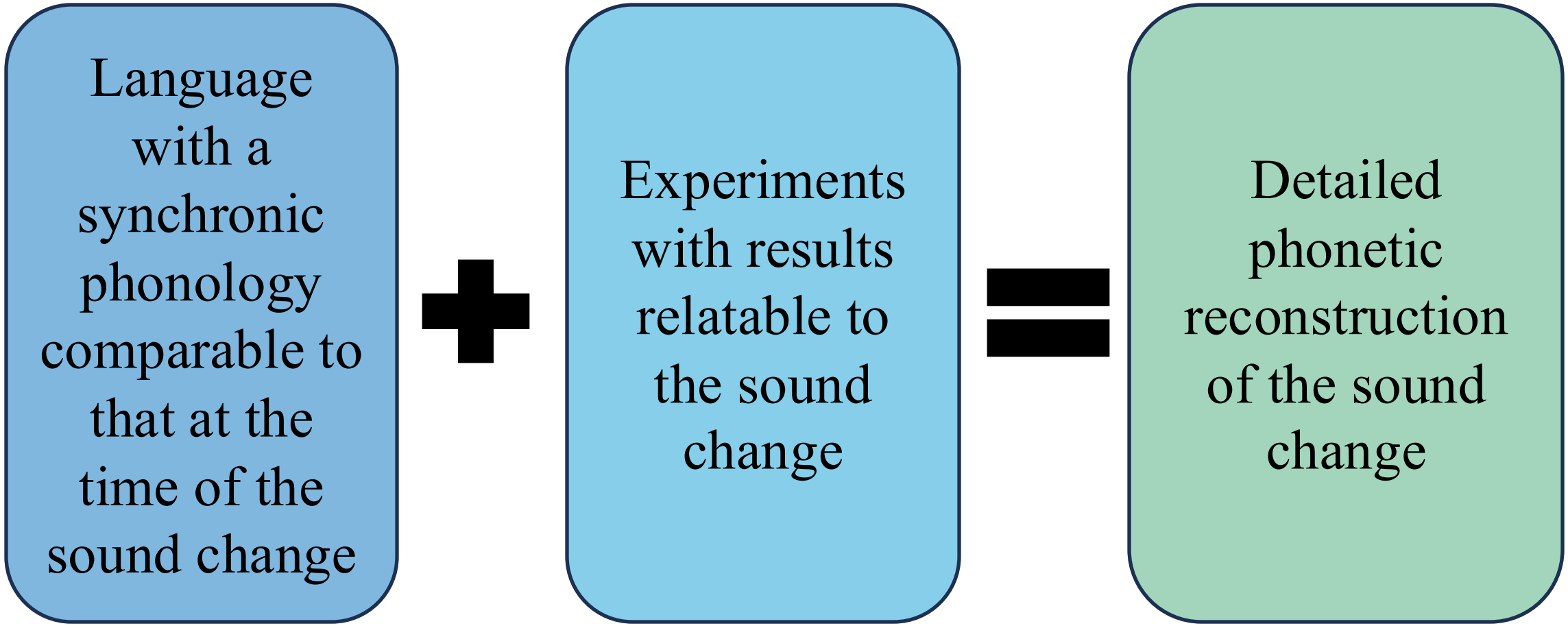
→ coarticulation or gestural blending between /k, g/ and /l/.

- **How was this coarticulatory process?**
  - Did it affect both consonants or just the lateral? (García-Covelo, in prep.)
  - Is the palatalization of /pl fl bl/ only explained by analogy? (cf. Müller 2011; Recasens 2020)
  - Did articulation alone play a role in this change? (Ohala 1993; Blevins 2004)
  - Can all Romance results be explained with /Cʎ/ as a first step?

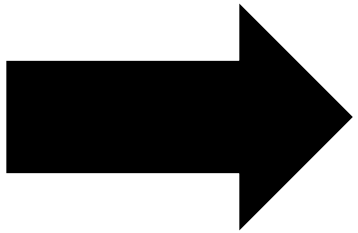
Synchronic variation reflects diachronic change

Uniformity of production and perception dynamics
(e.g. Ohala 1974, 1989; Blevins 2004; but also the Neogrammarians)

- Current sound changes (synchrony) are similar to those of the past (diachrony).
- Synchronic variation as the seed of sound change.


Language with a synchronic phonology comparable to that at the time of the sound change
Experiments with results relatable to the sound change
Detailed phonetic reconstruction of the sound change

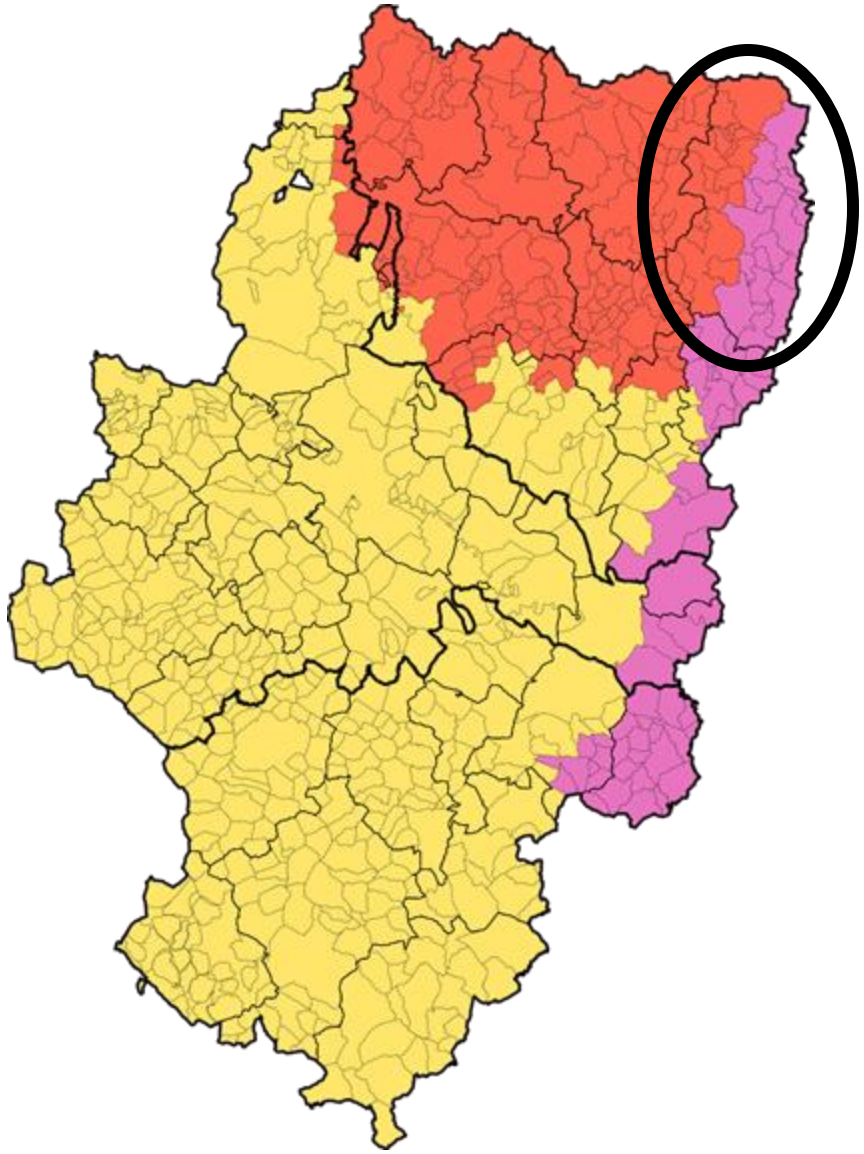
Language with a synchronic phonology comparable to that at the time of the sound change



Ribagorzan Aragonese

Ribagorza

- **Ribagorza**: Region of Huesca (Aragón).
- **Glosolects**: Aragonese and Aragonese-Catalan transitional varieties.
- **Ribagorzan Aragonese**: Eastern dialectal group.
- **Number of Aragonese speakers (2011):** 25,556.



Goals

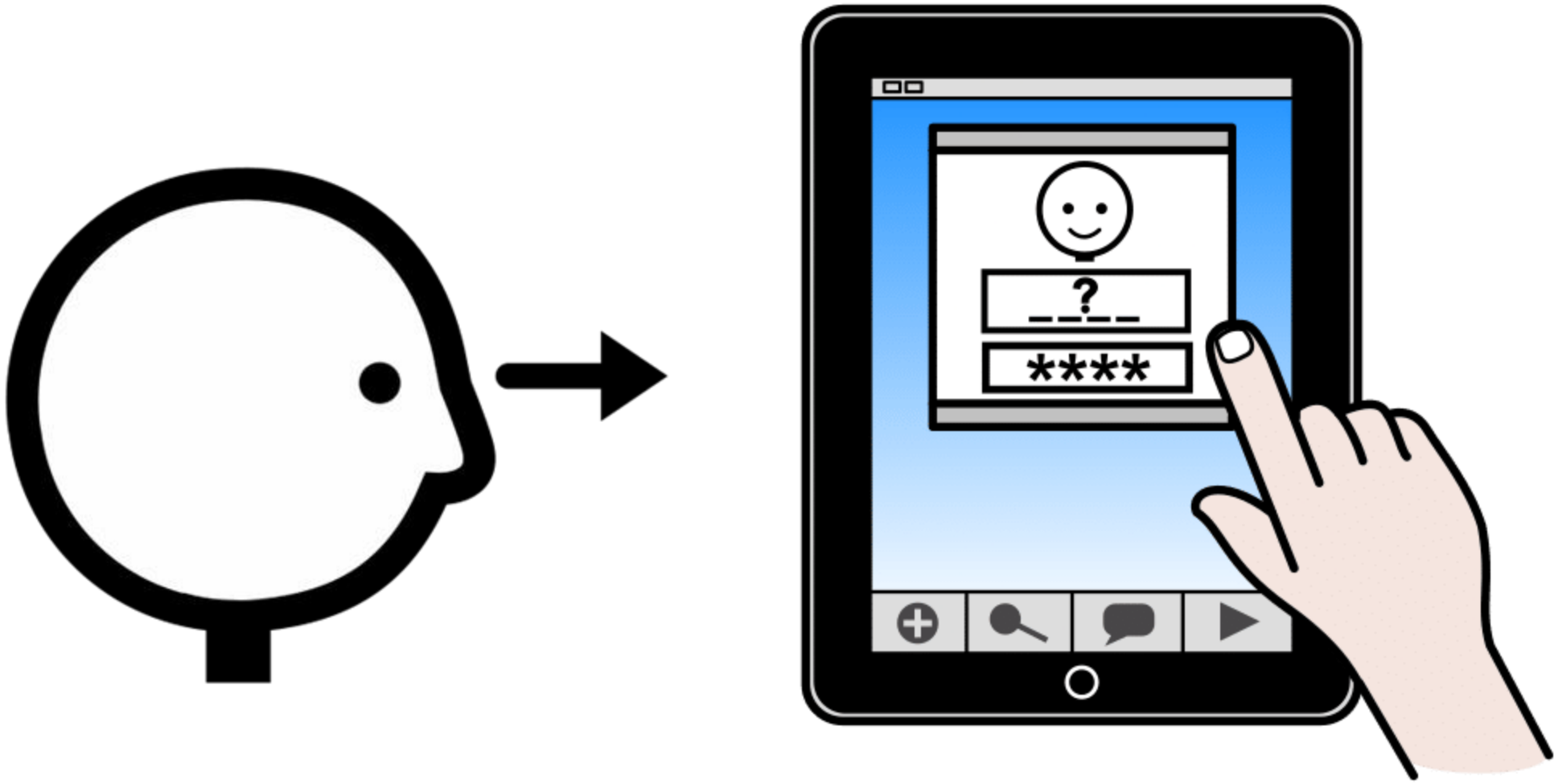
To present acoustic evidence of the maintenance of /Cʎ/ consonant clusters in Ribagorzan Aragonese.

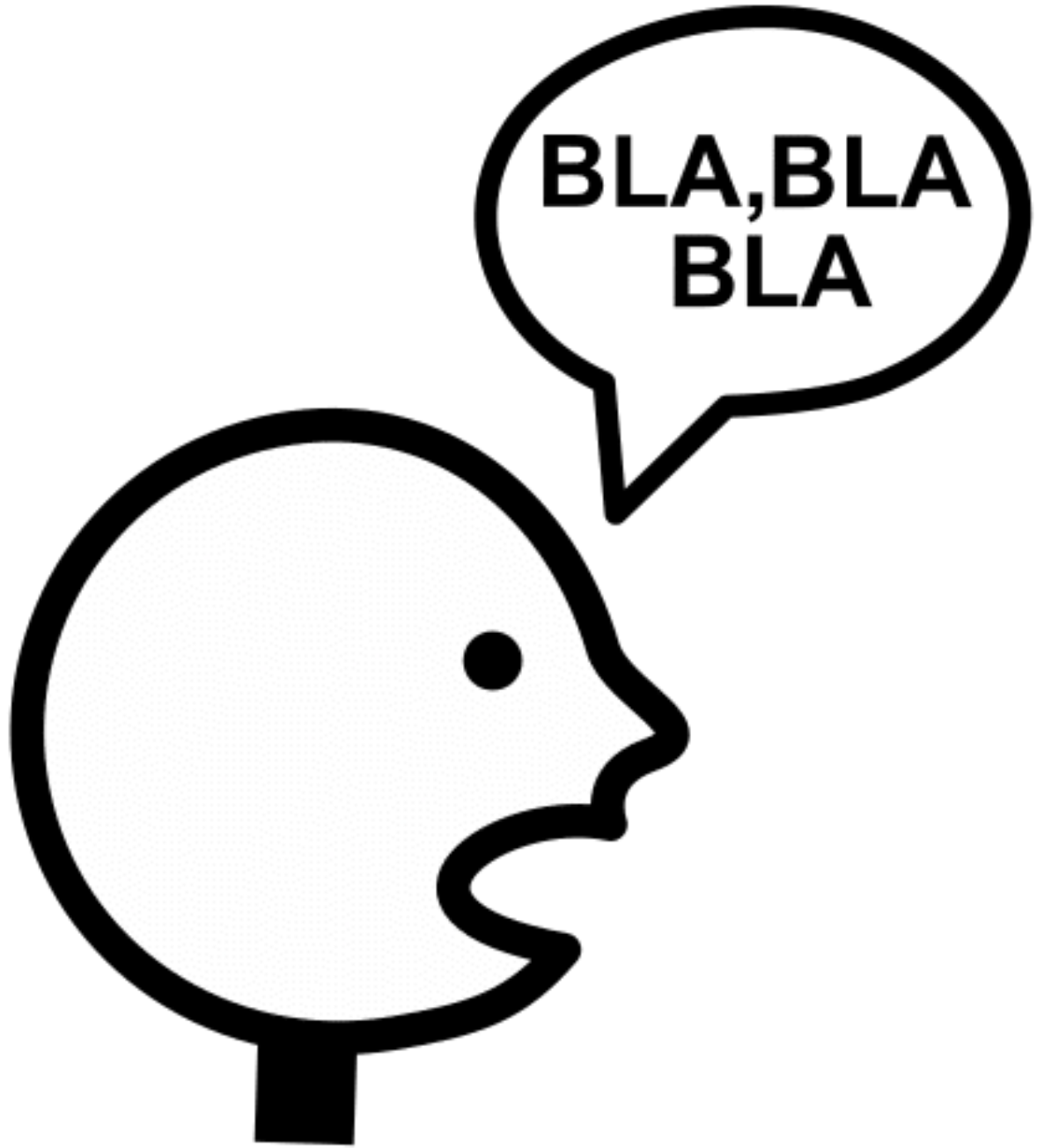
To describe the phonetic variation present synchronically.

Identify the seeds of the changes that led to the various Romance outcomes, e.g. Galician /ʧ/*ave*, Italian /kj/*ave*, Castilian Spanish /ʎ/*ave*.

Fieldwork

COSER: Corpus Oral y Sonoro del Español Rural




BLA,BLA
BLA

Stimuli

Lat. /#Cl/ > /#Cʎ/: CLAVEM > cllau, FLOREM > fllor…

Lat. /VlV/: pala

Lat. /#l/ > /#ʎ/: LUPUM > llop, LAVARE > llavar

/ʌ#/: ALIUM > all, CAPILLUM > cabell

Participants

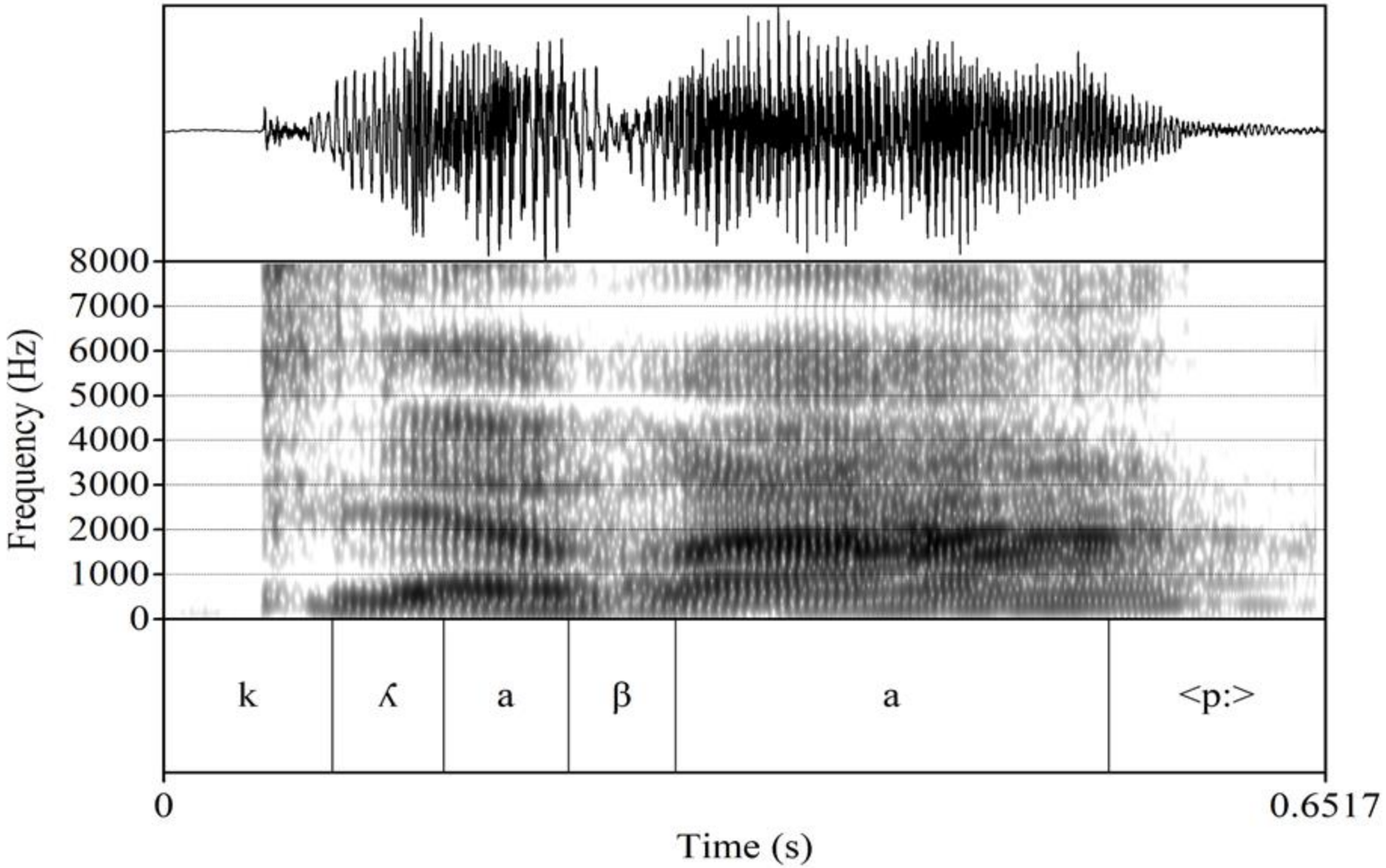
7 participants.

From: Sopeira, Bonansa, Serraduy, and Ciscar.

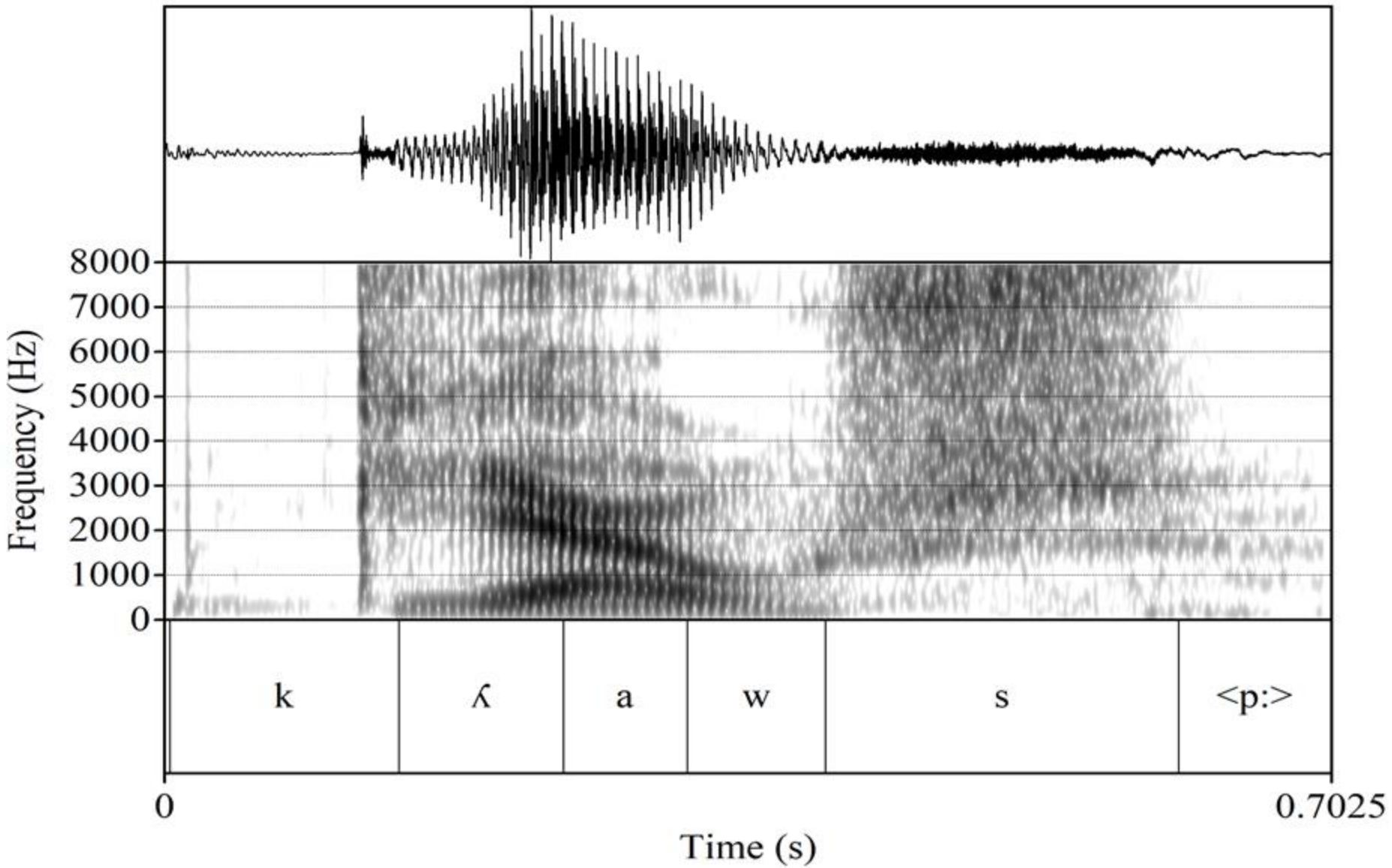
Aged between 72 and 96 years old.

Spectrograms

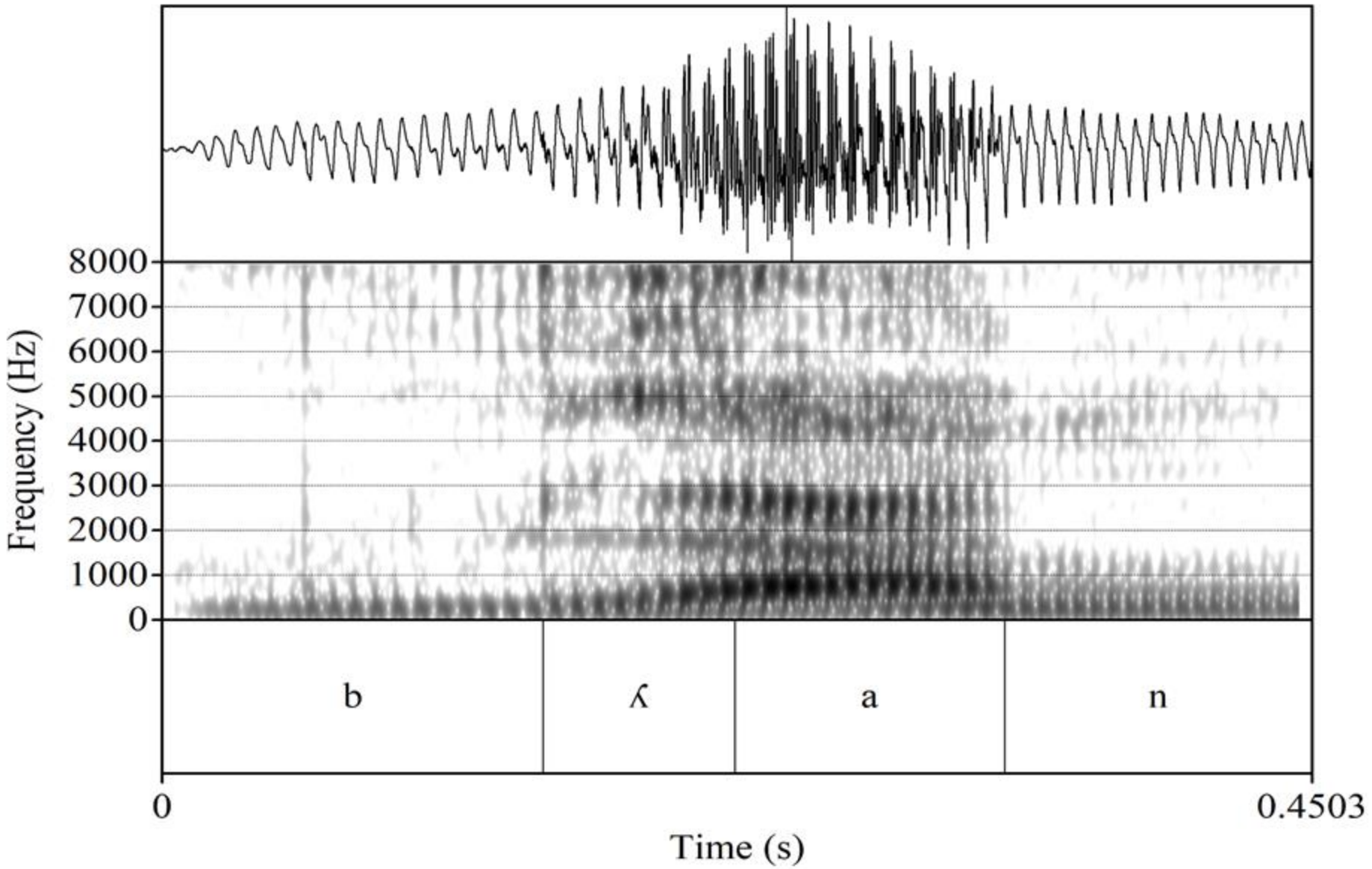
/Cʎ/ maintenance



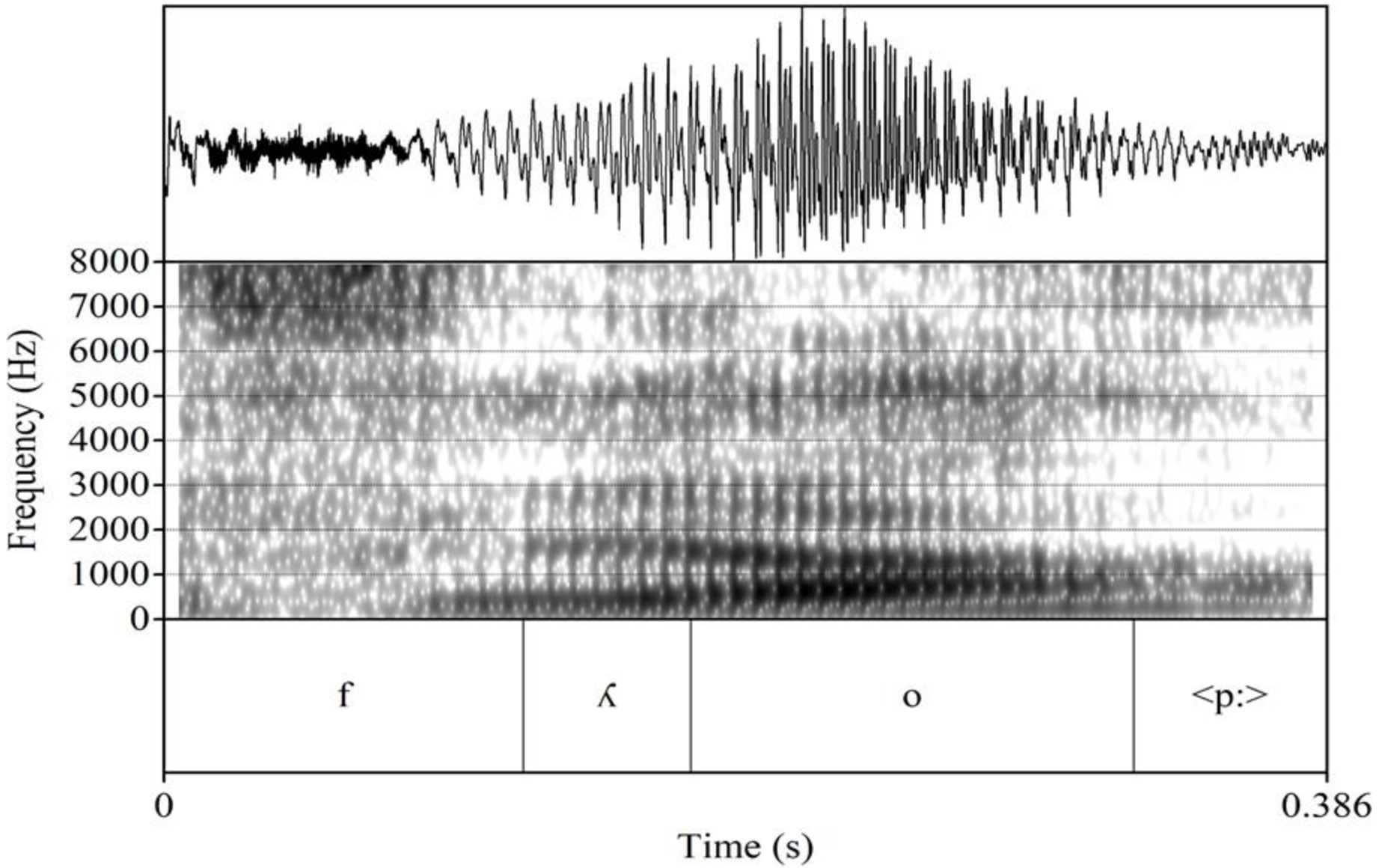
/CʎV maintenance



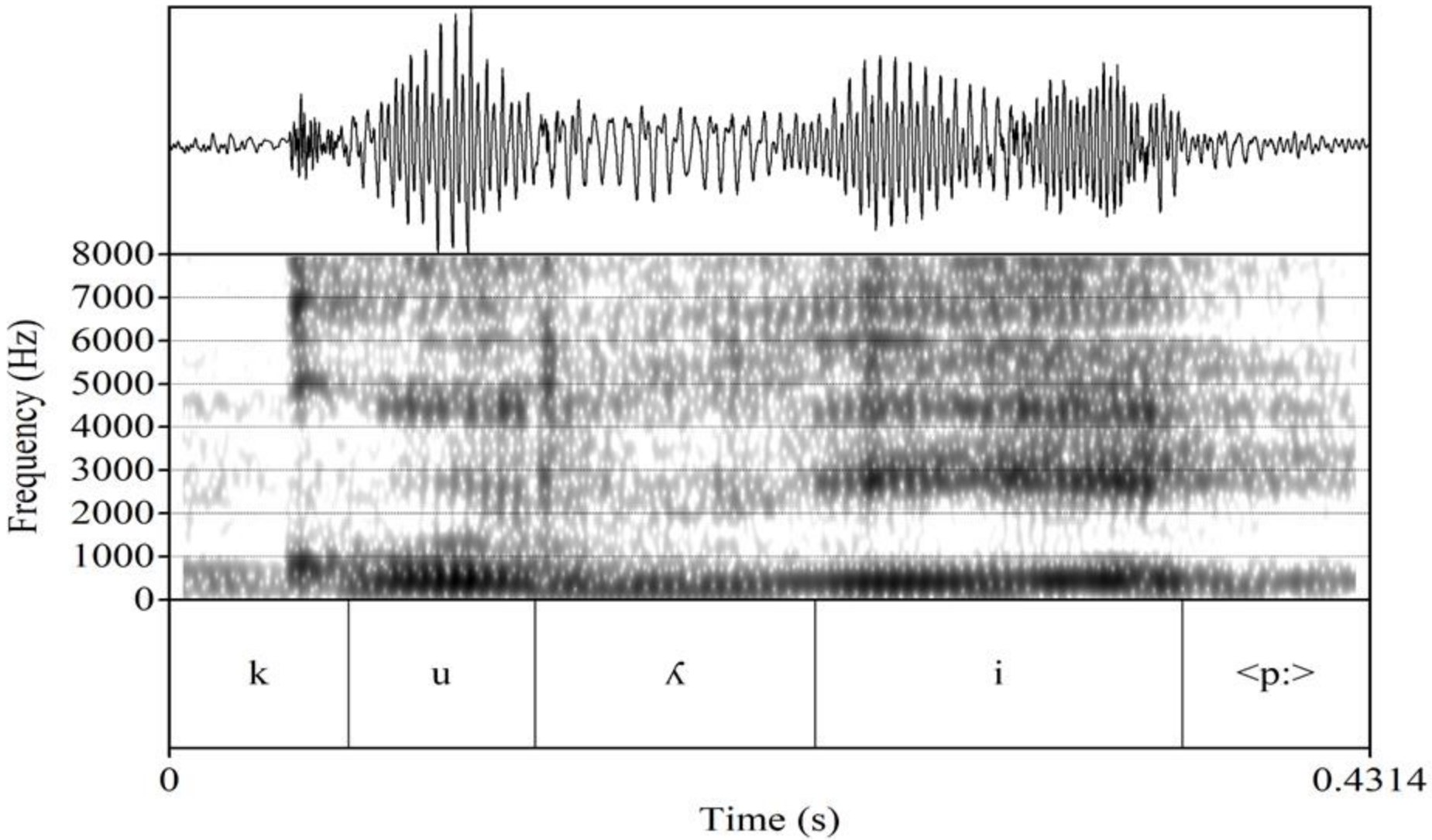
(Semi)vocalic offset, little to no lateralization



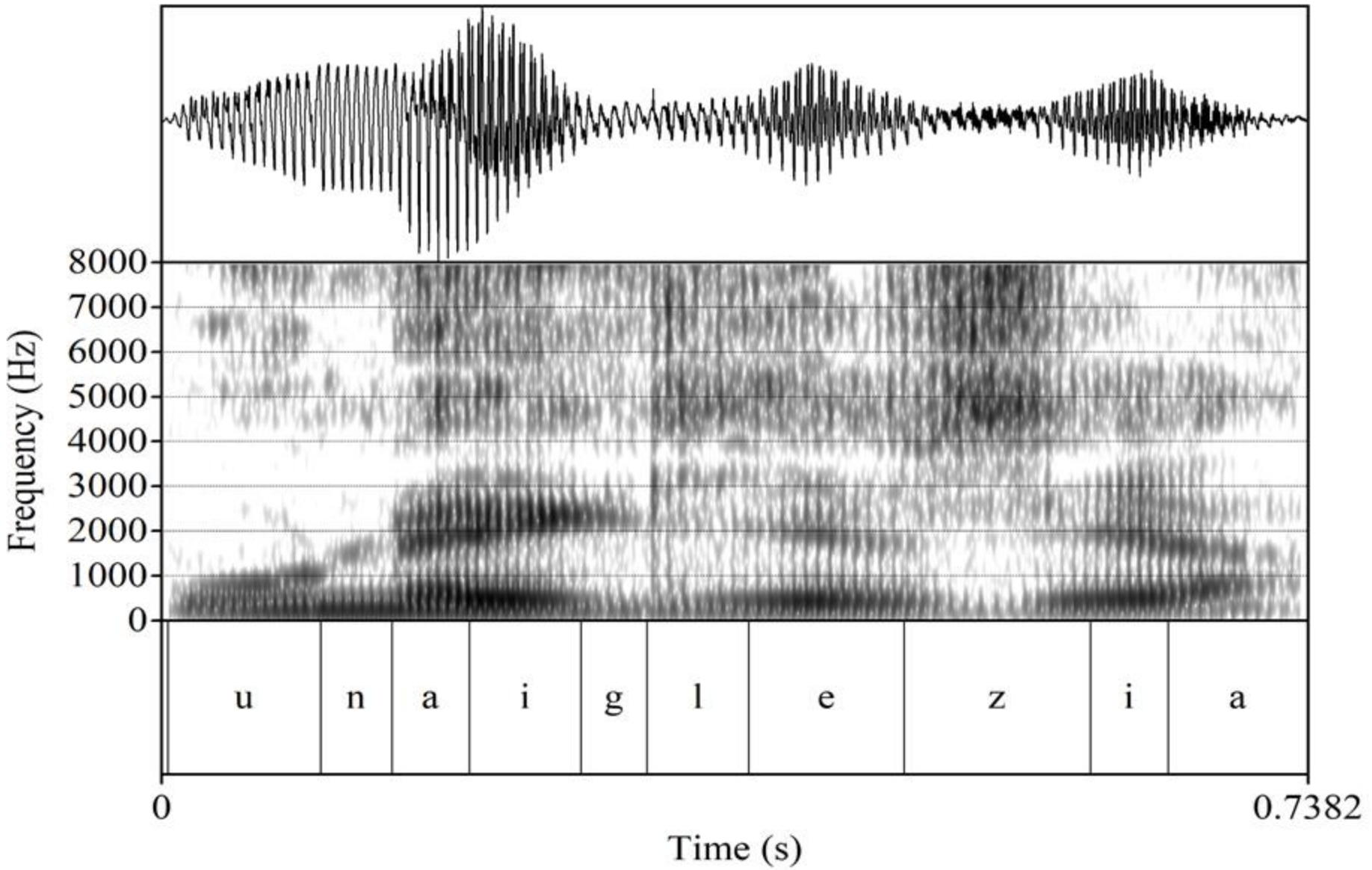
(Semi)vocalic offset, little to no lateralization



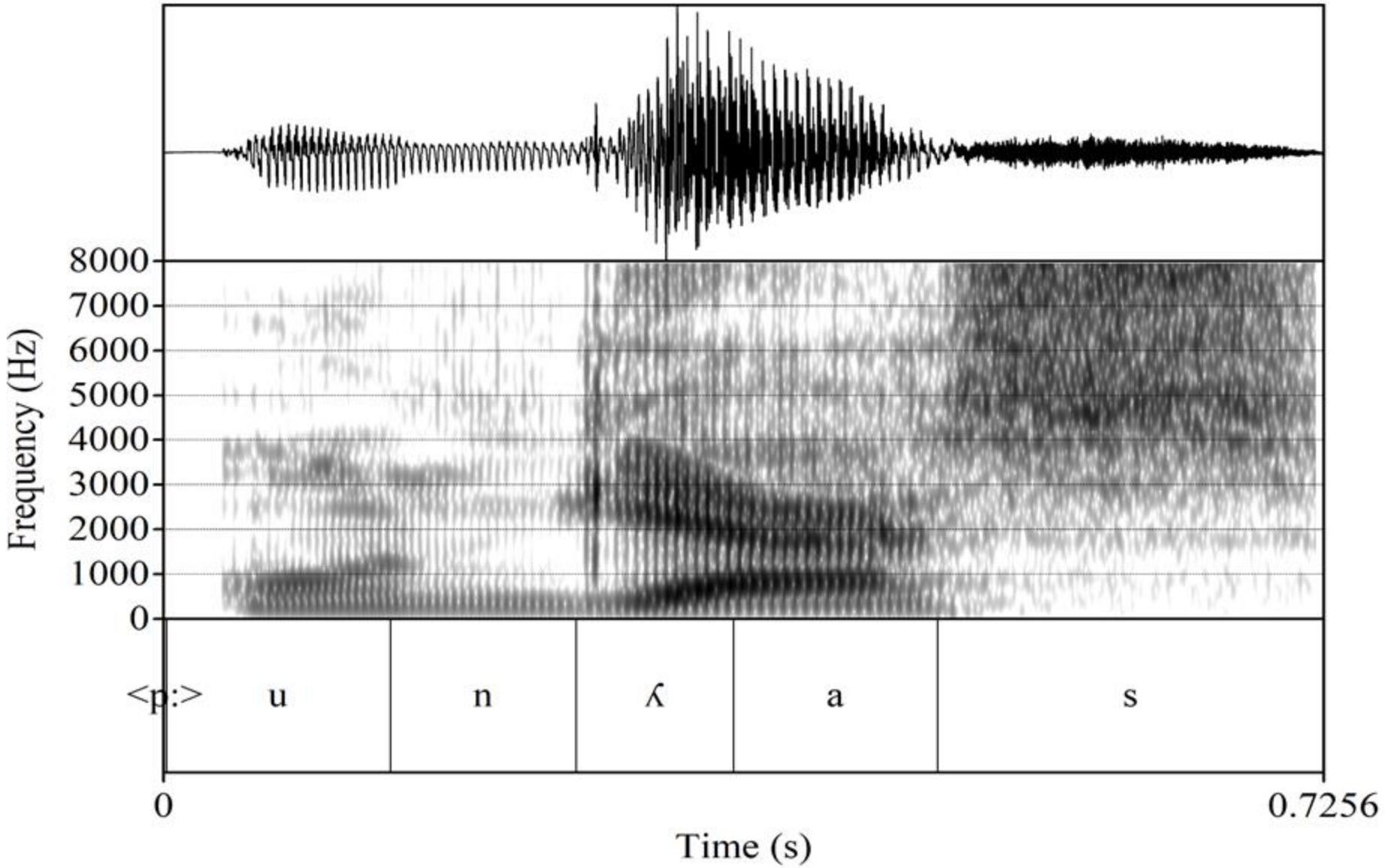
Palatal (lateral) with an aperiodic component



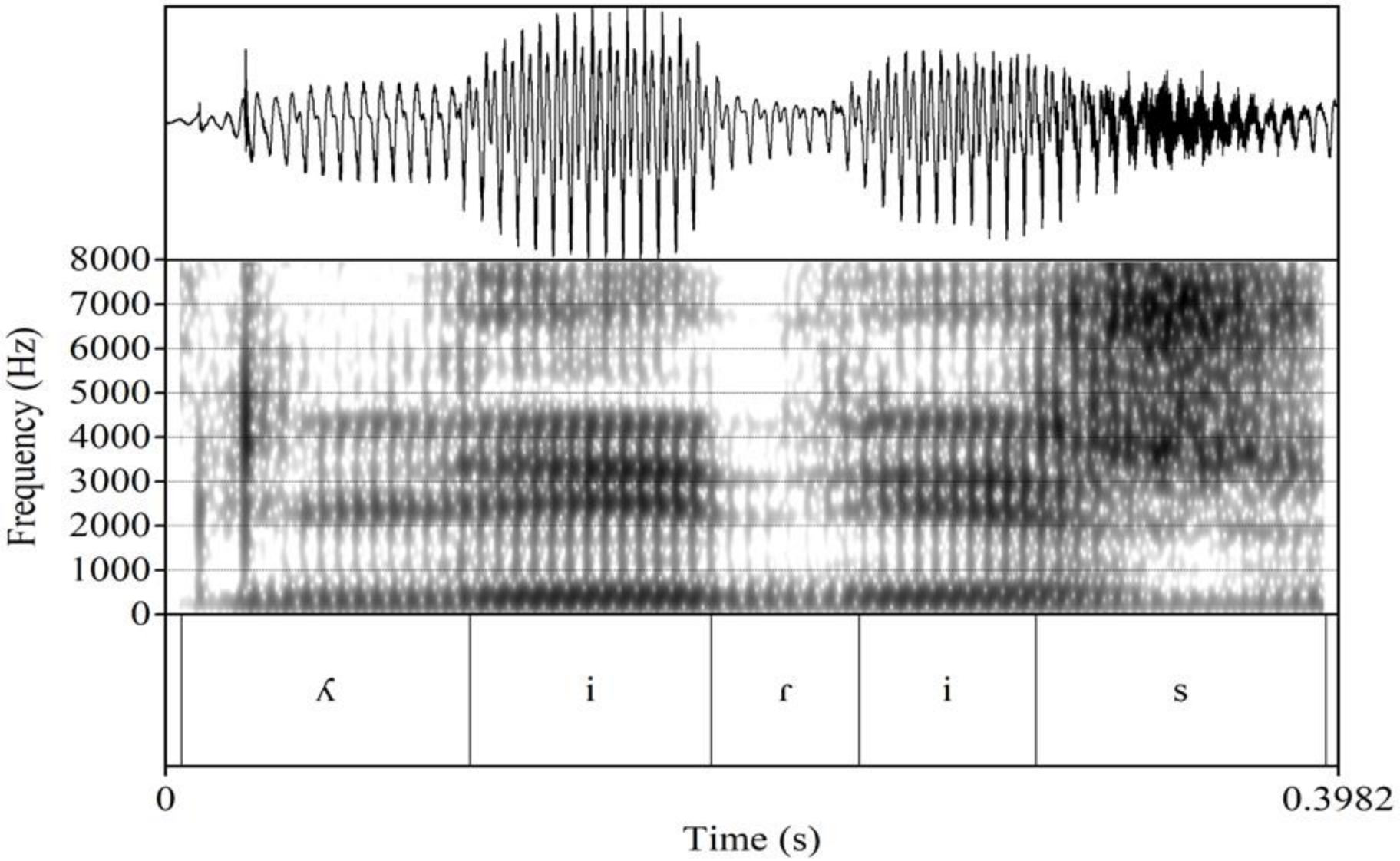
Palatal (lateral) with an aperiodic component



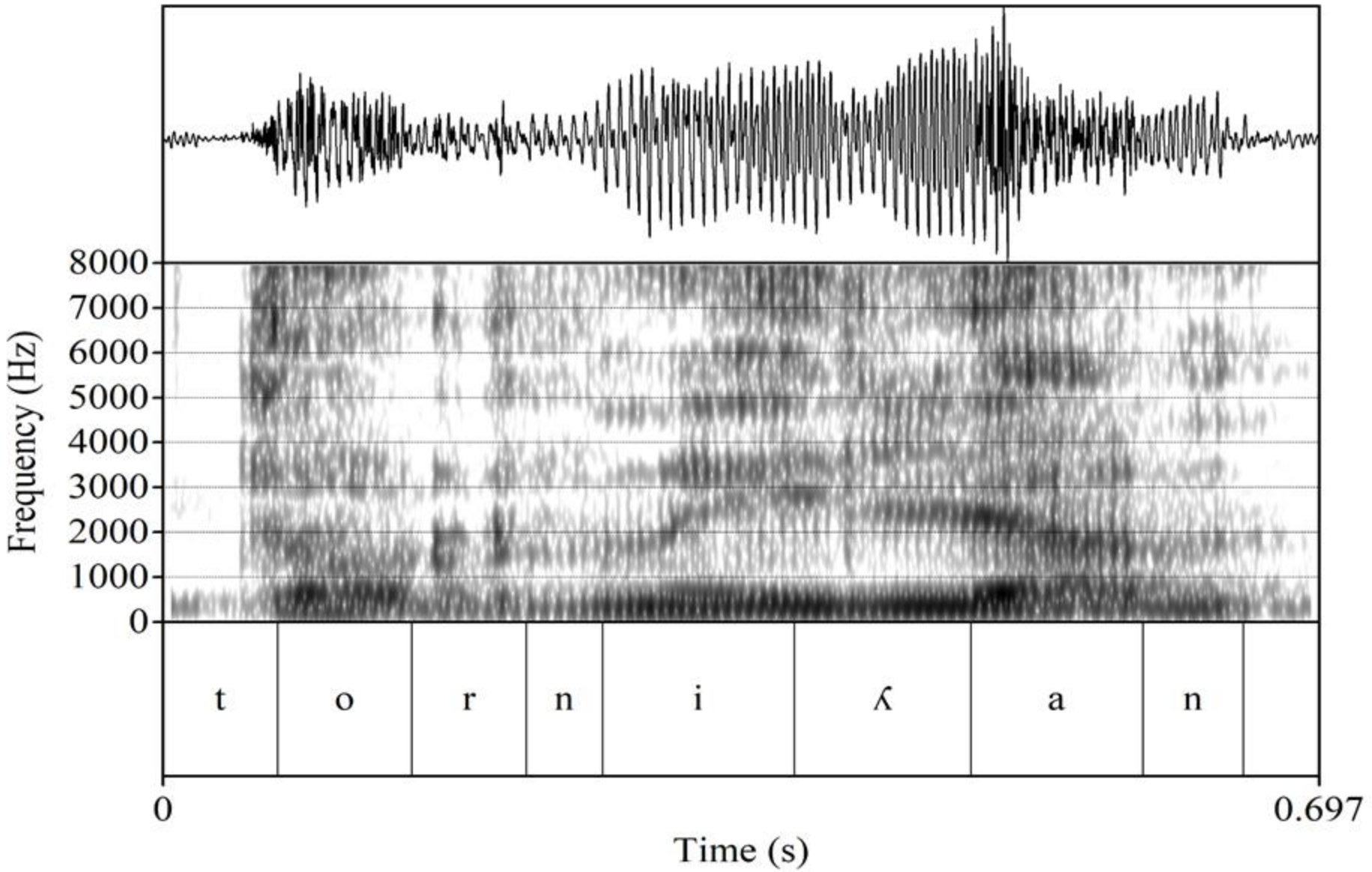
Palatal (lateral) with a stop-like burst



Palatal (lateral) with a stop-like burst



Palatal (lateral) with a stop-like burst



Discussion

- There are /Cʎ/ clusters in Ribagorzan
  - …with multiple synchronic phonetic realizations.

- A language that is structurally similar to a past language can be of key interest for phonological reconstruction of a sound change.

- Ribagorzan is a minority and endangered language that can be crucial to problems of typology and general phonological theory.

Next steps: Acoustic analysis

- Relative amplitude: Glides vs. consonants?
- Autocorrelation: Voiced vs. voiceless.
- F2 of the onset of the following vowel: palatal vs. alveolar place of articulation.

Adaptation of CL clusters into Basque

Unexpected obstruent loss in initial CL clusters

CC clusters and the Sonority hierarchy

- Most of the work on tautosyllabic consonant clusters explains a cross-linguistic preference for obstruent–sonorant (OR) onset clusters over other cluster types in terms of the sonority hierarchy.

Sonority hierarchy

vowels > glides > liquids > nasals > obstruents

high sonority ——————————————— *low sonority*

Organization of consonant clusters

- Sonorants (vowels, glides, liquids, nasals) are more sonorous than obstruents (fricatives, affricates, oral stops).
- In the organization of tautosyllabic consonant clusters:

Sonority Sequencing Generalisation (SSG)

Between any member of a syllable and the syllable peak, a sonority rise is preferred over a sonority plateau or a sonority fall.

- OR onset clusters have a rising sonority profile, claimed to be favored over sonority plateaus or sonority falls.

CL clusters in loanword adaptation

When languages without consonant clusters borrow words

- with word-initial TR onsets (T = oral stop):

  An epenthetic vowel: TVR

- with word-initial #ST clusters (S= sibilant):

  A prothetic vowel: VST

- Perceptual similarity (Fleischhacker 2001, 2005):
  - initial TR clusters are perceptually more similar to TVR than VTR.
  - initial ST clusters are more similar to VST than to SVT sequences.

General pattern in loan phonology: #ORV >> #OVRV

	language	*loanword*	*source*	
a.	Pitjantjatjara/ Yankunytjatjara	kalatji	Eng.	glass
		kilina		clean
		pilangkita		blanket
		purita		bread
		tarangka		drunk
		tarapula		trouble
b.	Rotuman	keresi	Eng.	grace
		kilaka		clerk
		purumu		broom
		paraisi		prise
		tarako		dragon
		taraku		truck
c.	Tzotzil	kurus	Sp.	cruz ‘cross’
		pulatu		plato ‘dish’
d.	Popoluca de Texistepec	kunus	Sp.	cruz
		päläät		plato

CL clusters in loanword adaptation

- Nevertheless, some languages are reported to regularly resolve word-initial OR clusters in loans by deleting the first obstruent.

- In these languages, words and syllables cannot begin with CC clusters.

- Well-established examples of this include Finnish and Ch’ol loanword adaptation patterns.

Unexpected and rare loan phonology: #ORV >> #RV

	language	*loanword*	*source*		*lost obstruents*
a.	Finnish	ruhtinas	Gmc	*druhtinaz ‘lord’	[d]
		ranta	Gmc	strand ‘beach’	[st]
		risti	Old Russ.	křistŭ ‘cross’	[k]
		luostari	Sw.	kloster ‘monastery’	[k]
		lyijy	Sw.	bly ‘lead’	[b]
b.	Ch’ol	rus	Sp.	cruz ‘cross’	[k]
		lawuʃ	Sp.	clavos ‘nails’	[k]
		latu	Sp.	plato ‘dish’	[p]
		lesia << glesia	Sp.	iglesia ‘church’	[g]

Why are these unexpected?

- Acoustic cues for the initial obstruents are expected to be stronger than those for the sonorants.
- Maintenance of the obstruent results in a larger sonority rise (OV vs. RV) (cf. Clements' (1990) sonority cycle).
- Loss of the initial obstruent results in massive neutralization, while retention preserves more lexical contrasts.
- There is no obvious reason why these languages would not employ vowel epenthesis, as some related languages do.

Romance CL clusters in Basque

- An initial OR cluster is simplified, with loss of the initial obstruent.

Main difference:

- This process only affects OL (L= lateral) in Basque.

Initial obstruent loss in Basque loans from Romance

cluster	*Latin*	*Basque*	
/pl/	plācet	laket	‘(to be) pleasing’
	plānca	langa	‘board, bar’
	plānu(m)	lau(n) < *lanu	‘flat, plain’
	plantātu(m)	landatu	‘to plant’
	plūma	luma	‘feather’
/fl/	flamma	lama	‘flame’
	flōre(m)	lore	‘flower’
/kl/	clāru(m)	laru	‘bright, clear/yellow’
	Claudiānu(m)	Laudio	(proper name)
/gl/	glōria	loria	‘glory’

Unexpected obstruent loss

- The apparent loss of initial obstruents in Basque borrowings from Romance is striking.

- Proto-Basque is generally reconstructed as lacking initial clusters.
  - However, the expected repair in loans, based on typology, phonology and phonetics, is copy-vowel epenthesis, not obstruent loss.

- As a matter of fact, other loanword adaptation mechanisms are also found in the language.

Vowel copy in old Basque loans

cluster	*Latin/Romance*	*Basque*	
/kl/	cleta	g<u>e</u>reta	‘grate, grating’
/pr/	presbyter	b<u>e</u>reter, b<u>e</u>retter	‘priest, cleric’
/br/	libru(m)	lib<u>u</u>ru	‘book’
/fr/	fronte(m)	b<u>o</u>ronde, b<u>o</u>ronte	‘forehead, front’
/kr/	cruce(m)	g<u>u</u>rutze	‘cross’
	lucru(m)	luk<u>u</u>ru	‘profit, gain’
	christiānu(m)	g<u>i</u>ristiño	‘Christian’
/gr/	grānu(m)	g<u>a</u>rau(n) < *g<u>a</u>ranu	‘grain’

Basque loans with OR *clusters intact*

cluster			*source*	
/pr/	premia	‘necessity’	Sp.	premia
/br/	branka	‘prow’	Sp.	branca
/pl/	plen	‘abundant’	Gasc.	plen
/bl/	bleta	‘chard’	OFr.	blet ‘grain’
/tr/	tren	‘train’	Sp.	tren
/dr/	droga	‘drug’	Sp.	droga
/kr/	kristau	‘Christian’	Sp.	cristiano
/gr/	gramu	‘gram’	Sp.	gramo
/kl/	kloka	‘broody hen’	*klɔka (cf. Gasc. *clouque* /kluka/)	
/gl/	gloria	‘glory’	Sp.	gloria

Recent Basque loans with epenthesis in /Ol/ *clusters*

cluster			*source*
/bl/	bulia, bilia, bili	‘wheat’	MFr. blé
/kl/	bizikeleta	‘bicycle’	Sp. bicicleta
	koloka	‘broody hen’	*klɔka (cf. Gasc. *clouque*)
/gl/	erregela	‘rule’	Sp. regla
	Ingalaterra	‘England’	Sp. Inglaterra

Why /l/ then?

Simplest explanation of the obstruent loss:

- Borrowing from a Romance language after /Ol/ > /Oʎ/ > /ʎ/.

- In early loans, /ʎ/ is borrowed as Basque /l/, not /ʎ/ or /j/:
  - At the time of borrowing, neither /ʎ/ nor /j/ were contrastive, but /l/ was.
  - /l/ was, arguably, the perceptually closest matching phoneme at the time.

Romance #Ol > #Oʎ > #ʎ, #ʧ

cluster	*Latin*	*Castilian*	*Galician*	
/pl/	plorāre	llorar	chorar	‘lament, weep’
	plānu(m)	llano, llana	cha, chan	‘flat, plain’
	plicāre	llegar	chegar	‘fold, arrive’
	plāga	llaga	chaga	‘wound, sore’
	plantāre	(plantar) > OSp. llantar		‘to plant’
	plūma	(pluma) > OSp. lluma(zo)		‘feather’
/bl/	—	—		
/fl/	flamma	llama	chama	‘flame’
	flōre(m)	(flor) > OSp. llor(o)	chôr > Port. chôr	‘flower’
	flōrētu(m)	Lloredo		(name (top.))
/kl/	clāmāre	llamar	chamar	‘proclaim, call’
	clāve(m)	llave	chave	‘key’
	*kloka	llueca > Non-St. llueca	choca	‘broody hen’
/gl/	glānde(m)	llande > Asturian llande		‘acorn’
	glattire	latir		‘beat’

Basque /l/-initial loans from Romance/ʎ/-initial words

lau(n) < *lanu << *ʎanu < *pʎanu	cf. Lat.	planu(m)	‘flat, plain’
lama << ʎama < *fʎama		flamma	‘flame’
lore << *ʎore < *fʎore		flōre(m)	‘flower’
loria << *{ʎ,l}oria < *g{ʎ,l}oria		glōria	‘glory’

- One implication of this analysis is that Romance forms like *ʎore ‘flower’ and either *loria or *ʎoria ‘glory’ existed on the Iberian Peninsula close to Basque-speaking regions.
- In some cases, the absence of palatalized forms in modern Castilian and Galician may reflect re-borrowing from Latin after palatalization.

Conclusions

- The Basque case of initial obstruent loss is only apparent.
- Lateral-initial words were borrowed from Romance after having undergone palatalization and simplification of Latin /#Cl/ clusters.
- Evidence includes:
  - distinct behavior of direct loans from Latin
  - absence of /#Cr/ clusters in this category
  - the typological rarity of a loanword process of this type
  - the lack of phonetic explanation for the sound pattern

Latin CRUCEM >> *gurutze* ‘cross’, *krutze*, *grutze*, *kurtze*…

Conclusions

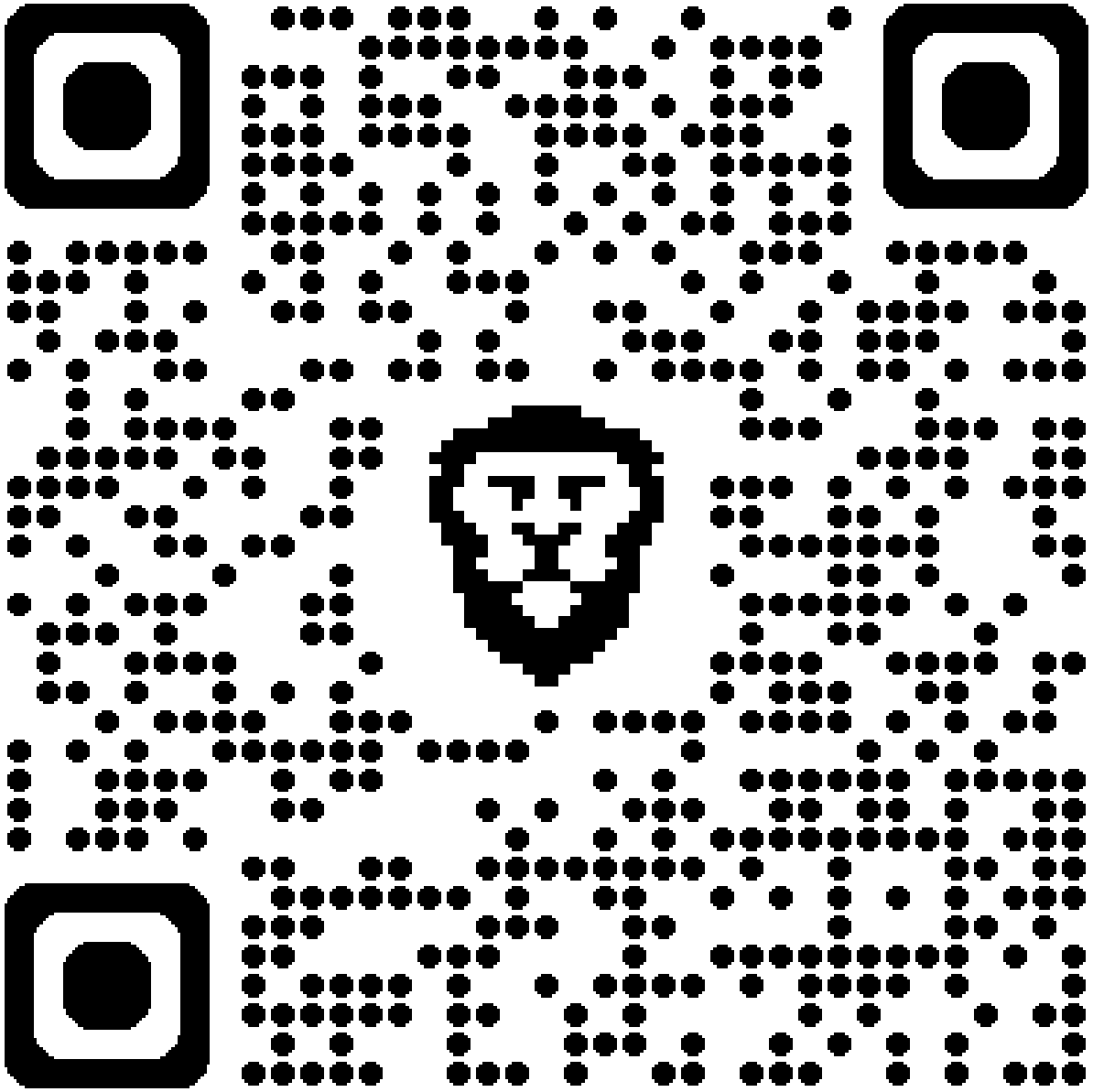
- The proposed analysis is highly language-specific and cannot be extended to the Finnish or Ch’ol loanword data discussed earlier.

- Future study of Uralic and Mayan should bring us closer to:
  - Understanding the specific conditions under which the role of sonority in cluster resolution is inactive.
  - A general theory of the transformations that can occur when words of one language are adopted naively by speakers of another.

Today's paper:

Blevins & Egurtzegi. 2017.
"Unexpected obstruent loss in initial obstruent–sonorant clusters: An apparent example from Basque",
Phonology 34, 507-522.

Open access here:
https://egurtzegi.github.io/papers/blevins_egurtzegi2017phonology.pdf



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