TYPOLOGICAL ASPECTS OF CONSONANT ARTICULATION

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INTRODUCTION

We have at present a good deal of knowledge about **consonant inventory types** (Maddieson, 1984) while being in need of more experimental data on

Consonant production characteristics/mechanisms

Consonant allophonic patterns

along the lines of work carried out by Ladefoged and colleagues (Ladefoged & Maddieson, 1996, Dart, 1991, Nartey, 1982).

This paper is a contribution to the knowledge of these aspects through the study of two research topics:

Typology of

places of articulation for (alveolo)palatal consonants

allophonic patterns for clear /l/ and dark /l/.

PLACE OF ARTICULATION TYPOLOGY

(ALVEOLO)PALATAL CONSONANTS

Research goal and working hypothesis

(Goal) Study on closure and constriction locations for (alveolo)palatal consonants based on linguopalatal contact and sagittal tongue configuration data (static palatography, EPG, X-ray, MRI) taken from the literature.

(Hypothesis) The traditional **'palatal'** consonant class ought to be subdivided into two independent consonant types:

- **'alveolopalatals'**, which are articulated simultaneously at the alveolar and palatal zones with the blade and predorsum,

- **'palatals'**, which are produced at the palatal zone with the dorsum of the tongue.

Data sample

Consonants

fricatives [ɕ], [ç]
lateral [ʎ]
oral stops [c], [ɟ]
nasal stop [ɲ].

Languages

[1]	**Romance**	(Catalan; French; Italian; Occitan; Portuguese; Romansh; Spanish);
[2]	**Germanic**	(German; Icelandic; Swedish), **Irish Gaelic**
[3]	**Slavic**	(Czech; Polish; Slovak), **Hungarian**
[4]	**African**	(Ibibio; Malagasy; Ngwo; Suto; Zulu)
[5]	**Australian**	(Arrernte; Walpiri)
[6]	**Eastern Asian**	(Chinese; Japanese)
[7]	**Other**	(Greek; Abkhaz).

		ɕ	ç	ʎ	c	ɲ	Total numbers per language group
1. Romance	contact	0	0	42	15	66	
	config	0	0	6	2	9	140
2. Germanic, Irish	contact	1	4	2	4	2	
	config	0	7	0	1	0	21
3. Slavic, Hungarian	contact	2	1	3	15	12	
	config	5	1	1	5	5	50
4. African	contact	0	0	0	1	4	
	config	0	0	0	1	0	6
5. Australian	contact	0	0	3	3	3	
	config	0	0	0	0	0	9
6. Eastern Asian	contact	9	1	0	1	3	
	config	3	0	0	0	0	17
Total numbers per consonant		20	14	57	48	104	243

Measurement criteria

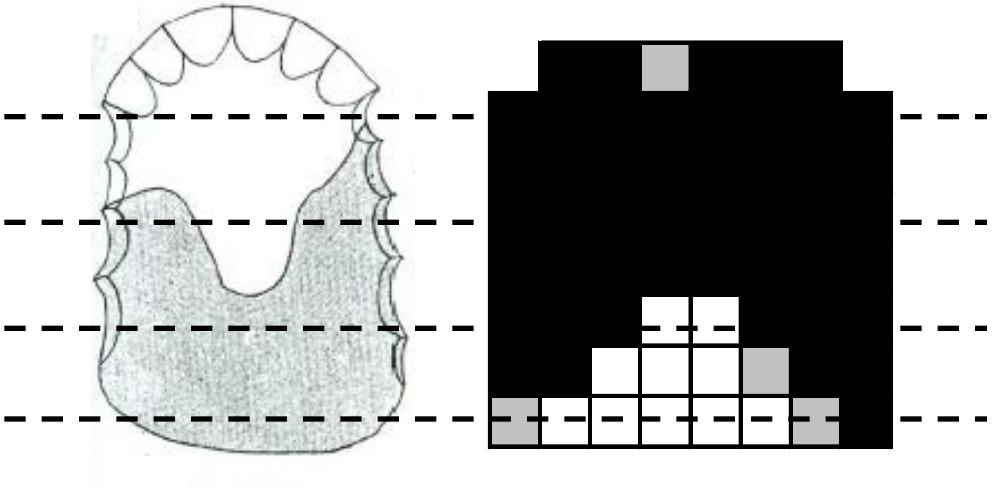
(Linguopalatal contact patterns)

-Contact percentages were computed at

25% over the median line (mid alveolar zone),
50% " (postalveolar-prepalatal zone),
75% " (prepalato-mediopalatal zone),
100% " (postpalatal zone).

-Closure or constriction placement was also identified at those zones.

Static palatography Electropalatography (EPG)



Alveolar

Postalveolo-prepalatal

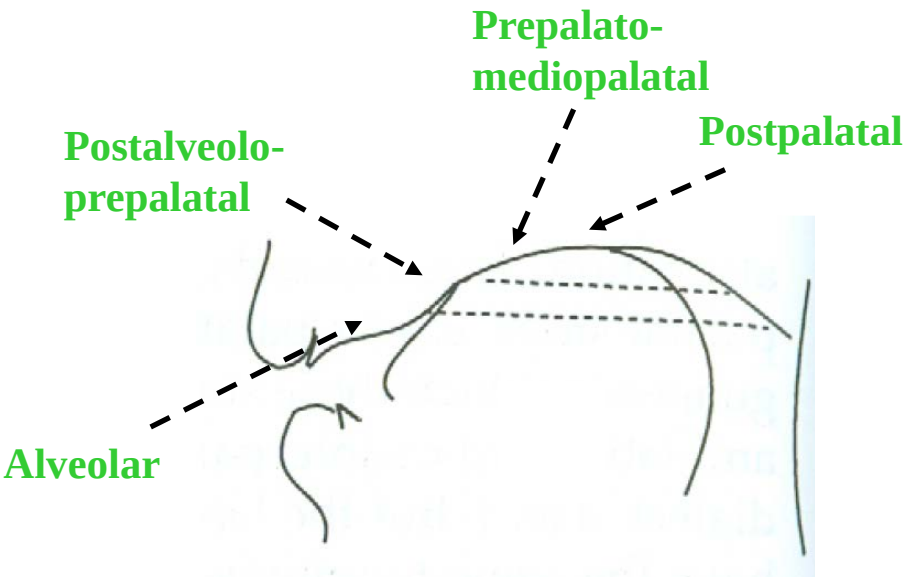
Prepalato-mediopalatal

Postpalatal

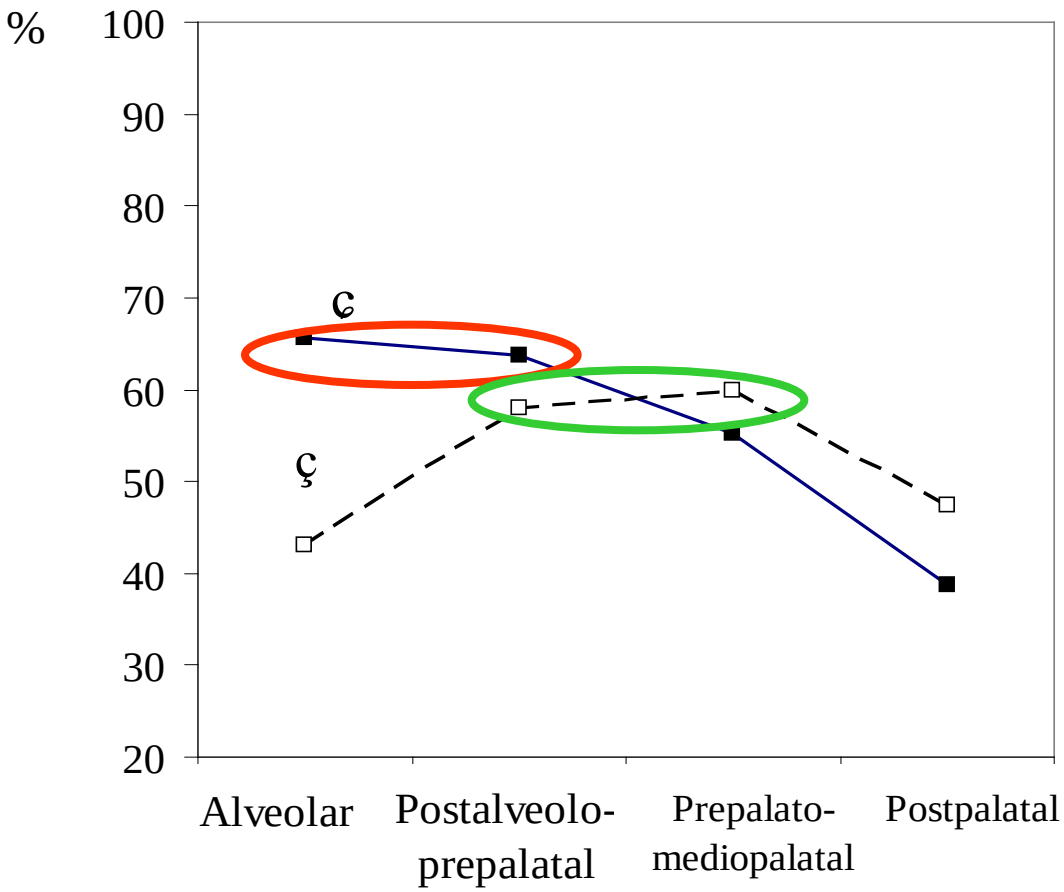
(Linguopalatal contact patterns, sagittal vocal tract configurations)

Closure or constriction placement was identified at the four articulatory locations (also at the dental zone).

Sagittal lingual configuration



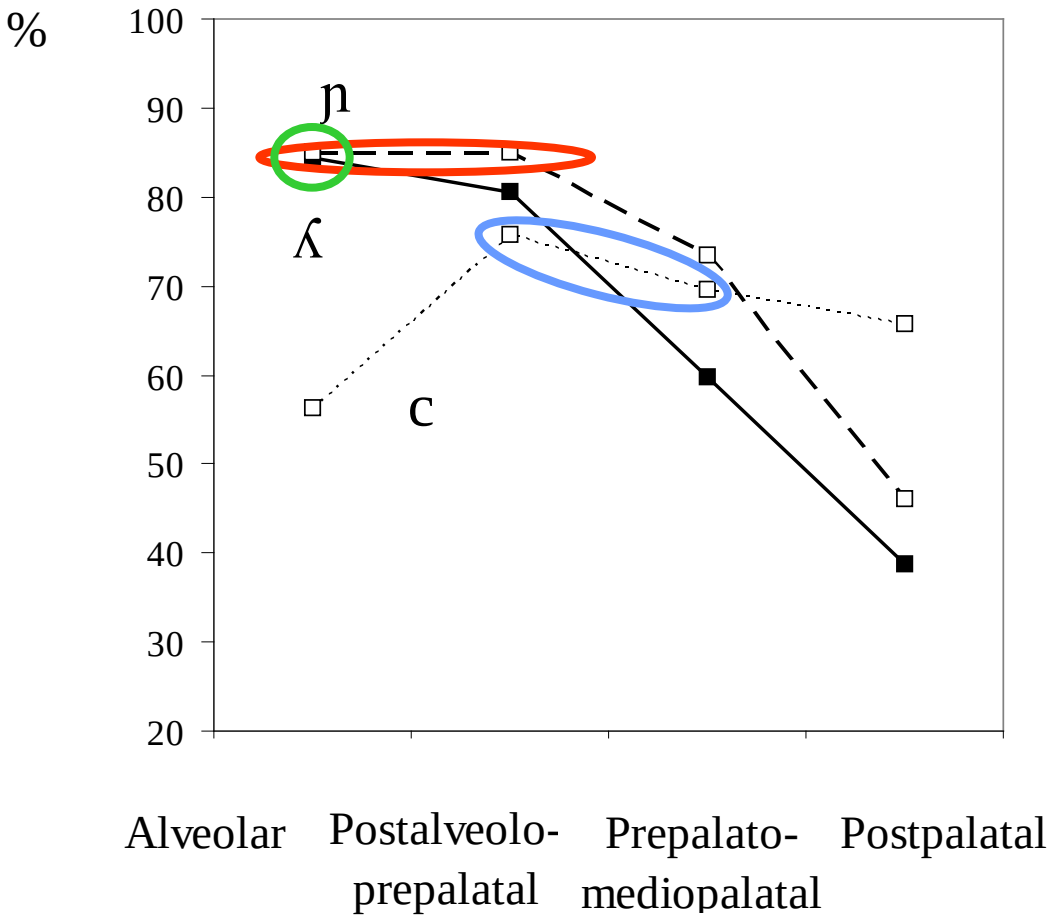
Cross-language linguopalatal contact percentages (fricatives)



[ɕ]
Alveolar,
Postalveolo-prepalatal

[ʂ]
Postalveolo-prepalatal,
Prepalato-mediopalatal

Cross-language linguopalatal contact percentages (stops, laterals)

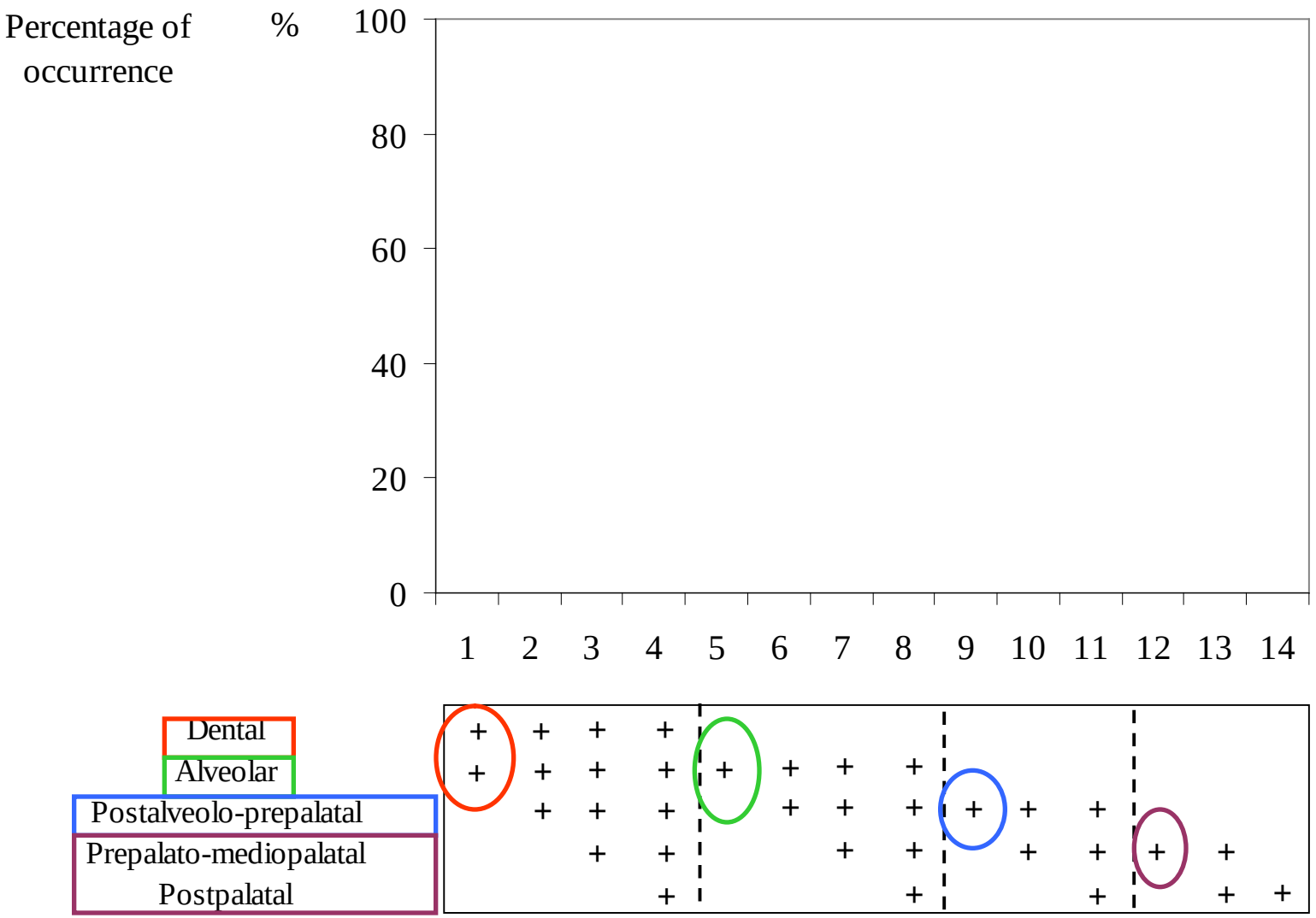


[ʎ]
Alveolar

[ɲ]
Alveolar, Postalveolo-prepalatal

[c]
Postalveolo-prepalatal, palatal

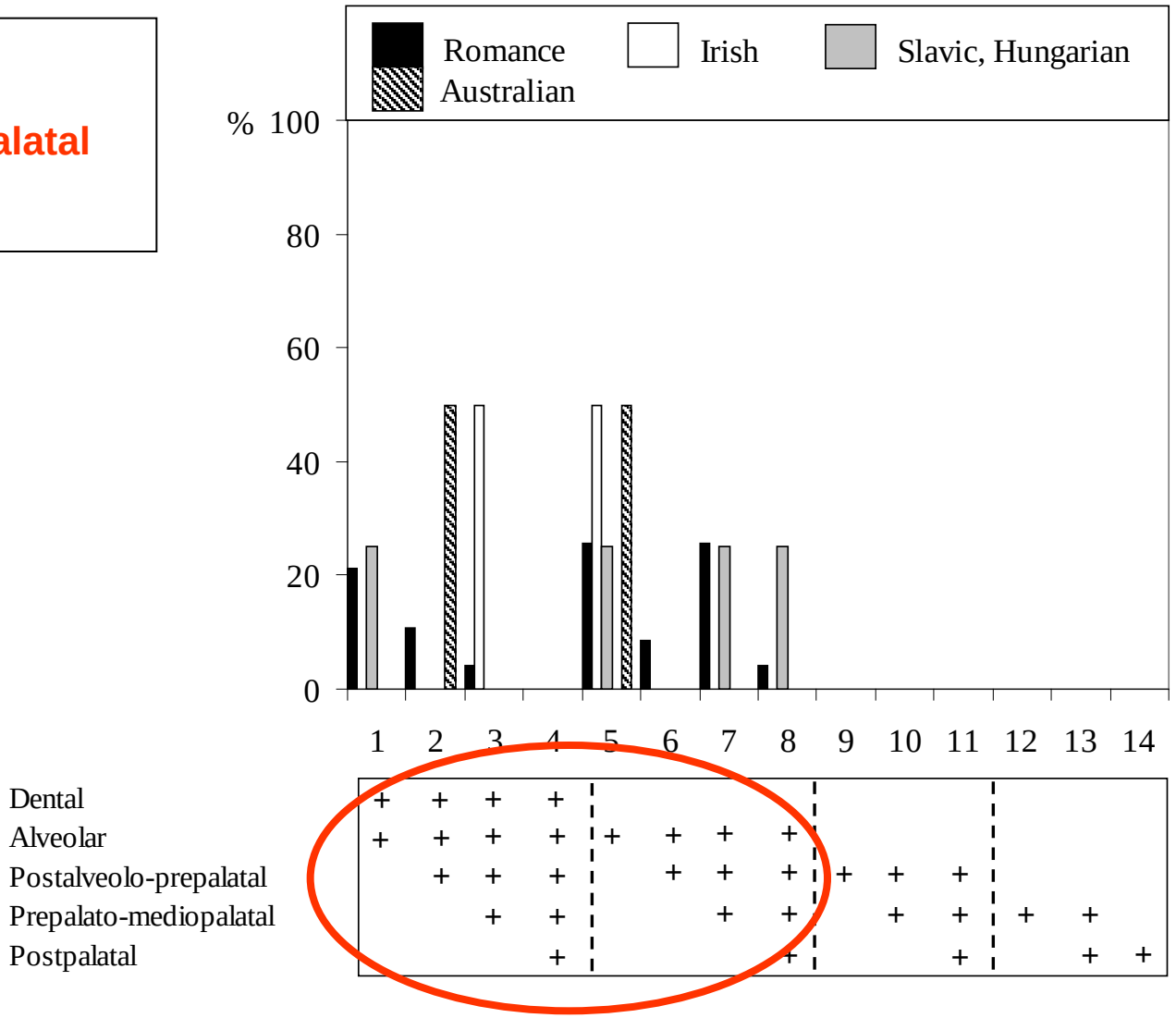
Closure/constriction location



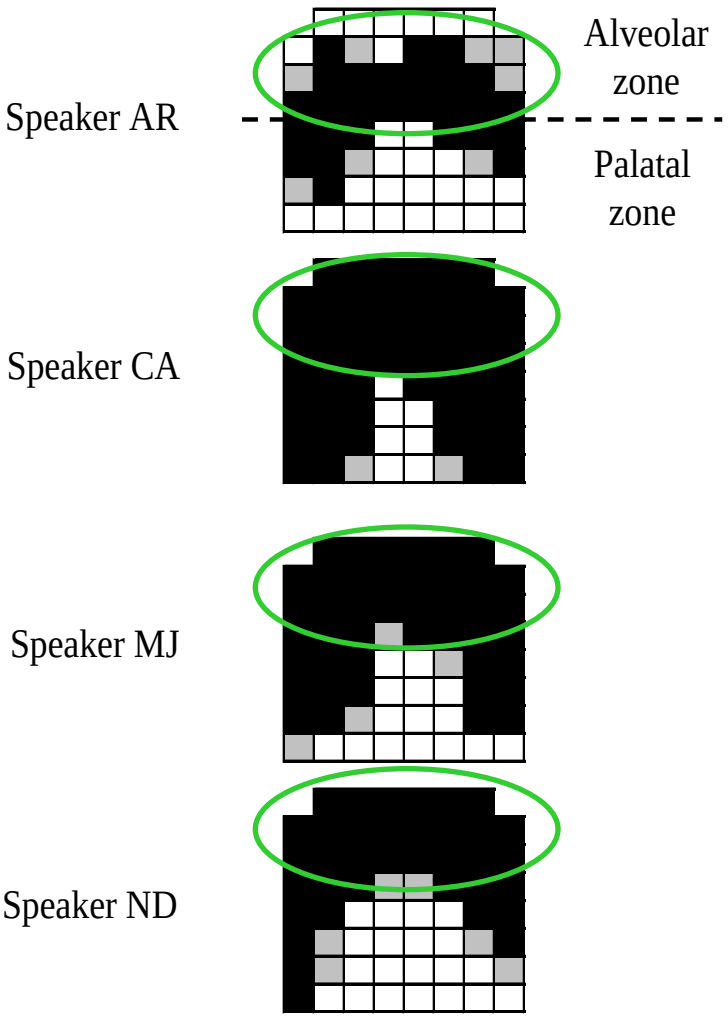
Closure/constriction location (lateral [ʎ])

(Dento)Alveolar,
(Dento)Alveolopalatal

All languages/dialects



Alveolar /ɾ/ in Majorcan Catalan (Recasens & Espinosa, 2006)



Closure location (stops [c, ɟ])

(Dento)alveolar
Australian

Alveolar, Alveolopalatal
Czech

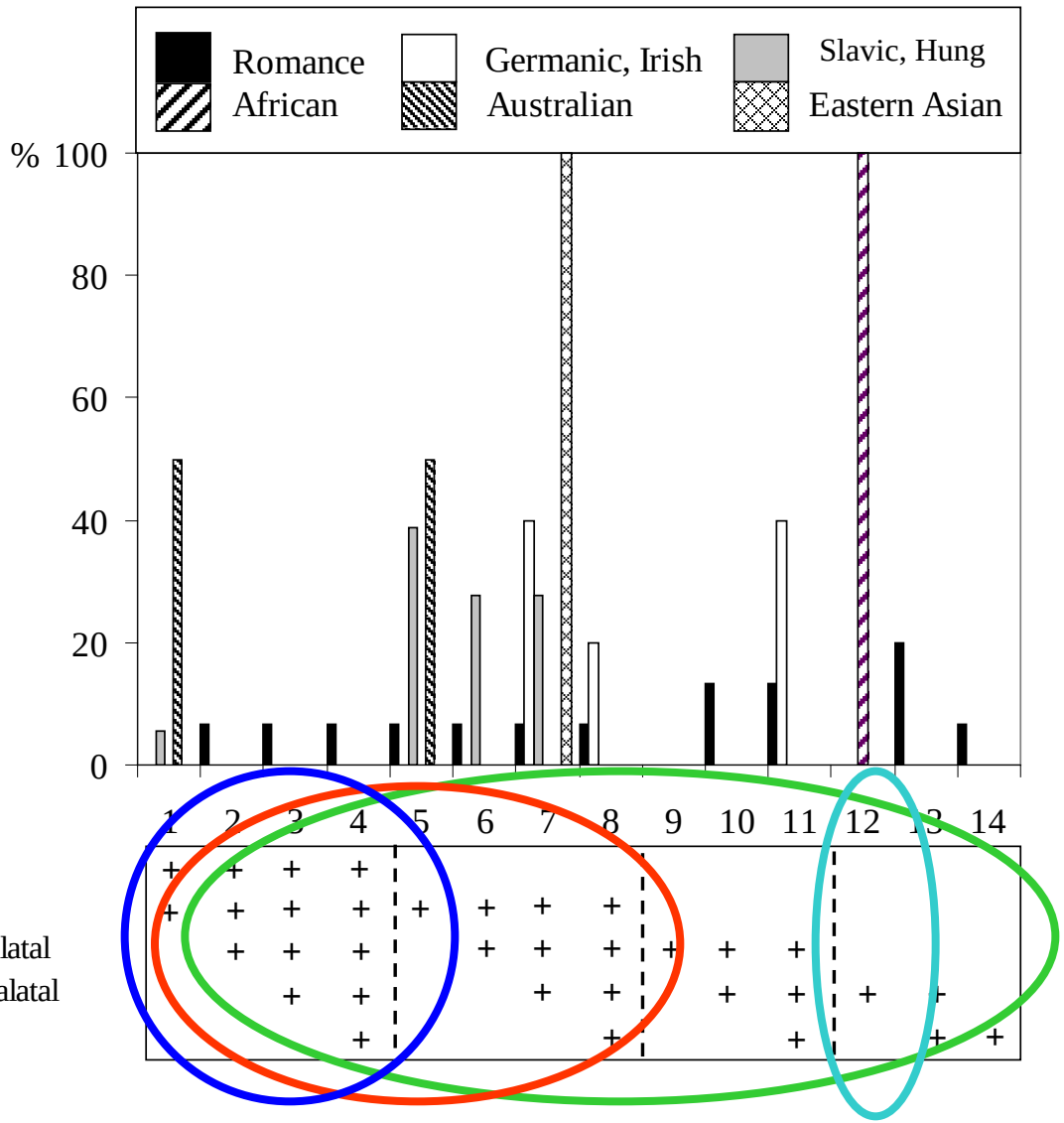
Alveolopalatal
Icelandic
Slavic, Hungarian
Chinese

Essentially all places

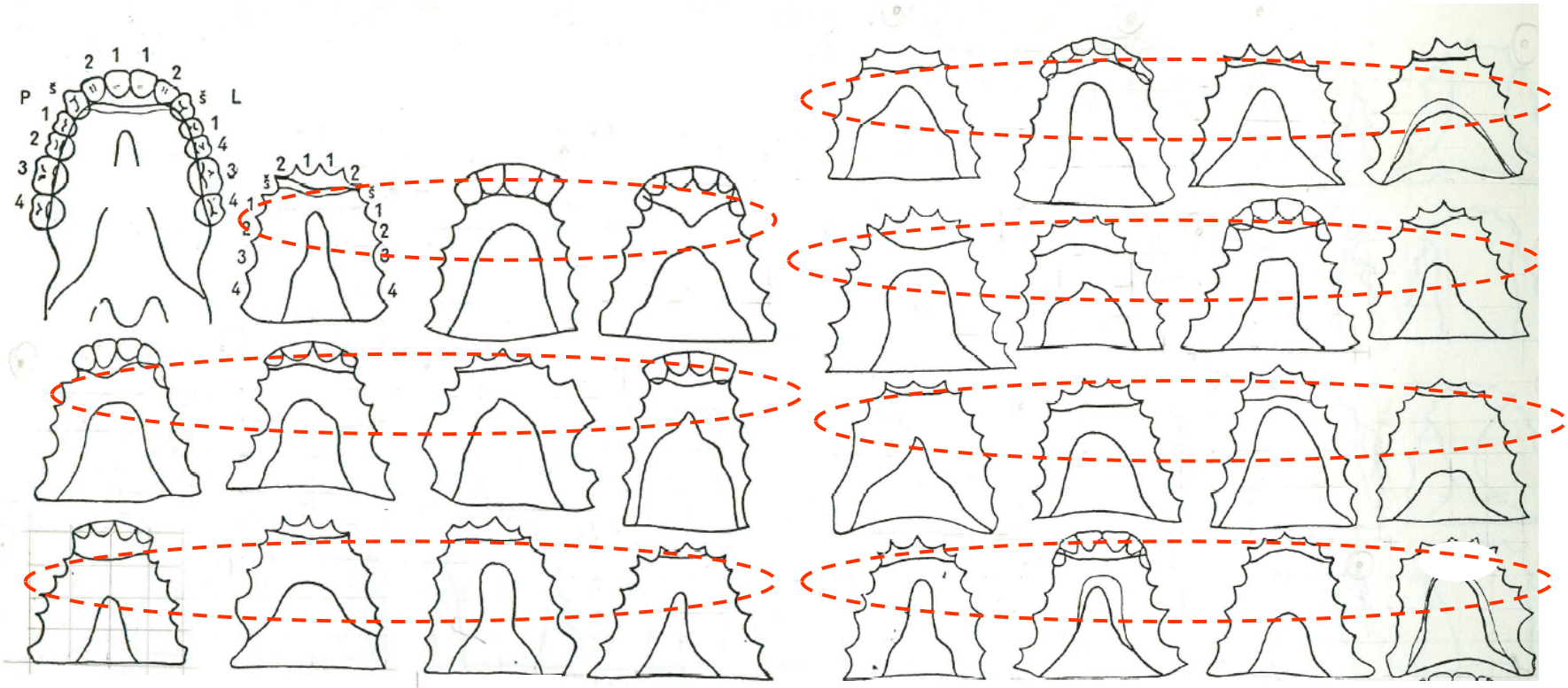
Romance (Parisian, Majorcan)
Irish

Palatal

African (Ngwo, Ibibio)

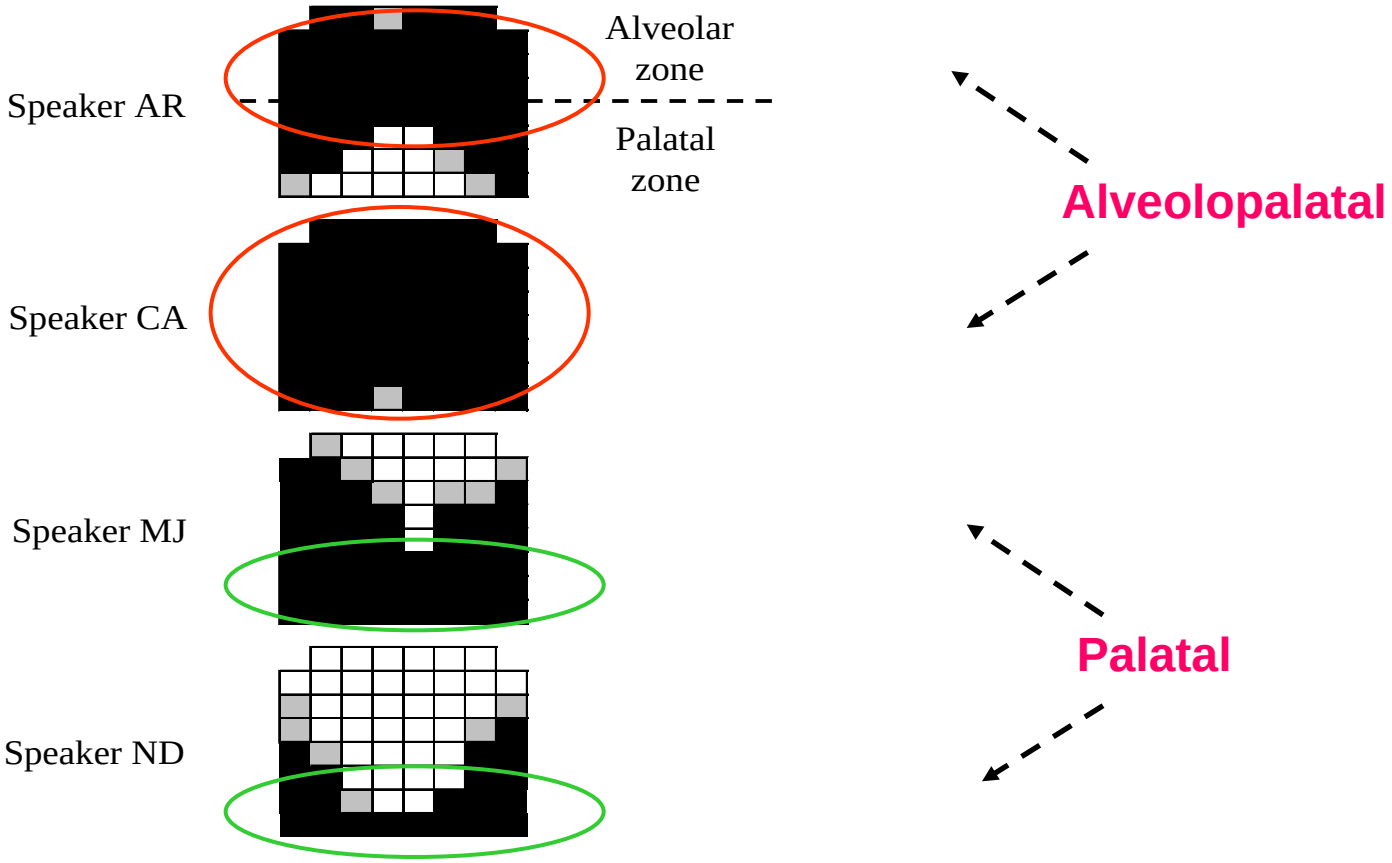


Alveolar and alveolopalatal /c/ in Czech (Hála, 1962, 27 speakers)

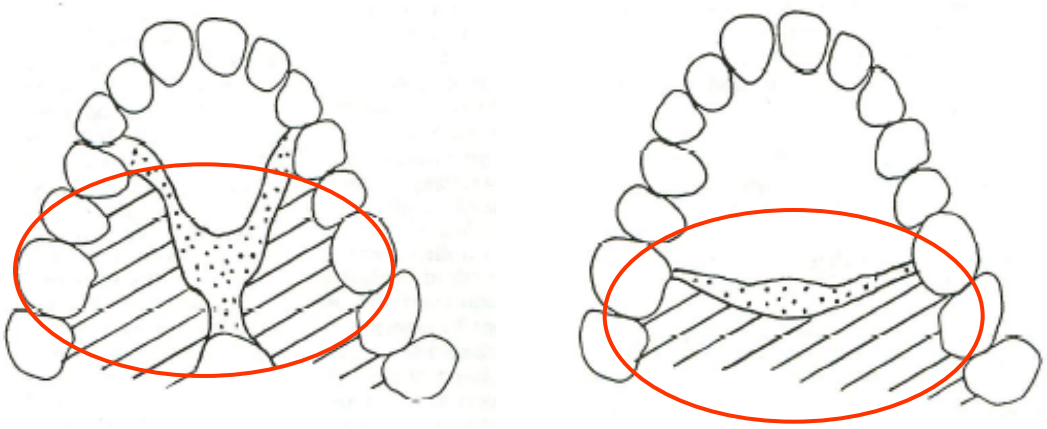


Alveolopalatal and palatal [c] (allophone of /k/) in Majorcan Catalan

(Recasens & Espinosa, 2006)

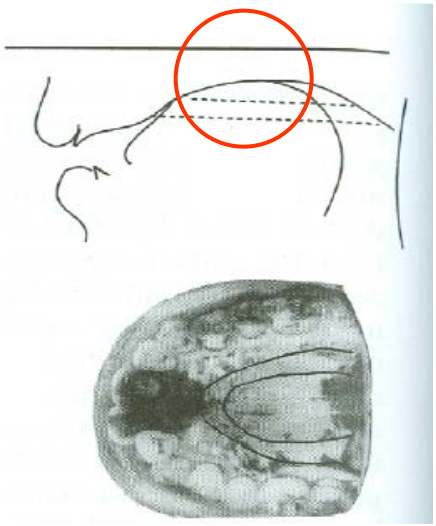


Palatal [c] (allophone of /k/) in Ibibio (Connell, 1991)



/ki/ /ka/

Palatal /ɟ/ in Ngwo (Ladefoged & Maddieson, 1996)



Closure location (nasal [ɲ])

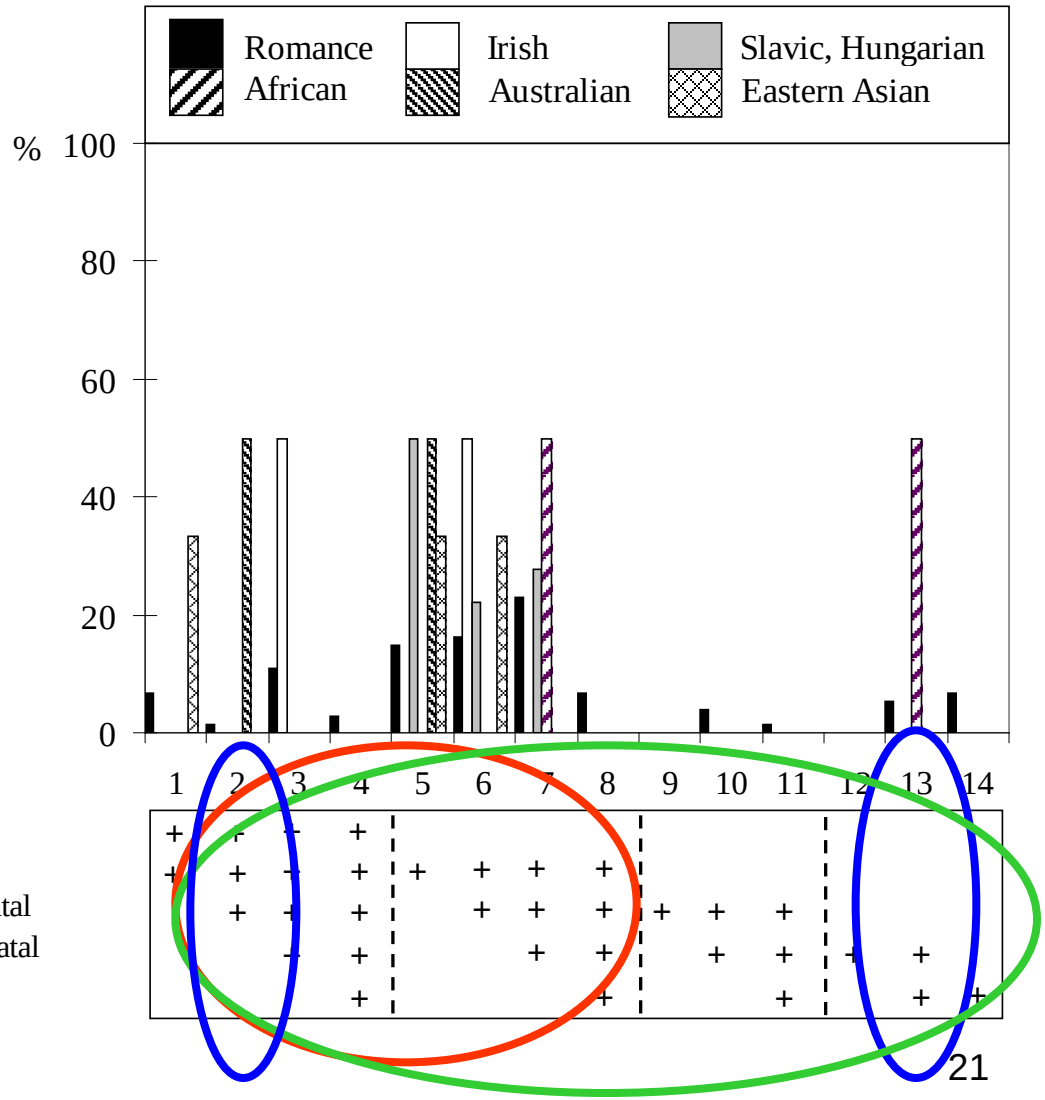
(Dento)alveolar
Walpiri

More anterior, alveolopalatal
Romance languages
Irish
Slavic, Hungarian
Australian languages (Arrernte)

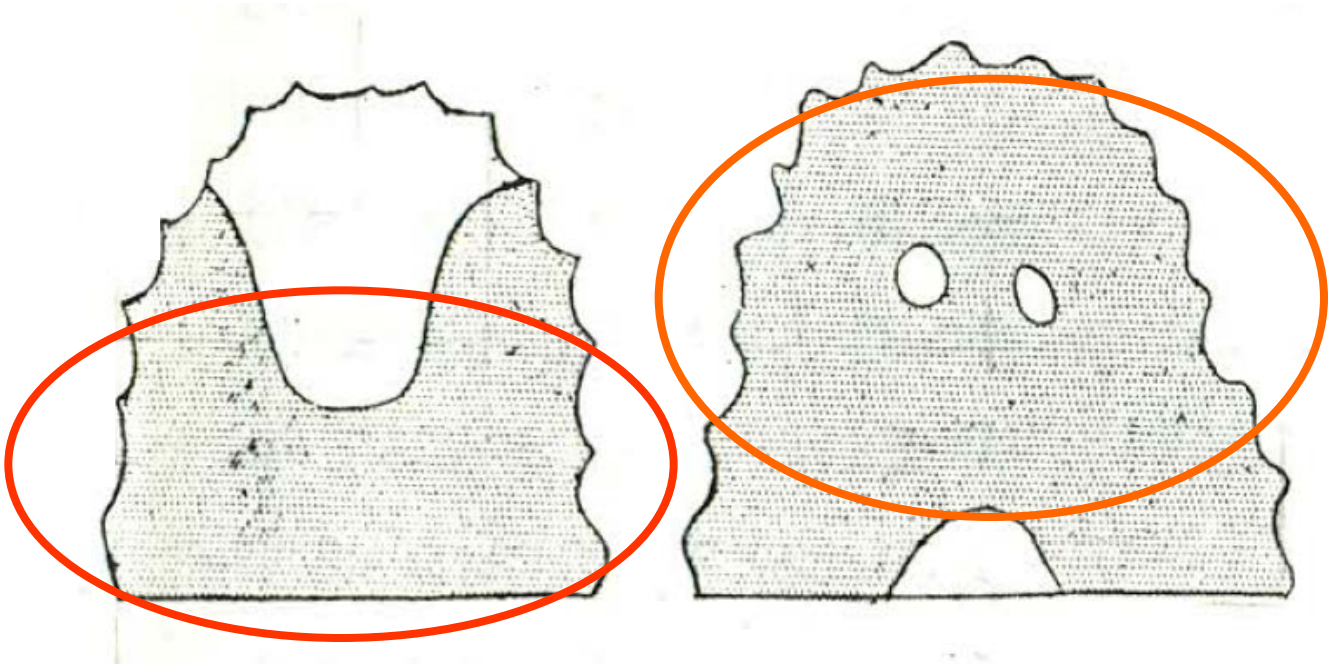
Alveolopalatal
Romance languages
African (Zulu, Ibibio)
Chinese

Essentially all places
Romance (Parisian, Majorcan)

Palatal
African (Austronesian Malagasy)

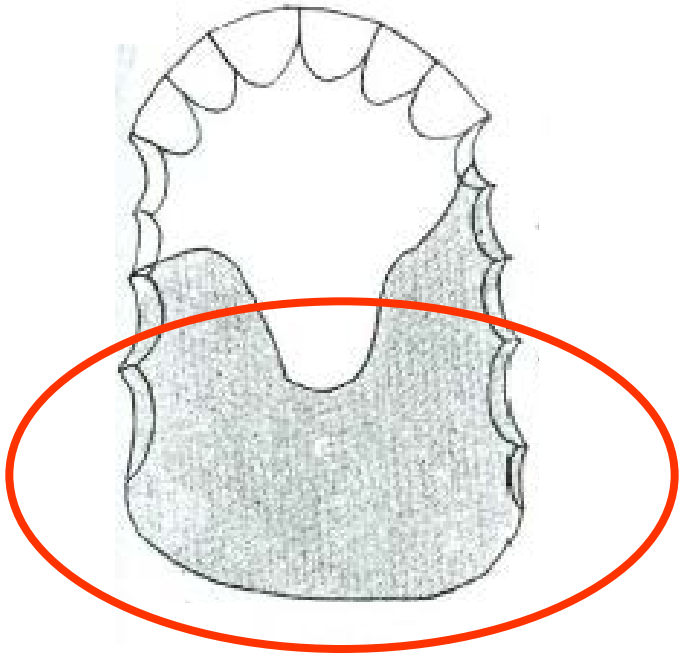


Alveolopalatal and palatal /ɲ/ in Parisian French (Rousselot, 1924-1925)



Palatal **Alveolopalatal**

Palatal /ɲ/ in Malagasy (Rousselot, 1924-1925)



Symmetry relationship between [c] and [ɲ]

(Dento)alveolar [c] → **(Dento)alveolar [ɲ]**

(Walpiri)

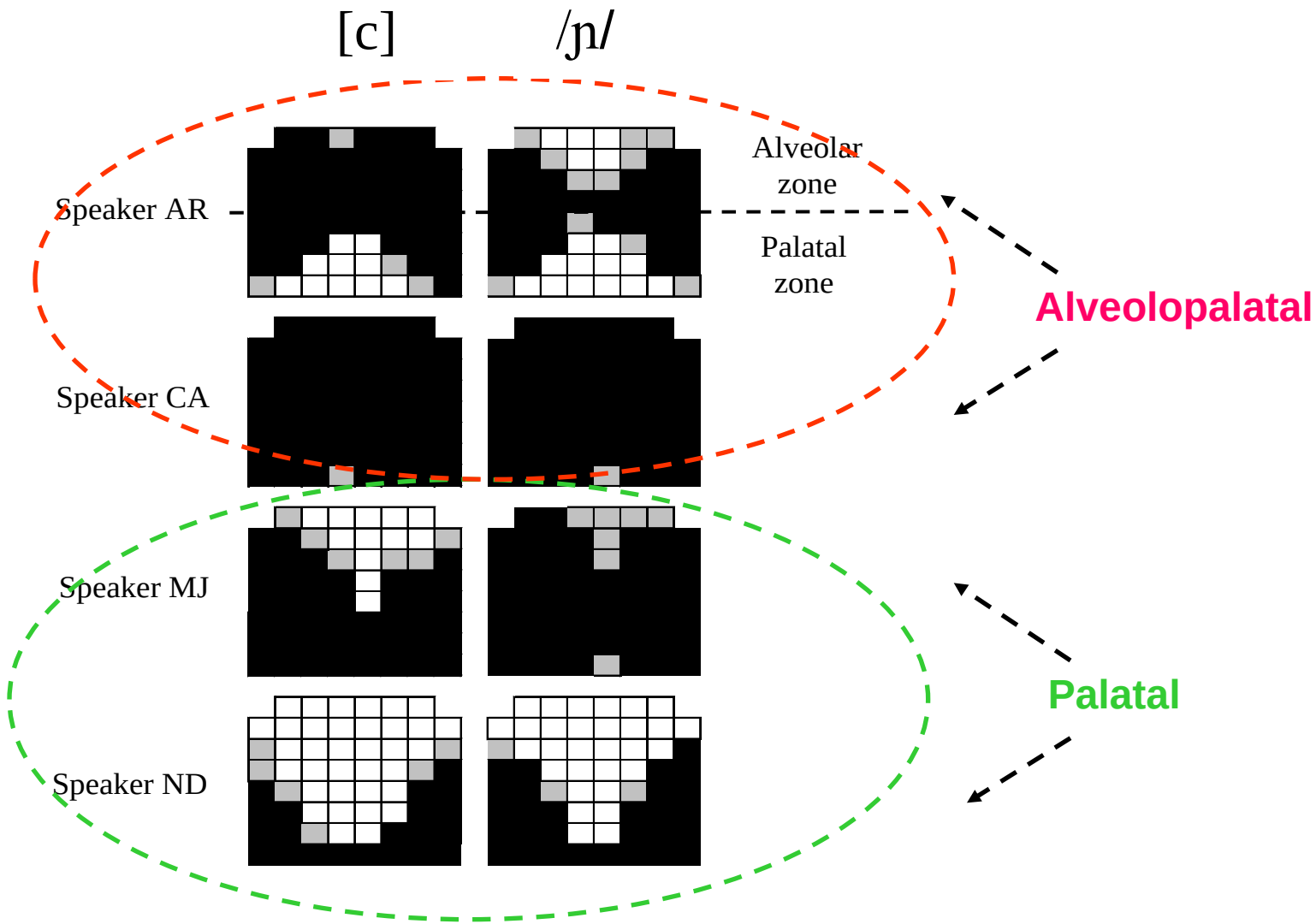
Alveolopalatal [c] → **Alveolopalatal [ɲ]**

(Hakka Chinese, essentially Czech and Hungarian).

All places [c] → **All places [ɲ]**

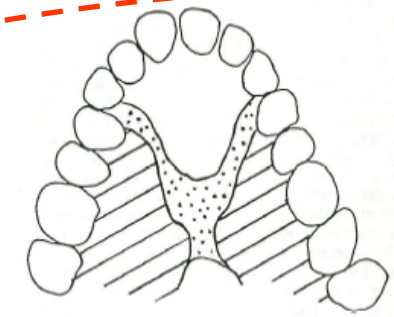
(Parisian French, Majorcan Catalan).

Majorcan Catalan (Recasens & Espinosa, 2006)

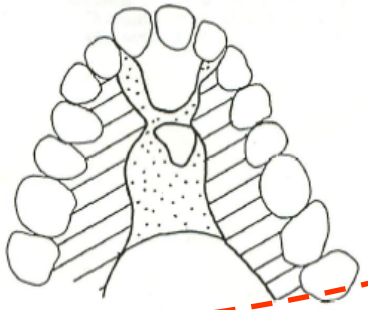


Ibibio (Connell, 1991)

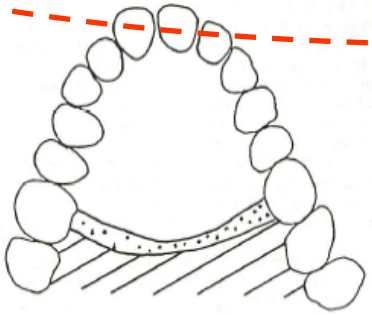
/ki/



/ɲi/

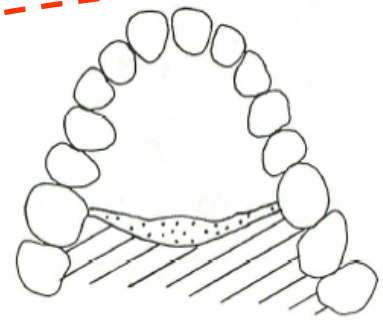


/ku/



/ɲu/

/ka/



/ɲa/

Possible generalizations

Articulatory classification

(a) the lateral [ʎ] cannot be purely palatal (i.e., it should be classified as alveolopalatal);

(b) [ɕ], [c] and [ɲ] may allow for one or several closure/constriction locations depending on language/dialect, and therefore should be labeled alveolopalatal or palatal depending on the case.

Clear preference for [ɕ], [c] and [ɲ] to exhibit an alveolopalatal rather than a purely palatal place of articulation.

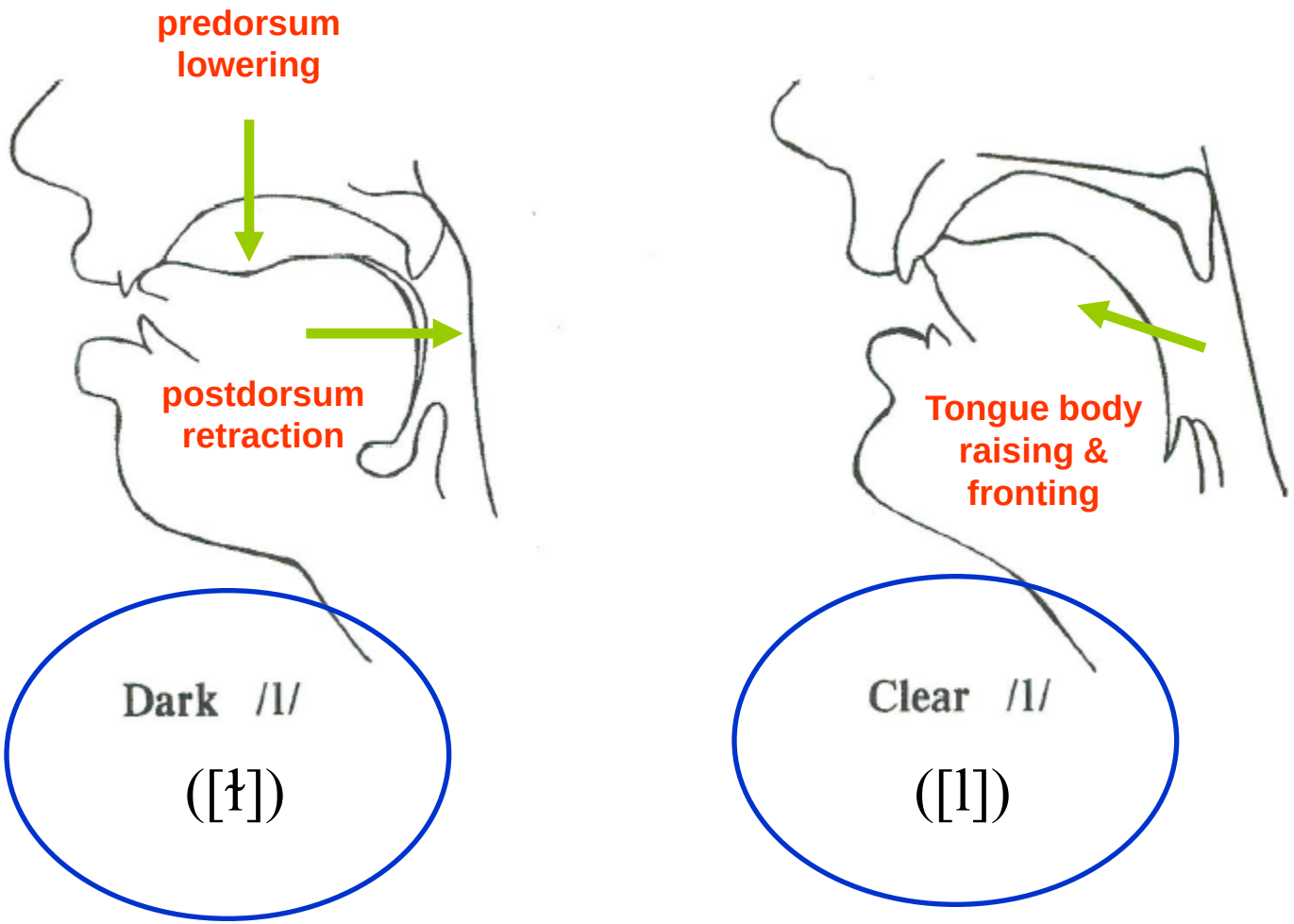
Is closure for [c] and [ɲ] exclusively palatal in specific African languages and exclusively alveolar in specific Australian languages?. (More data are needed).

Symmetrical relationship between closure location for (alveolo)palatal oral and nasal stops.

TYPOLOGY OF ALLOPHONIC PATTERNS

DARKNESS DEGREE IN /l/

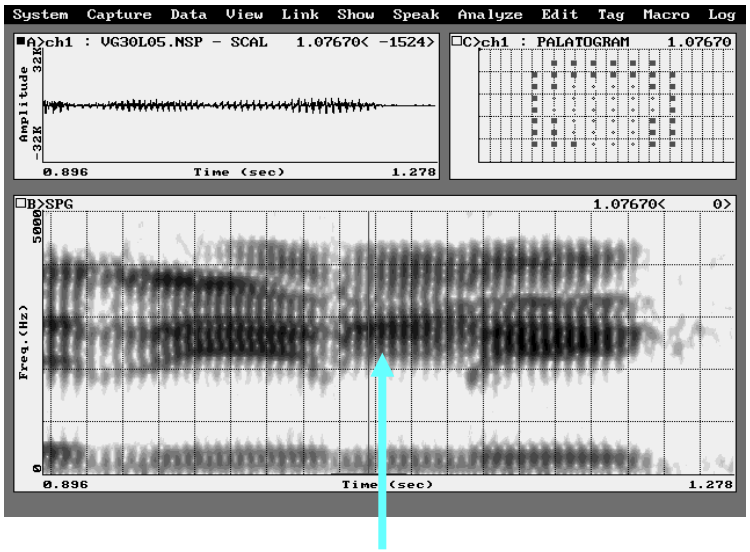
Two different varieties of apicoalveolar /l/ have been identified, i.e., **dark** and **clear**.



Articulatory differences between the two /l/ types yield different spectral configurations.

Clear /l/ ([ili])

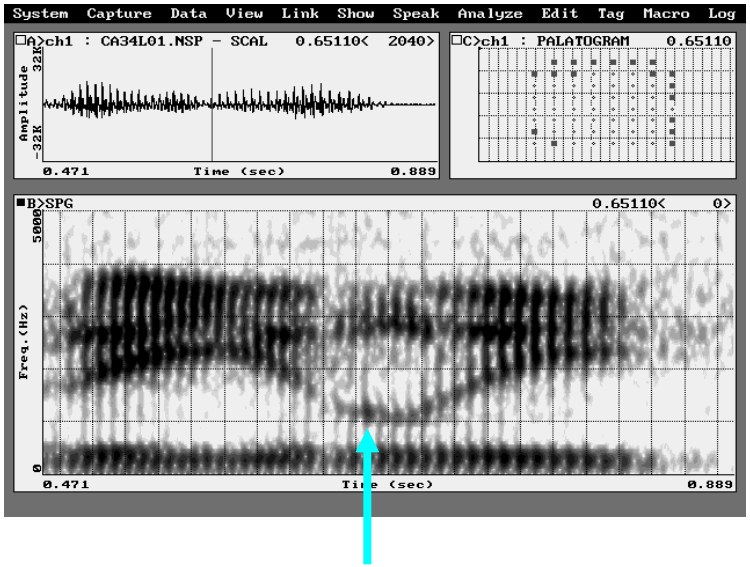
(Valencian Catalan)



High F2 (1500-2000 Hz)

Dark /l/ ([ɪɬi])

(Majorcan Catalan)



Low F2 (800-1300 Hz)

Research issues

‘Intrinsic’ allophones of /l/
(one distinctive allophone with two positional phonetic variants)

/l/ should be slightly ‘clearer’ (and thus should show a slightly higher F2) initially than finally

in line with a trend for front lingual consonants to exhibit a somewhat higher and more anterior tongue position in initial vs final position (Recasens & Pallarès, 2004).

This position-dependent F2 frequency difference ought to be larger for languages with clear /l/ than for those with dark /l/

since dark /l/ is more constrained than clear /l/ at the articulatory level.

‘Extrinsic’ allophones of /l/

(considerably different initial and final variants of /l/, which may be characterized as a ‘clear’ and ‘dark’; Ladefoged, 1971).

What is the size of the F2 difference between initial and final /l/ in languages with intrinsic allophones and in languages with extrinsic allophones?.

Methodology

Experimental conditions

Acoustic recordings of postpausal /li, la/, intervocalic /i(#)li, a(#)la/ and prepausal /il, al/ produced in short meaningful sentences by several male speakers of 23 languages/dialects.

Languages/dialects

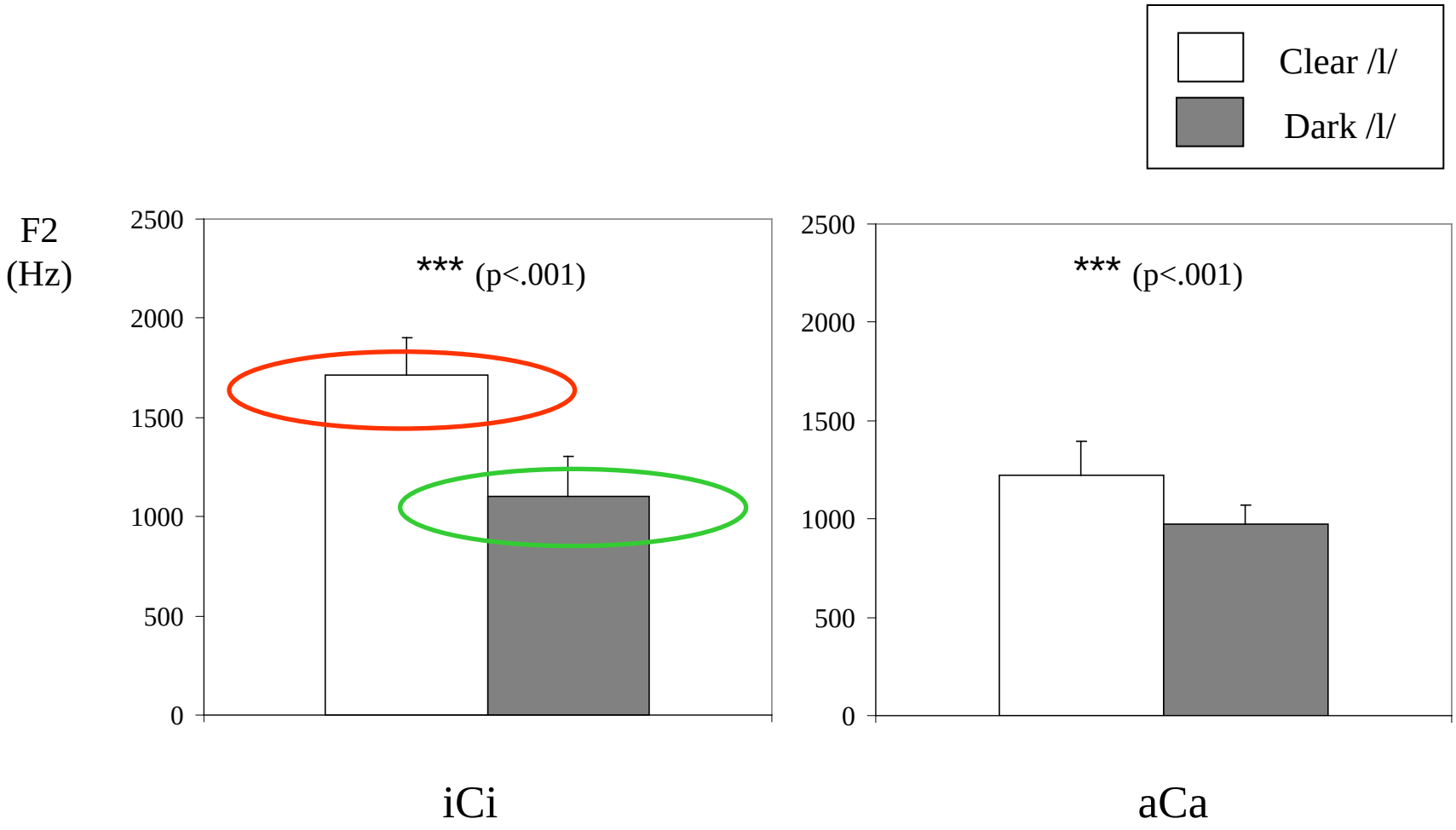
Clear /l/

Alguerese & Valencian Catalan
Czech
Danish
Dutch **(extrinsic allophony)**
Finnish
French
Hungarian
German
Italian
Newcastle English **(extrinsic allophony)**
Norwegian
Lengadocian Occitan
Romanian
Spanish
Swedish

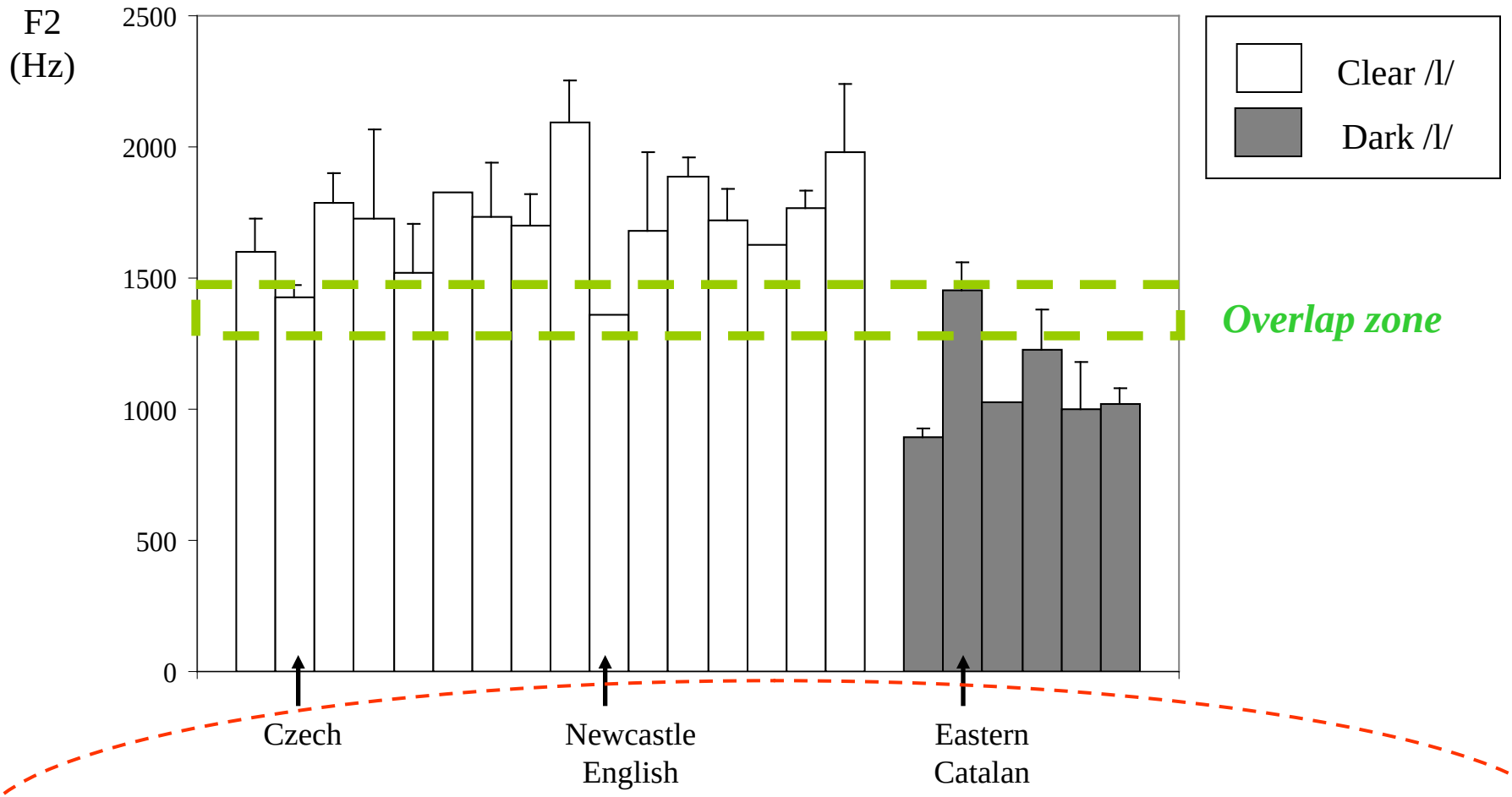
Dark /l/

Midwestern American English **(extrinsic allophony)**
British English RP **(extrinsic allophony)**
Eastern & Majorcan Catalan
Leeds English
Portuguese
Russian

Darkness degree (cross-language data)

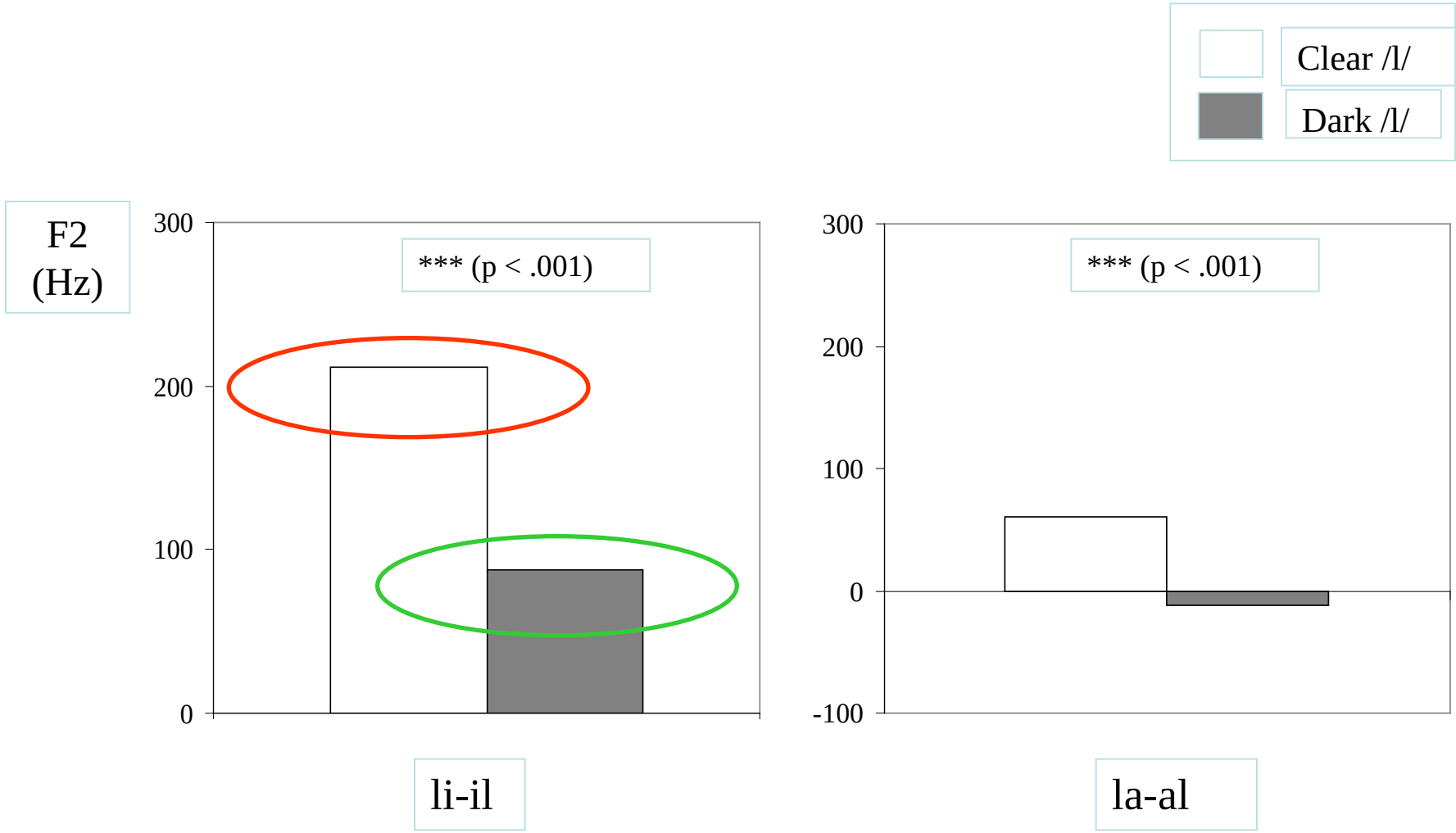


Darkness degree estimated from the sequence /ili/
(data for individual languages/dialects)

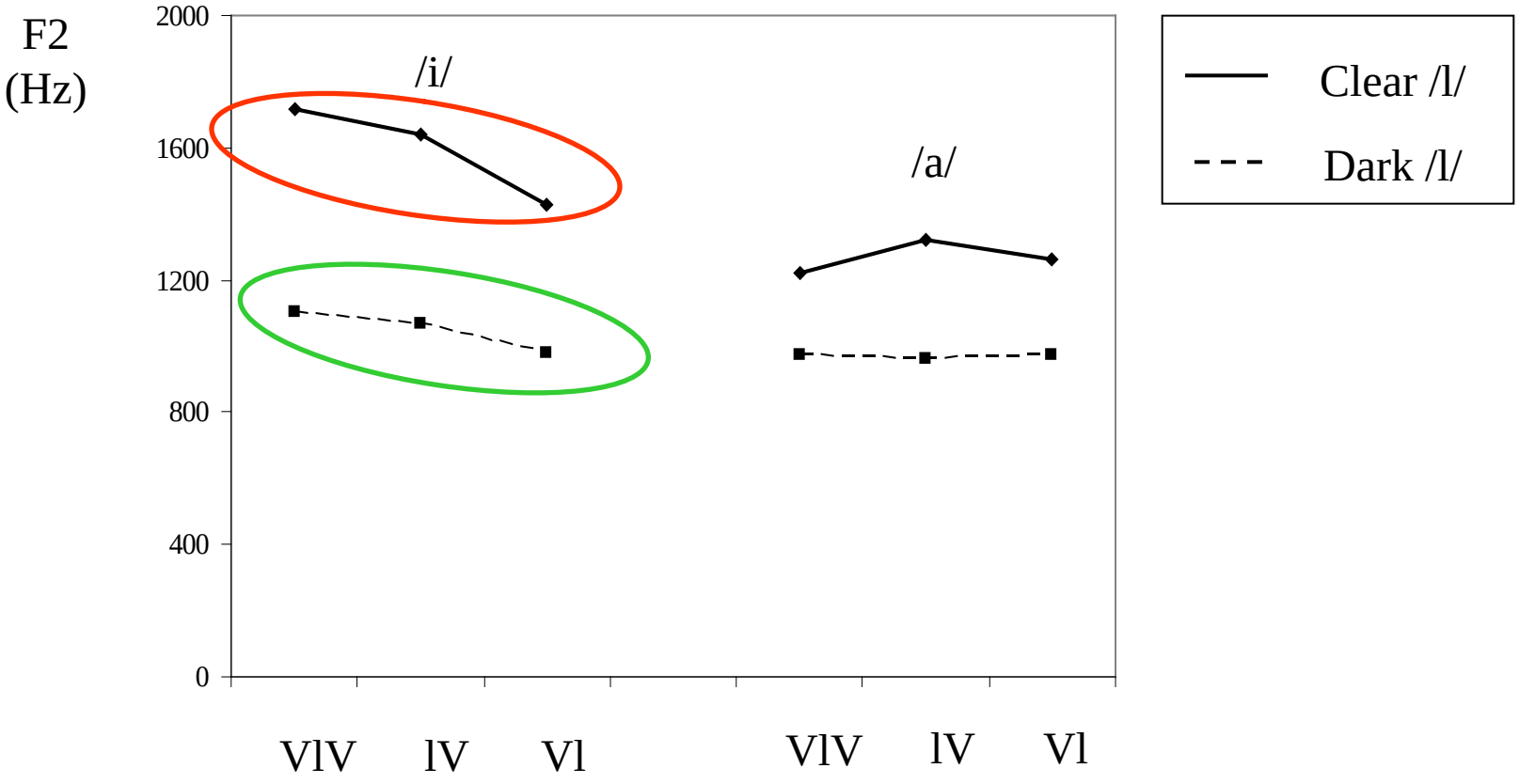


Languages/dialects showing an intermediate darkness degree

Initial and final allophones (cross-language data)

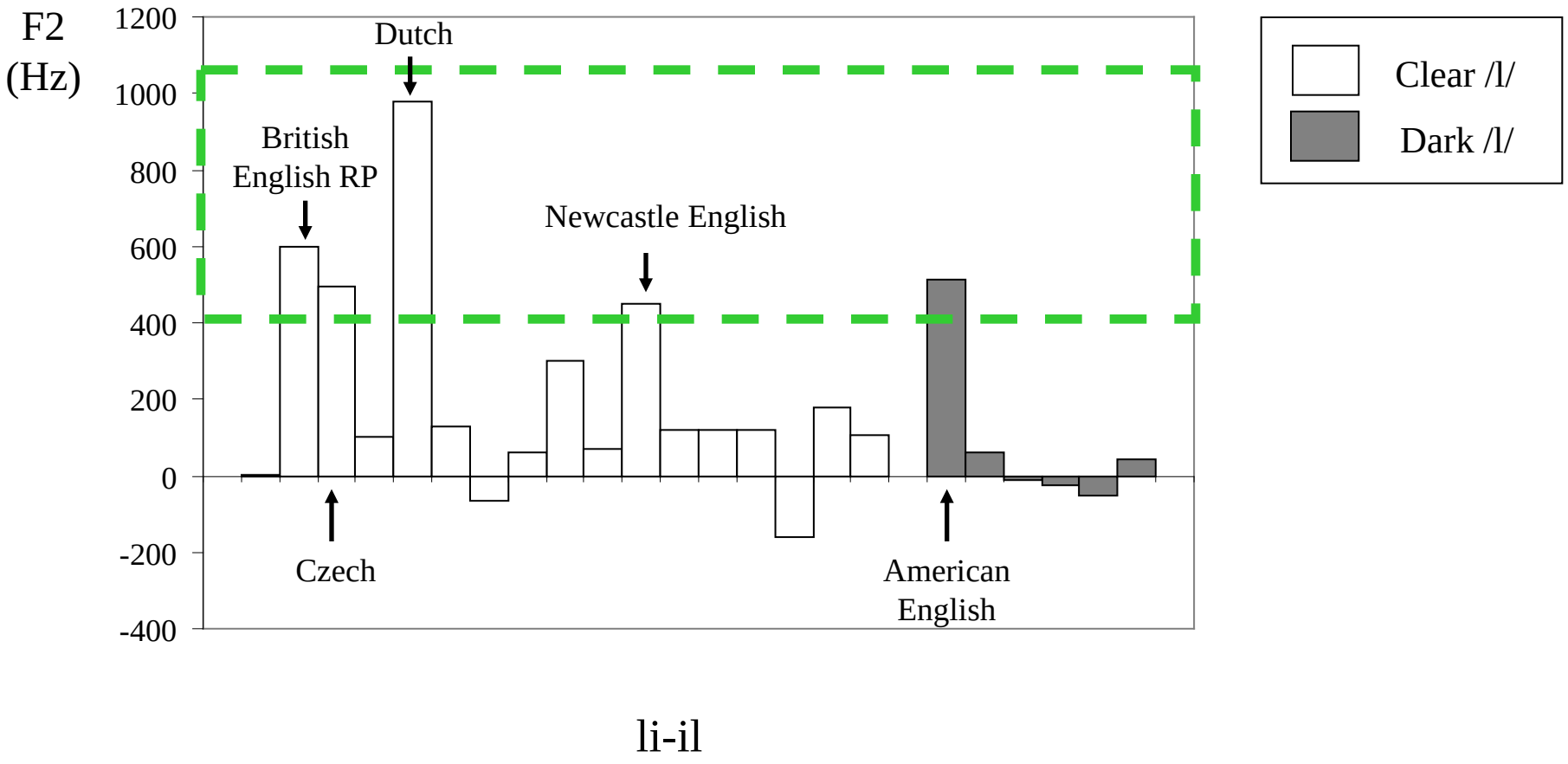


Position-dependent darkening degree (cross-language data)

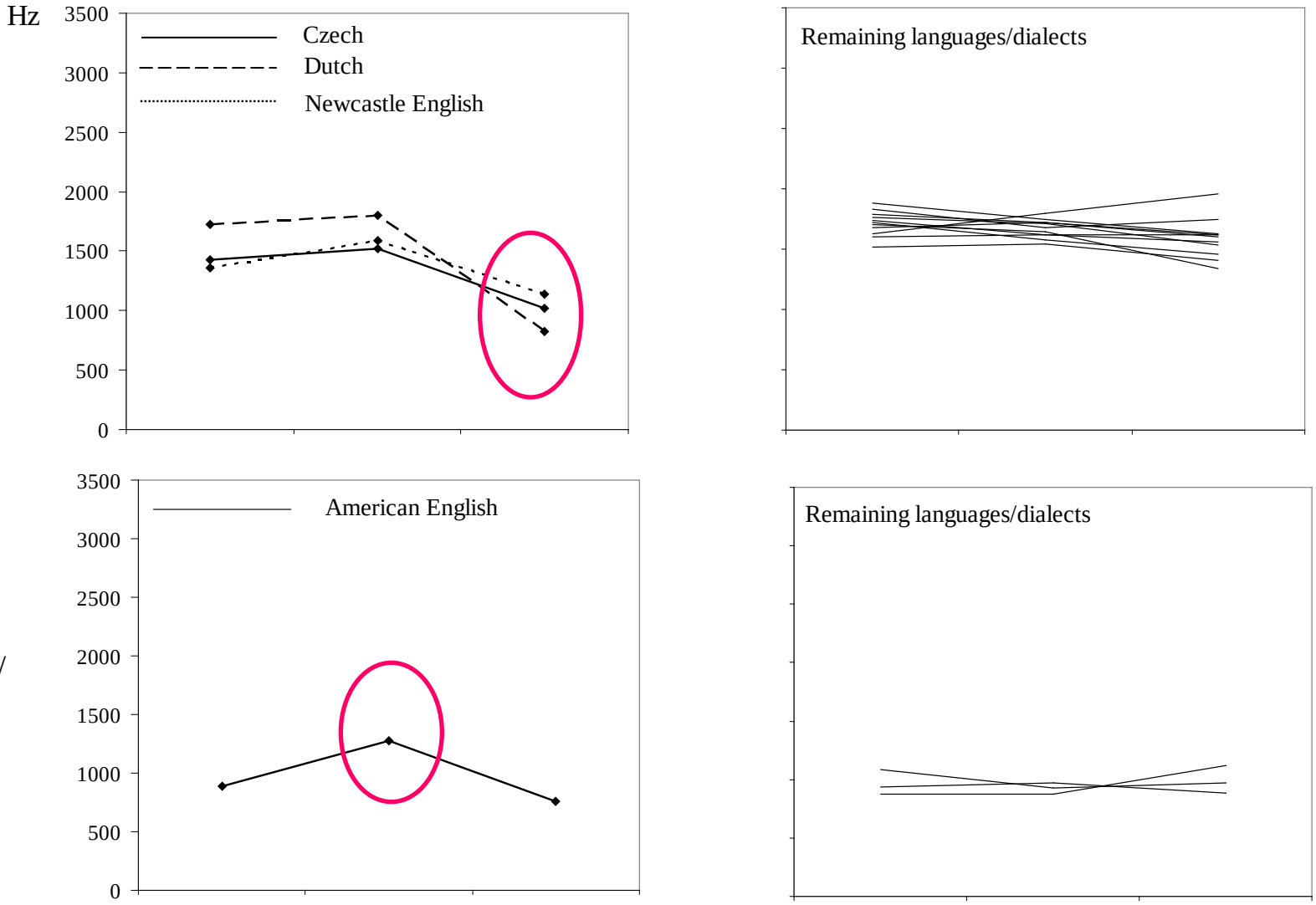


More /l/ darkening as a function of position for clear /l/ than for dark /l/

Extrinsic allophones (data for individual languages/dialects)

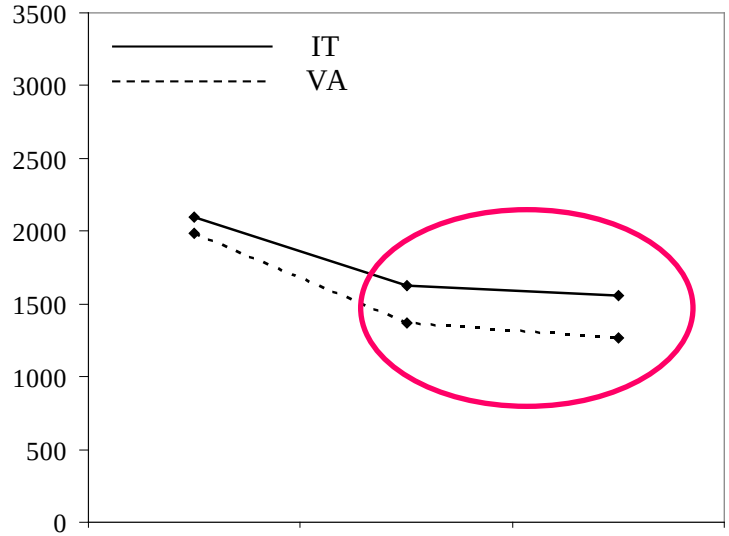


Languages with extrinsic allophones

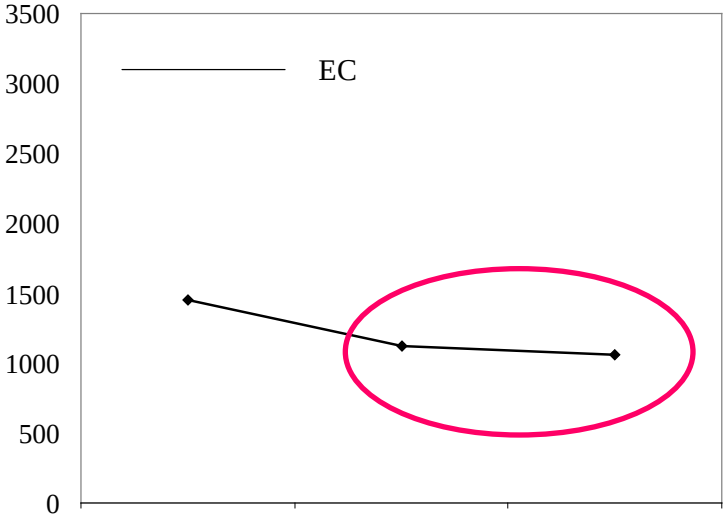


Languages with intrinsic allophones

Clear /l/



Dark /l/



/ili/ /li/ /il/

Summary and discussion

Robust F2 difference between clear /l/ and dark /l/. The splitting boundary occurs at 1300-1400 Hz in the /i/ context and at 1000 Hz in the /a/ context. Differences are largest word initially in the context of /i/.

Larger contrast between intrinsic allophones in languages with clear /l/ than in those with dark /l/ in line with differences in articulatory constraint between the two /l/ varieties.

The initial-final F2 difference is below 200/300 Hz for the 'intrinsic' allophones of /l/ and above this figure for the 'extrinsic' allophones of the consonant.

'Extrinsic' allophones: American English (initial clearing);
British English RP, Czech, Dutch, Newcastle English (final darkening).

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