Sibilants in Italian / Tyrolean bilingual speakers: a UTI study

Lorenzo Spreafico | Free University of Bozen-Bolzano

ALPS — Alpine Laboratory of Phonetics and Phonology

Kompetenzzentrum Sprachen
Centro di competenza Lingue
Zenter de Competenza Lingac
unibz

Introduction

South-Tyrol (Italy) is characterized by a societal bilingualism with two quite separate historical linguistic communities: German and Italian. The actual degree of overlapping between the two speech communities is slowly increasing nowadays, so that the number of bilinguals inhabitants is also growing. Nevertheless the German and the Italian community still exhibit markedly asymmetric linguistic repertoires:

	TYROLEAN COMMUNITY		ITALIAN COMMUNITY	
H	Standard German	(Standard Italian)	Standard Italian	(Standard German)
M	Bozner Deutsch	((Regional Italian))	Regional Italian	
L	Tyrolean		(Italian dialect)	((Tyrolean))

What are the consequences of this situation -if any at all- on the phonetics of sibilants in ST-Italian? What is the indexical value of /s/, if any at all? I answer these questions basing on ultrasound tongue imaging data.

Informants & Stimuli

Linguistic distribution (2011 Census)
Tyrolean: 50.47%
Italian: 49.06%
Ladin: 0.47%
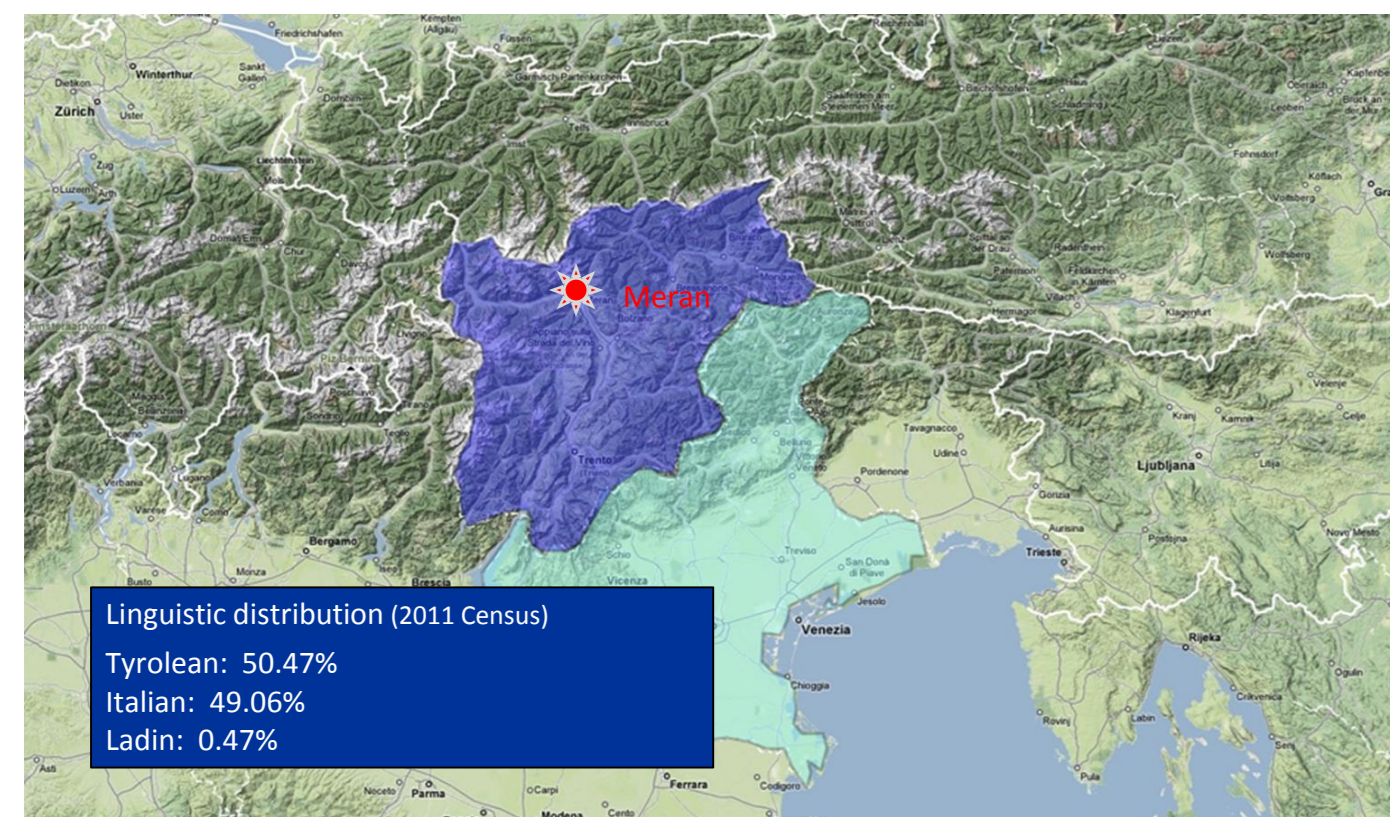
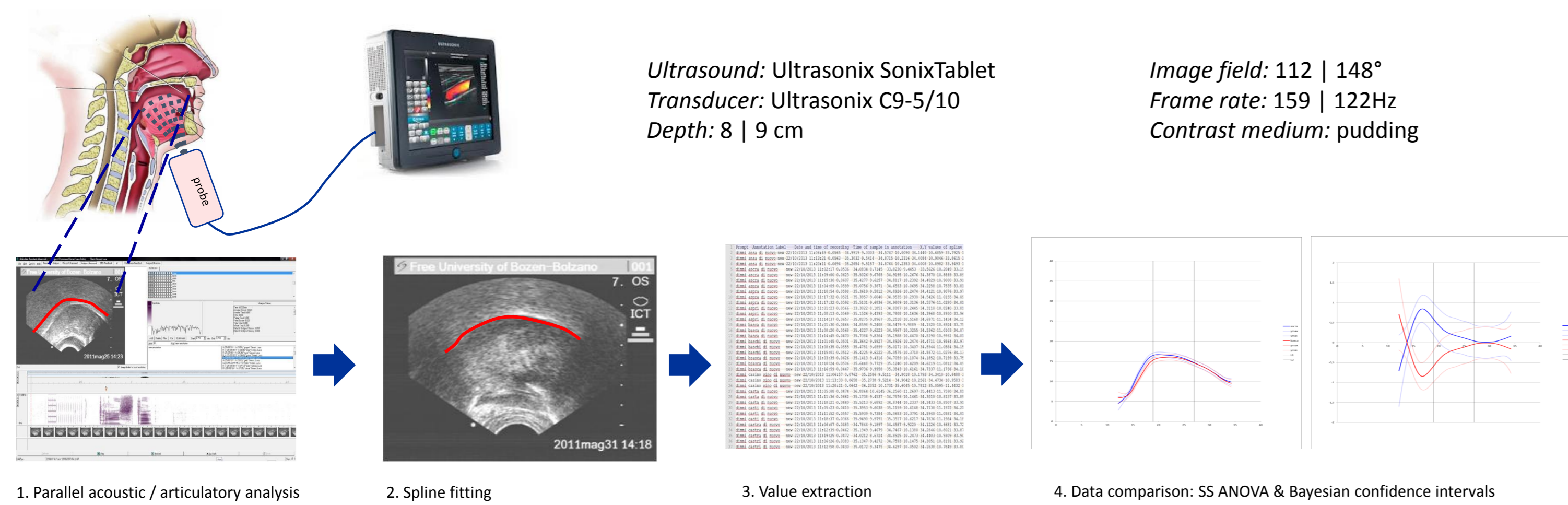| LATE SEQUENTIAL BILINGUALS	SIMULTANEOUS BILINGUALS
3 (Greta, Lia, Daniela)	2 (Mara, Susan)
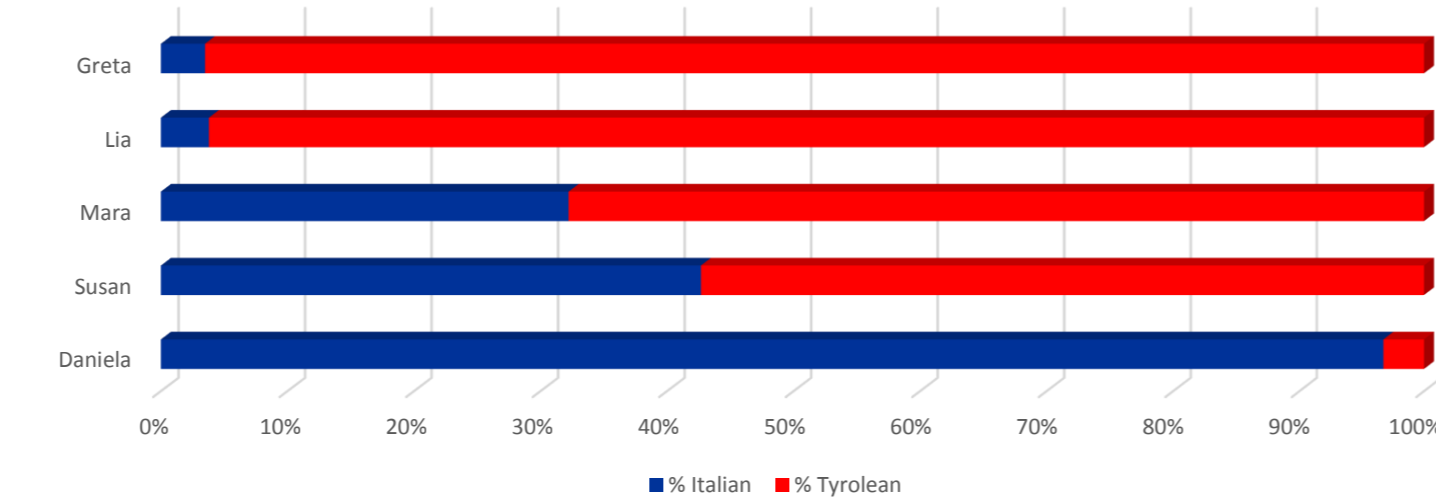
5 informants (females; age: 22-27) from Meran. Adult informants on the bilingualism continuum scale [defined on the base of two parameters: (1) the rate of bilingualism in the family, that is whether the informant`s parents were native speaker of the same language or not; (2) the rate of dual language exposure, that is whether the informant had been in contact with Italian and Tyrolean from birth, or from the nursery school on, or from the primary school on or from the secondary school on only]. All of the speakers were recorded whilst reading a word lists aloud while in the bilingual mode.

		/ka/	/kra/	/pa/	/pra/	/ta/	/tra/	/ka/
/s/		/ˈskanno/	/ˈskranno/	/ˈspatsjo/	/ˈsprattso/	/staːto/	/ˈstrato/	/ˈskanno/
		/ˈbaska/	/ˈaskra/	/ˈspattsi/	/ˈaspra/	/ˈkasta/	/ˈkastra/	/ˈbaska/
		/ki/	/kri/	/pi/	/pri/	/ti/	/tri/	/ki/
		/ˈskivo/	/ˈskrivo/	/ˈspinto/	/ˈsprint/	/ˈstirare/	/striˈare/	/ˈskivo/
		/ˈbaski/	/deˈscrivo/	/ˈraspi/	/ˈaspri/	/ˈcasti/	/ˈcastri/	/ˈbaski/
		/u/	/kru/	/pu/	/pru/	/tu/	/tru/	/u/
		/ˈskudo/	/ˈskruto/	/ˈsputo/	/ˈspruttso/	/ˈstukko/	/ˈstrukko/	/ˈskudo/
		/disˈkuto/	/inperskruˈtabile/	/ˈdisputo/	/dʒurispruˈdɛntsa/	/riˈstukko/	/riˈstrukko/	/disˈkuto/

Carrier phrase: /ˈdimmi _____ di nwɔvo/

Equipment & Method

All of the speakers were recorded individually at ALPs (*Alpine Laboratory of Phonetics & Phonology*) using the equipment listed below. Subsequently a parallel acoustic/articulatory analysis was run on the synchronized mid-sagittal ultrasound images of the tongue to identify the sibilants. Eventually tongue surfaces for /s/ were semi-automatically fitted using the software Articulate Assistant Advanced (AAA, v. 2.13) from Articulate Instruments.

Ultrasound: Ultrasonix SonixTablet
Transducer: Ultrasonix C9-5/10
Depth: 8 | 9 cm

Image field: 112 | 148°
Frame rate: 159 | 122Hz
Contrast medium: pudding

1. Parallel acoustic / articulatory analysis
2. Spline fitting
3. Value extraction
4. Data comparison: SS ANOVA & Bayesian confidence intervals

Tongue profiles at the fricative acoustic midpoint were compared according to Davidson (2006) by computing smoothing spline ANOVA and by calculating Bayesian confidence intervals for each set of curves. The procedure was run in R using the *gss* (general smoothing spline) *package* adjusted to the format of the data for each spline, and replicated into Microsoft Excel spreadsheet for ease of use.

Caveat: remember to approach acoustic and articulatory associations cautiously and be prepared to variation induced by the technique and the procedures we used when comparing tongue profiles!
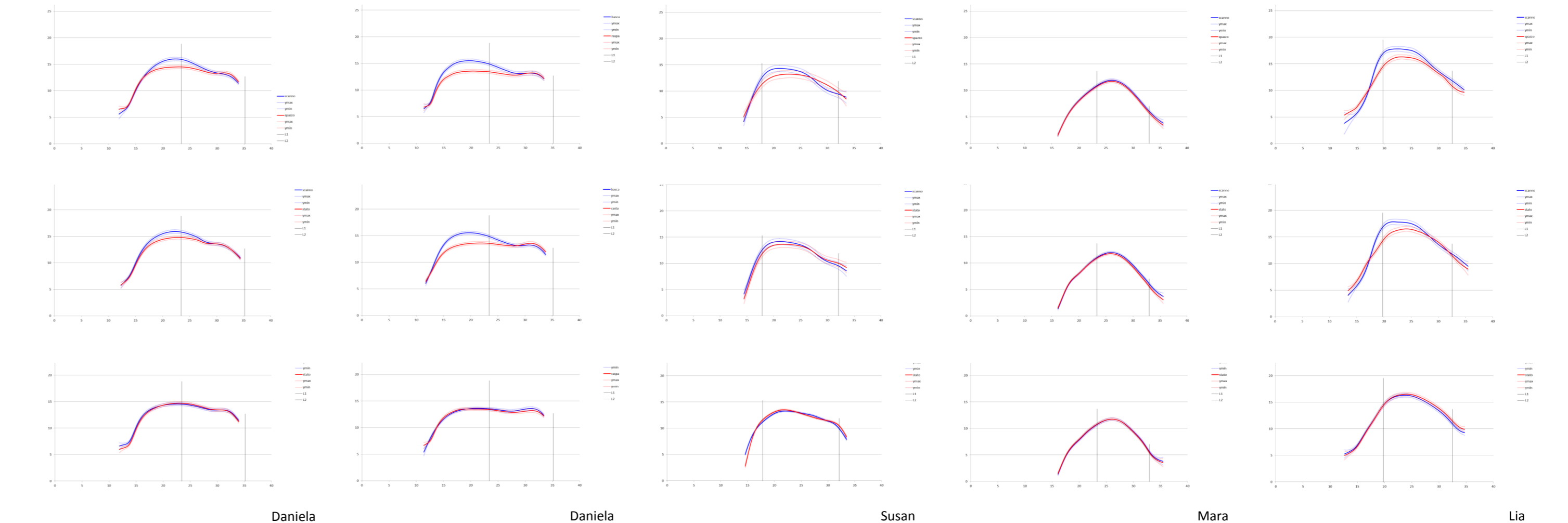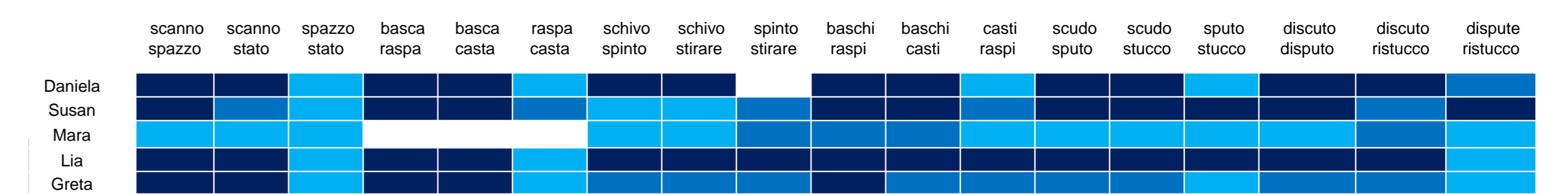
Q1: Are tongue shapes for /s/ similar?

No. The inter-speaker comparison of tongue profiles at the fricative acoustic midpoint shows that the informants resort to different articulatory patters: the covert apical vs. laminal distinction plays a role in contrasting /s/ as produced by monolingual speakers against /s/ as produced by bilingual speakers. This differentiation has negligible effects on the acoustic output in the data under scrutiny.
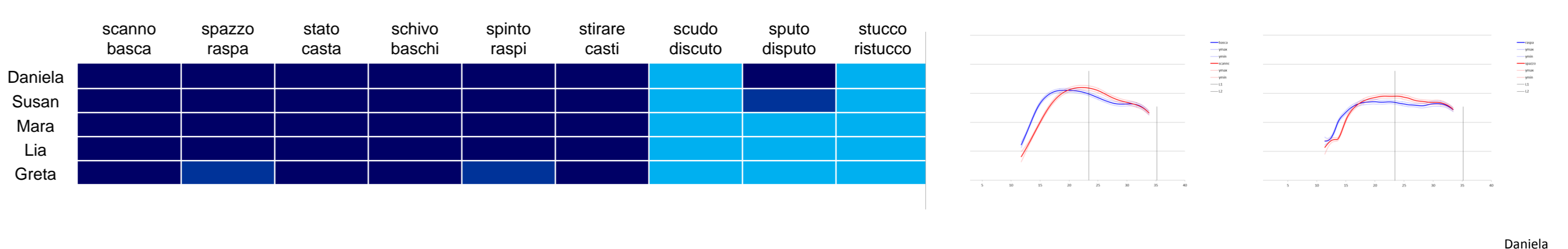

Daniela   Susan   Mara   Lia   Greta
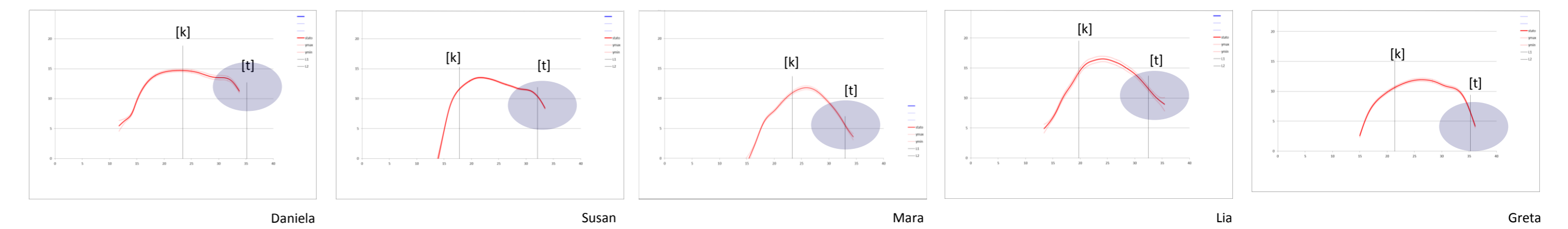
Q2: Are the articulatory patterns influenced by the nature of the consonant that follows?

It depends on the speaker. Tongue configurations are influenced by the consonant that follows in the cluster, but the significance of the degree of differentiation for the same clusters seems to be speaker dependent insted of „degree-of-bilingualism" dependent. The table below shows the results for tongue profiles similarity or dissimilarity for each of the possible /sCV/ combination in the dataset. The darker the box, the bigger the difference between the two profiles according to the number of diverging point in the Bayesian interaction graphs (>4).

	scanno spazzo	spazzo stato	spazzo stato	basca raspa	basca casta	raspa casta	schivo spinto	schivo stirare	spinto stirare	baschi raspi	baschi casti	casti raspi	scudo sputo	scudo stucco	sputo stucco	discuto disputo	discuto ristucco	dispute ristucco
Daniela																		
Susan																		
Mara																		
Lia																		
Greta																		

Daniela   Daniela   Susan   Mara   Lia

Q3: Do the articulatory patterns differ systematically according to the position of /s/ in the word?

If the same /sPV/ sequences in both word initial and word internal position are contrasted it turns out that speakers tend to behave the same irrespective of their degree of bilingualism. If [a] precedes /s/ speakers display tongue dorsum backing or stretching and a slight tongue body lowering, but no tongue tip context-dependent variability thus pointing to the strict requirements for the production of the sibilant. If [ii] precedes the cluster no significant differentiation.

	scanno basca	spazzo raspa	stato casta	schivo baschi	spinto raspi	stirare casti	scudo discuto	sputo disputo	stucco ristucco
Daniela									
Susan									
Mara									
Lia									
Greta									

Daniela

Q4: Is /s/ in word-initial /spr/ /str/ /skr/ clusters more retracted than in /sp/ /st/ /sk/ sequences?

In a number of cases both sequential and simultaneous speakers differentiate between tongue profiles for the sibilant in complex consonant cluster. In particular, the differentiation affects the position of the tongue rather than its shape. However a comparison of tongue shapes for /s/ in Italian and /ʃ/ in Tyrolean shows that in Italian the retraction is quite limited if contrasted with the tongue dorsum pointing towar

	scanno scranno	spazzo sprazzo	stato strato	ascra basca	aspra raspa	casta castra
Daniela						
Susan						
Mara						
Lia						
Greta						

Daniela   Mara   Lia

Final remarks: The across-speakers comparison of intra-speaker difference for /s/ tongue profiles under different conditions shows that: (i) as for each possible /sC/ combination in the dataset, the significance of the degree of differentiation in tongue profiles for the same cluster is different across the speakers, but independent from the degree of bilingualism; (ii) as for as for each possible /sCr/ combination in the dataset, the significance of the degree of differentiation in tongue profiles for the same cluster is the same across the speakers, hence independent from the degree of bilingualism; (iii) as for word-initial vs. word-internal allophones the significance of the degree of differentiation in tongue profile is the same across speakers, hence independent from the degree of bilingualism. Hence, at this stage of investigation the initial question about the possible indexical value of /s/ in Italian as spoken by simultaneous and sequential bilinguals cannot receive a full, positive answer, in the sense that no coherent strategy or scheme of differentiation in tongue configurations emerges, that correlates to the degree of bilingualism of the speakers. Nevertheless the UTI approach points to promising directions of investigation, in particular that of the more apical/more laminal articulation playing a role in differentiating bilingual speakers of Italian and Tyrolean respectively.