PHONOLOGICAL ACQUISITION IN MULTILINGUAL SPEECH

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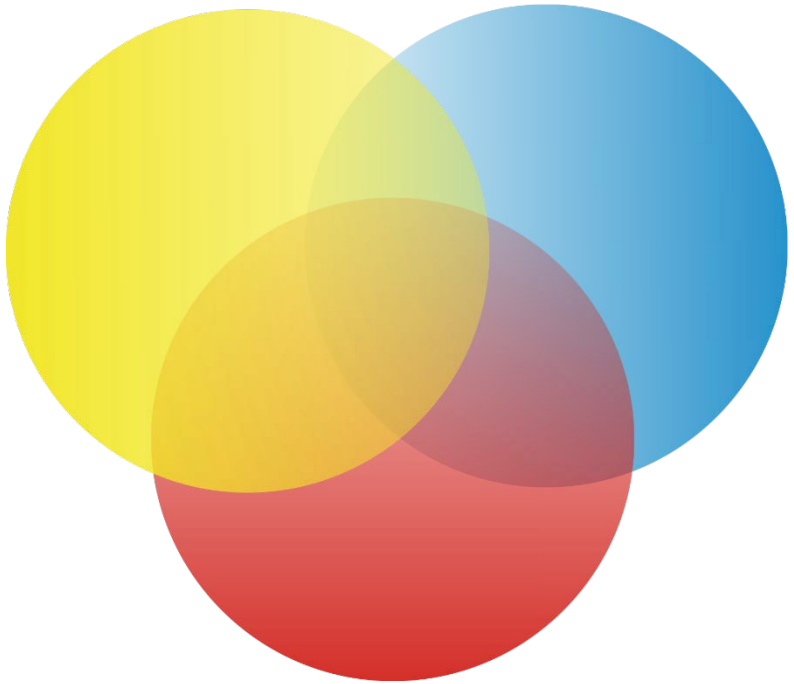
Linguistic Theory MA course | http://seas.elte.hu/w/!lingtheo



Broad aims

- an overview of how **phonological** processes are learned in **multilingual** speech (L2, L3, L*n*)
- focus: **production** and **perception** of **dynamic laryngeal** patterns
- wish to refine existing **models of phonological learning**
- insights from **experimental** work and **data analysis**

Overview

- L2 and multilingual acquisition research in general
- L3 phonology acquisition
- detailed example of two experiments with L1 Hungarians with L2/L3 English and Spanish
- discussion of some of the results

Multilingualism

- It is estimated that over half of the worldwide population use **two** or **more languages** regularly in their daily life
- European Commission study (2013) reported that **25%** of EU teenagers were competent users of **three** languages
- but: much of the previous phonological research has focused on monolingual (**L1**) and bilingual speakers (**L2**)
- work on **L3** phonological acquisition is very limited

Focus has been on L2 acquisition (L2A)

- one prevalent idea: L3 acquisition is an **extension** of L2 acquisition
- some dominant L2 acquisition models:
  - The Speech Learning Model
  - The Perceptual Assimilation Model
  - The Second Language Linguistic Perception model

What do the L2A models share?

- L2 phonological acquisition is deeply influenced by **perceptual biases caused by L1**
- bilinguals tend to initially identify categories in L2 as instances of **L1 categories**
- L2 categories are easier to learn if they are **dissimilar to L1** sounds
- **categories that are similar in L1 and L2 are more difficult to acquire** as a new category because they are equated to an existing L1 category
- perception is also influenced by learning stage (initial, beginner, intermediate, advanced)
- e.g. beginner L2 learners tend to perceive L2 sounds as instances of **L1** categories, they will then **adjust** their L1 perceptual boundaries in the direction of L2 perceptual boundaries and attain **optimal L2 perception**; 3 scenarios:
  - ***new:*** speakers must learn a sound not present in their L1, or an L1 category needs to be split (difficult)
  - ***similar:*** L2 sounds resemble existing L1 categories (somewhat less difficult for learners)
  - ***subset scenario:*** one L2 sound is perceived as more than one L1 category = learners must learn to fit a larger L1 phonology into a smaller L2 phonology (predicted to be of medium difficulty for learners)

L3/L*n* research

- very young field (started in the 1990s)
- models extended from L2
- but: L3A/L*n*A necessarily involves multiple effects & their interaction
- **cross-linguistic influence/transfer (CLI)**, L3/L*n* research aims to determine the source of CLI:
  - primacy of **L1**, and hence the source of transfer
  - L2 is acquired later, cognitively more similar, **L2** is the main source
  - **combination of L1+L2** (hybrid transfer)
- so far: limited to morphosyntax
- L3 phonology: itself is limited research (mostly phoneme-acquisition)

Difficulties of multilingual research

- many factors can influence multilingual speech
- the “usual suspects” of L1 and L2 acquisition (age, individual-related factors, method of learning – classroom, immersive, etc.) **plus:**
  - L2 status
  - L3 experience
  - typological proximity
  - level of proficiency (LoP)
- multilingual research requires applied, theoretical and psycholinguistic competence but applied linguists are usually not trained theoretical linguists

L2 status

- refers to the impact of previously learnt languages on L3 phonological acquisition, which has been demonstrated as a factor influencing the source of cross-linguistic effects on L3 perception and production
- findings: L2 transfer is greater than L1 transfer at the beginning of L3 phonological acquisition
- the influence of L2 on L3 phonological acquisition diminishes as L3 experience increases

L3 experience

- refers to exposure to the L3, such as the length of residence in the L3-speaking environment
- L3 experience is suggested to facilitate sound discrimination, especially in the early stage of L3 acquisition

Typological proximity

- refers to the relationship between languages and language families that linguists can formally and objectively define and identify
- CLI is more likely to occur between languages that are closely related
- L3 learners are likely to establish links between the L3 and prior languages they have acquired; they tend to establish links between languages that have more similarities rather than differences
- similarities between the L3 and L1/L2 can hinder multilinguals' ability to learn an L3

Level of proficiency

- the lower the level of L3 proficiency, the greater the CLI from L2 to L3
- the influence of L2 decreases as L3 proficiency increases, and L3 phonological categories are more likely to be influenced by input from the L3

L3/L*n* research: similarity as facilitation

- interaction of variables in CLI necessarily involves **facilitation** and **inhibition** (blocking) effects
- (perceived) typological **similarity** is known to be a facilitator
- when Ls are similar enough, transfer is more likely
  – **wholesale**, or **property-by-property** depending on which aspects of L1 or non-native language (L2/L*n*) are perceived to be more similar,
  e.g., Arabic L1 learners of English: consonants are transferred from Arabic, while vowels form French due to the respective similarity
- similarity in CLI can potentially be inhibitory, too
- defining/modelling of similarity is not clear though, one contributing factor: **cognate status** of words

Cognates as sources of CLI

- **cognate effect:** similarity of lexical items as wholes might impact on the acoustic realisation of segments within them
- considerable **phonological, semantic, orthographic overlap** but not easy to quantify
- many studies: production and perception are faster, lexical access is more accurate for cognate words than noncognates
- has not been investigated in dynamic phonological processes

Multilingual laryngeal research

- L2/3/*n* research focus: mostly on morphosyntactic phenomena
- phonology: focus on phoneme acquisition, research on allophonic and dynamic phenomena leading to neutralization is scarce
- laryngeal phonology: focus usually on VOT of voiceless stops
- no L3 research on regressive voicing assimilation (**RVA**) or presonorant voicing (**PSV**)
- no attempt at distinguishing between **types of phonological processes** either, this may also influence CL transfer

Multilingual laryngeal research: some results

- limited research has shown **no prevalent conclusions**
- **L1 dominance** on L3 has been shown in most studies
- **other effects** also seem to play a role: language proficiency, language dominance, language mode, and cognate status
- perception & production may not go hand in hand: a feature (e.g., voicing of stops) may be perceived by learners but cannot produce it

Types of laryngeal processes

- **new phonetic category formation**
  e.g. aspiration of voiceless stops in English
- **allophonic variation with a new segment**
  e.g. voiced stop spirantisation in Spanish
- **applying an existing phonological process to a new context**
  e.g. pre-sonorant voicing in Spanish, Slovak
- **unlearning an existing phonological process**
  e.g. no regressive voicing assimilation in English

Three laryngeal systems: an overview

HUNGARIAN	ENGLISH	SPANISH
/s/ – /z/ contrast	/s/ – /z/ contrast	no /s/ – /z/ contrast
general RVA	no RVA	/s/-voicing before voiced stops (“RVA”)
word-internal & sandhi	no PSV	/s/-voicing before sonorants (“PSV”)
categorical		word-internal & sandhi
		gradient or optional-categorical

sandhi = phonological process between two words/across a word boundary

Hungarian

- **voicing** language: laryngeal contrast is based on voicing
- /s/–/z/ contrast: ***sz**ár–**z**ár; mé**sz**–mé**z**; má**sz**nak–má**z**nak*
- RVA: /tb/ → [db]: *há**t**-ba*; *ké**t** barát*
  /sb/ → [zb]: *mé**sz**-be(= méz-be*!)
  /bt/ → [pt]: *lá**b**-tól; lá**b** torna*
  /zt/ → [st]: *mé**z**-től (= mész-től*!)
- no PSV: /tn/ → *[dn]: *há**t**-nak; há**t** masszázs*
  /sn/ → *[zn]: *mé**sz**-nek (≠ méz-nek*!*)*

English

- **aspirating** language: laryngeal contrast is based on aspiration: **fortis–lenis** contrast
- fortis obstruents: unvoiced; lenis obstruents: only passively voiced
- /s/–/z/ contrast: ***s**ip–**z**ip; bu**s**–bu**zz**; mi**ss**le–mi**zz**le*
- no RVA: /kd/ → *[gd]: *ane**c**dote; La**k**e District*
  /sb/ → *[zb]: *ba**s**eball*
  /vʃ/ → *[fʃ]: *li**v**e show (≠ life show!)*
  /zt/ → *[st]: *he'**s** tired*
- no PSV: /sl/ → *[zl]: *di**s**loyal; thi**s** lady*
  /sm/ → *[zm]: *mi**s**match; busine**ss** model*

Spanish

- **voicing** language: laryngeal contrast is based on voicing
- contrast is **limited** (fricatives/affricates have no voiced counterparts)
- RVA/PSV of /s/: in dialects where /s/ remains in the coda
- high degree of individual **variation**, the process is less categorical (gradual) or categorical but optional
- RVA:/sb/ → [zβ]: *e**s**belto* 'slim', *e**s** bueno* 'it's good'
- PSV: /sl/ → [zl]: *i**s**la* 'island', *e**s** largo* 'it's long'
  /sj/ → [zj]: *de**s**hielo* 'thaw', *lo**s** hielos* 'the ices'

Research questions

- how do multilingual speakers handle the **conflicting cross-linguistic influences** on **RVA** and **PSV** in their speech **productions** and **perception**?
- what is the role of **cognate status** effect in CLI? what facilitates and what inhibits transfer?
- is there a difference between **dynamic** (across a word boundary) vs. **non-dynamic** (word-internal) voicing assimilation?

- in L1 Hungarian, L2/L3 English/Spanish

Experiments

- /s/ and /z/-voicing in English and Spanish by L1 Hungarians
- production
- perception
- joint work with Dr Zsuzsanna Bárkányi (Open University, London; Hungarian Research Centre for Linguistics; formerly Spanish Dpt. ELTE)

Methodology: speakers

- 14 (8 female, 6 male) aged 19–25
- L1 Hungarian speakers of L2/L3 English and Spanish (at least B2, majoring Spanish – **advanced** speakers)
- 0–3 months abroad
- all claimed to speak Central-Northern Peninsular Spanish; 4 American English, 6 British English, 4 mixed variety

Methodology: experiments

- conducted at Hungarian Research Centre for Linguistics
- sound proof room, with high-tech audio technology
- participant in room alone, experiment leader in separate room, contact through audio
    1. Hungarian part (for short checking of tech, speakers, etc.)
    2. Spanish part (production, short break, perception)
    3. Break
    4. English part (production, short break, perception)
    5. 2 questionnaires (demographics; phonological awareness); sign data handling agreement
- altogether around **90 minutes** for one participant

Methodology: production experiment

- time-limited reading task (4 seconds for each sentence)
- 10–13-syllable carrier sentences (same intonational phrase)
- randomised order with 4 repetitions for each sentence
- altogether: 83 sentences × 4 times × 14 participants = **4648** recordings to be analysed
- manual segmentation
- measured: amount of voicing within fricative constriction (%)
- suitable rigorous statistical analysis (extremely important but not detailed here…)

Methodology: production environments

- **target** consonants: **/s/** and **/z/** (only /s/ in Spanish)
- **trigger** consonants:
  - sonorants: **/m n l r/** (**PSV**)
  - stops: **/b d g/** (**RVA**)
- contexts:
  - **word-internally** (*static* voicing agreement)
  - **between words**/across a word boundary ("sandhi" context; *dynamic* context)

Examples for the English sentences

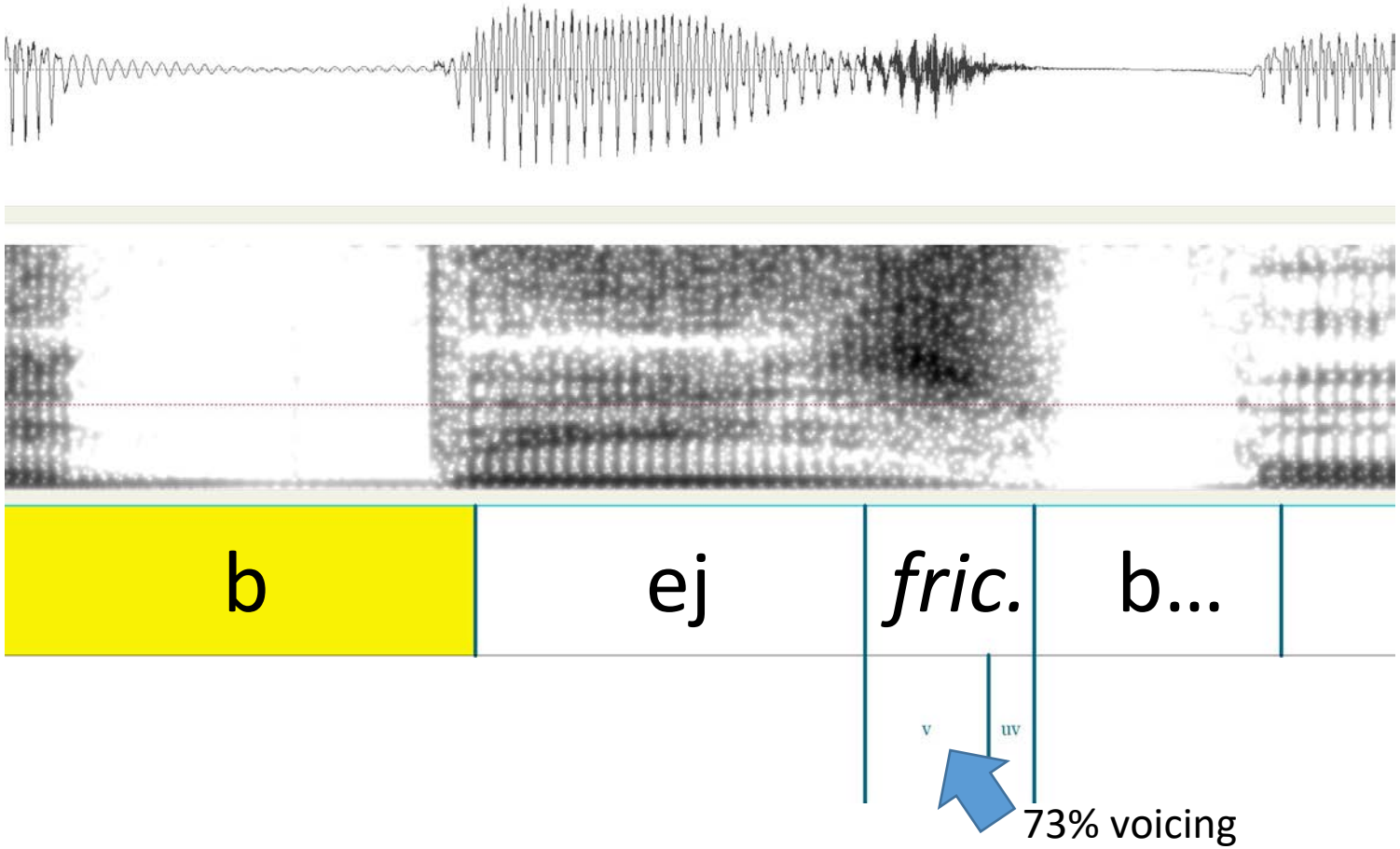
- The white **baseball** cap is my favourite. [sb] (RVA)
- A **disloyal** colleague was fired. [sl] (PSV)
- The use of **asbestos** was banned here. [zb] (RVA)
- Leaving **Bosnia** was difficult for me. [zl] (PSV)

- The **bonus deal** made everybody happy. [s#d] (dynamic RVA)
- This **virus loves** to mutate quickly. [s#l] (dynamic PSV)

Examples for the Spanish sentences

• Un bate de **béisbol** cuesta mucho.	[zb]	(RVA)
• Es un **rasgo** de su personalidad.	[zg]	(PSV)
• El **plasma** se movía bastante rápido.	[zm]	(PSV)
• El **islam** recupera su protagonismo.	[zl]	(PSV)
• Los **campus gallegos** aumentan.	[z#g]	(dynamic RVA)
• Hay **casas lindas** con jardines.	[z#l]	(dynamic PSV)

Segmentation demo



How much /s/-voicing is perceived as /z/?

- for aerodynamic reasons, voiced fricatives are often **not completely voiced**
- previous research has shown that if around **30%** of /s/ is voiced, it is enough to be perceived as **voiced /z/**
- less than 30% voicing can still be perceived as [z] if the preceding vowel is long enough (**Pre-Fortis Clipping rule**)

Cognate status illustration

- target: English /s/ before a sonorant = voiceless [s]
- ***dyslexia*** is a triple cognate word
  - it exists in English
  - cognate in L1 Hungarian, **facilitative** because it is pronounced with voiceless [s] in Hungarian (i.e., it is target-like)
  - cognate in L2 Spanish, **inhibitory** because it is pronounced with voiced [z] in Spanish (i.e., it is non-target-like)
  - coding: **SPA–HU+**
- ***asleep*** is a noncognate

Cognate status: English pre-sonorant target

ENG pre-son. /s/	SPA	L1 HUN
a**s**thma dy**s**lexia **s**nob	– /z/	+ /s/
I**c**eland Ya**s**min	– /z/	– /z/
di**s**loyal	– /z/	0
Noncognates: a**s**leep, ba**s**eline, Chri**s**tmas, mi**s**match		
Missing: Spanish **+** words		

ENG pre-son. /z/	SPA	L1 HUN
Bo**s**nia **I**slam	+ /z/	– /s/
phanta**s**mal	+ /z/	(0)
co**s**mos pla**s**ma	+ /z/	+ /z/
Noncognates: amu**s**ement, da**zz**ling, ro**s**emary, wi**s**ely		
Missing: Spanish **–** words		

Cognate status: Spanish pre-sonorant target

SPA pre-sonorant /s/ = [z]	ENG	L1 HUN
cosmos plasma	+ /z/	+ /z/
asma, dislexia esnobismo	– /s/	– /s/
Bosnia islam	+ /z/	– /s/
Islandia Yasmin	– /s/	+ /z/
fantasma, fantasmas	+ /z/	(0)
desleal, desmontar	– /s/	0
Noncognates: asno, isla, mismo, trasladar		

Hypotheses

- *Hypothesis 1:* inhibitory cognates are realised with voicing properties **less similar** to those in the target language than non-cognates.
- *Hypothesis 2:* facilitative cognates are **more likely** to be realised with target-like voicing properties than non-cognates.
- *Hypothesis 3:* when cognates are contradictory, e.g., L1 facilitative, L2 inhibitory or L1 inhibitory, L2 facilitative, it is the **L1 pattern that dominates**.
- *Hypothesis 4:* **sonorants do not trigger** voicing assimilation in sandhi in either Spanish (non-target-like) or English (target-like).
- *Hypothesis 5:* **obstruents trigger** RVA in sandhi context in both Spanish (target-like) and English (non-target-like).

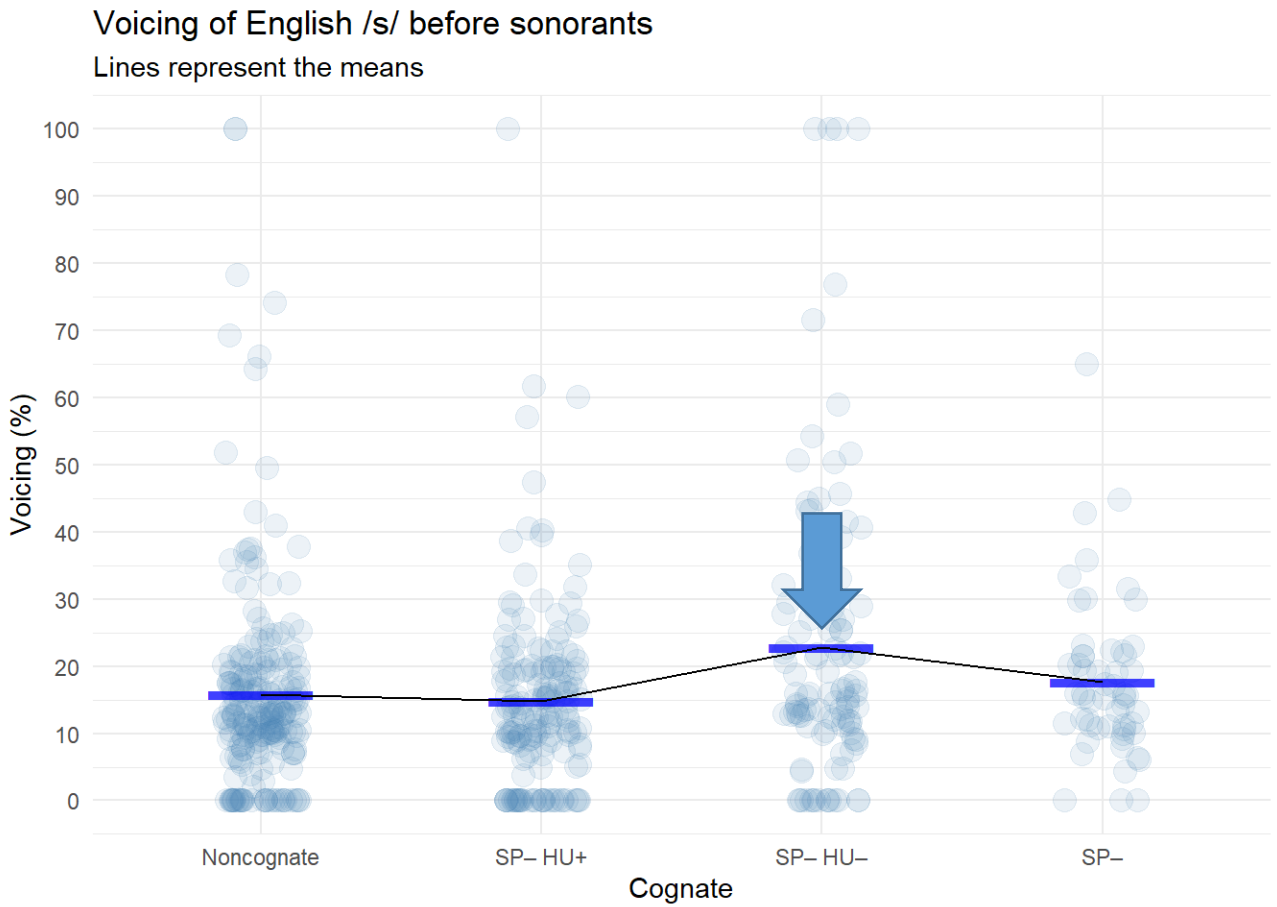
Extract from the data table

atm

Filter

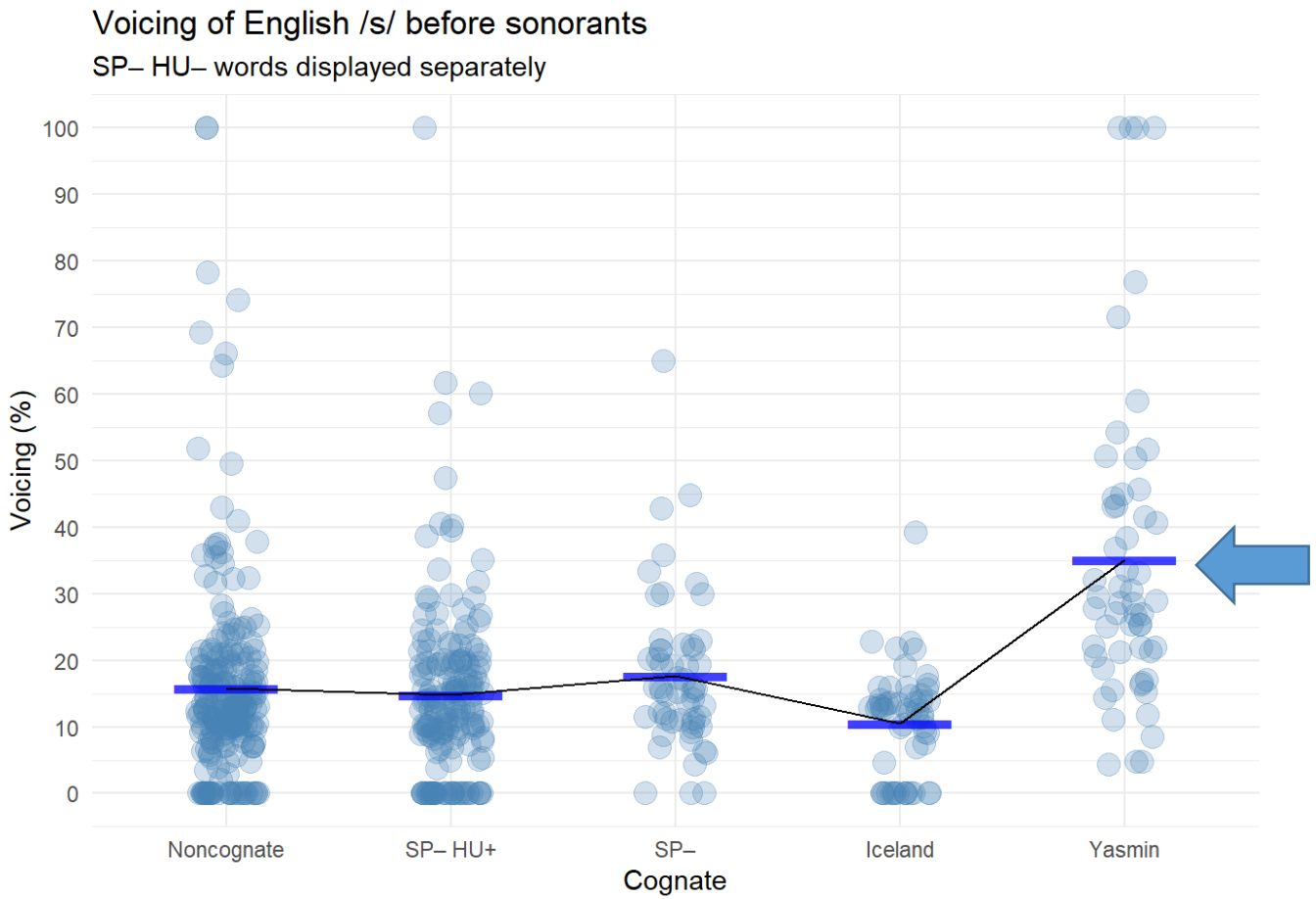
file	subjcode	subject	rep	sent	word	v1dur	c1dur	vdur	vtotpc	uvdur	lang	target	trigger	trigclass	cognate	env	part	sentence	segmer	bad
BRT0003eng_1_1	BRT	03	1	1	baseball	133.8565	33.2130	28.6052	86.126517	4.6078	eng	s	b	stop	cog_sp-hu-	word	p2	1;His baseball bat was lost by the airline.	gkz	n
BRT0003eng_1_2	BRT	03	1	2	baseball	122.8510	44.4380	25.4270	57.219047	19.0109	eng	s	b	stop	cog_sp-hu-	word	p2	2;The white baseball cap is my favourite.	gkz	n
BRT0003eng_2_1	BRT	03	2	1	baseball	133.3110	60.4618	27.0519	44.742135	33.4098	eng	s	b	stop	cog_sp-hu-	word	p2	1;His baseball bat was lost by the airline.	gkz	n
BRT0003eng_2_2	BRT	03	2	2	baseball	109.7056	64.5210	24.7761	38.400056	39.7449	eng	s	b	stop	cog_sp-hu-	word	p2	2;The white baseball cap is my favourite.	gkz	n
BRT0003eng_3_1	BRT	03	3	1	baseball	112.2348	54.6605	21.7411	39.774792	32.9194	eng	s	b	stop	cog_sp-hu-	word	p2	1;His baseball bat was lost by the airline.	gkz	n
BRT0003eng_3_2	BRT	03	3	2	baseball	101.6077	67.2680	33.7722	50.205447	33.4958	eng	s	b	stop	cog_sp-hu-	word	p2	2;The white baseball cap is my favourite.	gkz	n
BRT0003eng_4_1	BRT	03	4	1	baseball	110.7356	38.5007	25.6890	66.723462	12.8117	eng	s	b	stop	cog_sp-hu-	word	p2	1;His baseball bat was lost by the airline.	gkz	n
BRT0003eng_4_2	BRT	03	4	2	baseball	110.4103	63.8918	23.9315	37.456293	39.9604	eng	s	b	stop	cog_sp-hu-	word	p2	2;The white baseball cap is my favourite.	gkz	n
DEK0004eng_1_1	DEK	04	1	1	baseball	123.9252	61.3286	23.1515	37.749924	38.1771	eng	s	b	stop	cog_sp-hu-	word	p2	1;His baseball bat was lost by the airline.	gkz	n
DEK0004eng_1_2	DEK	04	1	2	baseball	111.2234	63.0368	63.0368	100.000000	0.0000	eng	s	b	stop	cog_sp-hu-	word	p2	2;The white baseball cap is my favourite.	gkz	n
DEK0004eng_2_1	DEK	04	2	1	baseball	114.5508	53.8061	53.8061	100.000000	0.0000	eng	s	b	stop	cog_sp-hu-	word	p2	1;His baseball bat was lost by the airline.	gkz	n
DEK0004eng_2_2	DEK	04	2	2	baseball	126.4493	59.1583	59.1583	100.000000	0.0000	eng	s	b	stop	cog_sp-hu-	word	p2	2;The white baseball cap is my favourite.	gkz	n
DEK0004eng_3_1	DEK	04	3	1	baseball	139.4603	40.3459	40.3459	100.000000	0.0000	eng	s	b	stop	cog_sp-hu-	word	p2	1;His baseball bat was lost by the airline.	gkz	n
DEK0004eng_3_2	DEK	04	3	2	baseball	115.6529	59.9773	59.9773	100.000000	0.0000	eng	s	b	stop	cog_sp-hu-	word	p2	2;The white baseball cap is my favourite.	gkz	n
DEK0004eng_4_1	DEK	04	4	1	baseball	125.0617	46.3691	46.3691	100.000000	0.0000	eng	s	b	stop	cog_sp-hu-	word	p2	1;His baseball bat was lost by the airline.	gkz	n
DEK0004eng_4_2	DEK	04	4	2	baseball	124.9480	60.9436	34.9732	57.386173	25.9705	eng	s	b	stop	cog_sp-hu-	word	p2	2;The white baseball cap is my favourite.	gkz	n
PAG0005eng_1_1	PAG	05	1	1	baseball	115.6659	43.4760	11.7458	27.016745	31.7302	eng	s	b	stop	cog_sp-hu-	word	p2	1;His baseball bat was lost by the airline.	gkz	n
PAG0005eng_1_2	PAG	05	1	2	baseball	100.3643	43.6030	26.8863	61.661583	16.7167	eng	s	b	stop	cog_sp-hu-	word	p2	2;The white baseball cap is my favourite.	gkz	n
PAG0005eng_2_1	PAG	05	2	1	baseball	104.6131	39.8160	22.1432	55.613824	17.6727	eng	s	b	stop	cog_sp-hu-	word	p2	1;His baseball bat was lost by the airline.	gkz	n
PAG0005eng_2_2	PAG	05	2	2	baseball	95.0466	46.5509	18.6089	39.975382	27.9420	eng	s	b	stop	cog_sp-hu-	word	p2	2;The white baseball cap is my favourite.	gkz	n
PAG0005eng_3_1	PAG	05	3	1	baseball	99.6404	31.6426	31.6426	100.000000	0.0000	eng	s	b	stop	cog_sp-hu-	word	p2	1;His baseball bat was lost by the airline.	gkz	n
PAG0005eng_3_2	PAG	05	3	2	baseball	81.9144	51.5547	19.7540	38.316584	31.8007	eng	s	b	stop	cog_sp-hu-	word	p2	2;The white baseball cap is my favourite.	gkz	n
PAG0005eng_4_1	PAG	05	4	1	baseball	100.0706	21.9825	11.8779	54.033436	10.1045	eng	s	b	stop	cog_sp-hu-	word	p2	1;His baseball bat was lost by the airline.	gkz	n
PAG0005eng_4_2	PAG	05	4	2	baseball	85.0839	48.7672	14.8006	30.349497	33.9666	eng	s	b	stop	cog_sp-hu-	word	p2	2;The white baseball cap is my favourite.	gkz	n
RIM0006eng_1_1	RIM	06	1	1	baseball	121.9727	55.6835	15.0167	26.967953	40.6668	eng	s	b	stop	cog_sp-hu-	word	p2	1;His baseball bat was lost by the airline.	gkz	n
RIM0006eng_1_2	RIM	06	1	2	baseball	147.9519	76.0150	24.9702	32.849043	51.0449	eng	s	b	stop	cog_sp-hu-	word	p2	2;The white baseball cap is my favourite.	gkz	n
RIM0006eng_2_1	RIM	06	2	1	baseball	122.9711	62.6220	16.9190	27.017662	45.7029	eng	s	b	stop	cog_sp-hu-	word	p2	1;His baseball bat was lost by the airline.	gkz	n
RIM0006eng_2_2	RIM	06	2	2	baseball	113.0754	59.6860	19.0050	31.841638	40.6809	eng	s	b	stop	cog_sp-hu-	word	p2	2;The white baseball cap is my favourite.	gkz	n
RIM0006eng_3_1	RIM	06	3	1	baseball	134.8737	72.3568	10.6745	14.752587	61.6823	eng	s	b	stop	cog_sp-hu-	word	p2	1;His baseball bat was lost by the airline.	gkz	n

Results: English pre-sonorant */s/ (disloyal)*



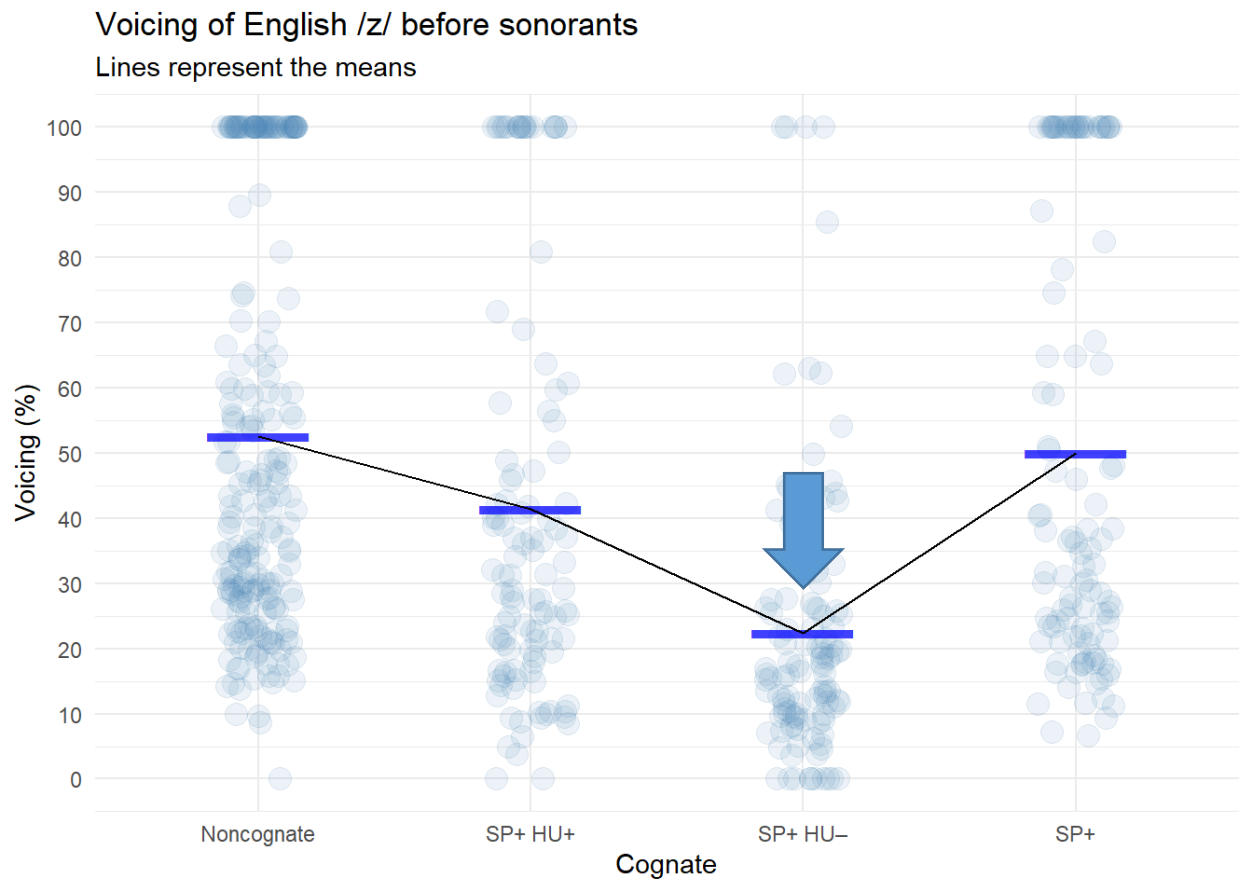
little voicing overall in /s/; cognate status effect: **SP– HU–**, **SP–** words increased voicing but the differences are not significant

Results: English pre-sonorant /s/



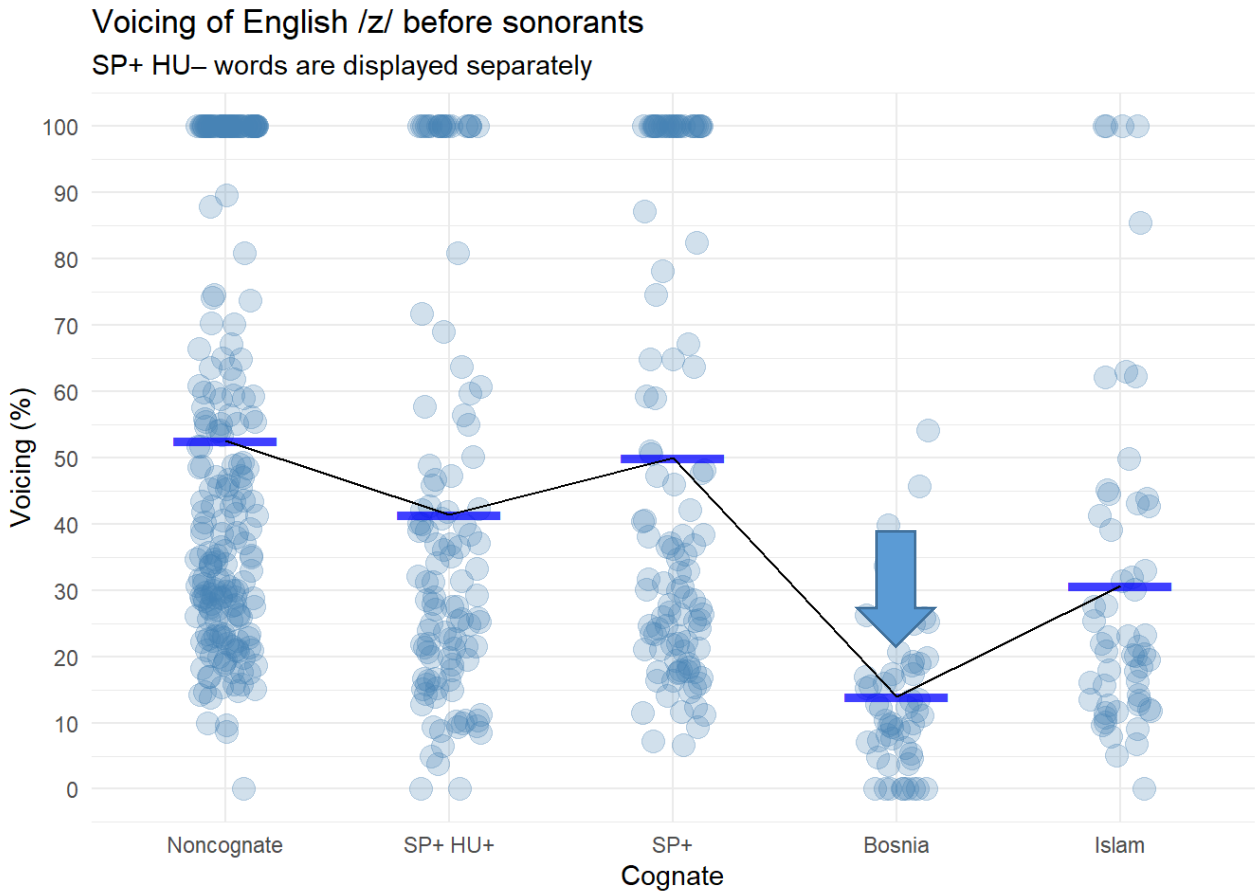
Yasmin was responsible for the effect
(significant difference from means of all other words, exc. one)

Results: English pre-sonorant /z/ *(amusement)*



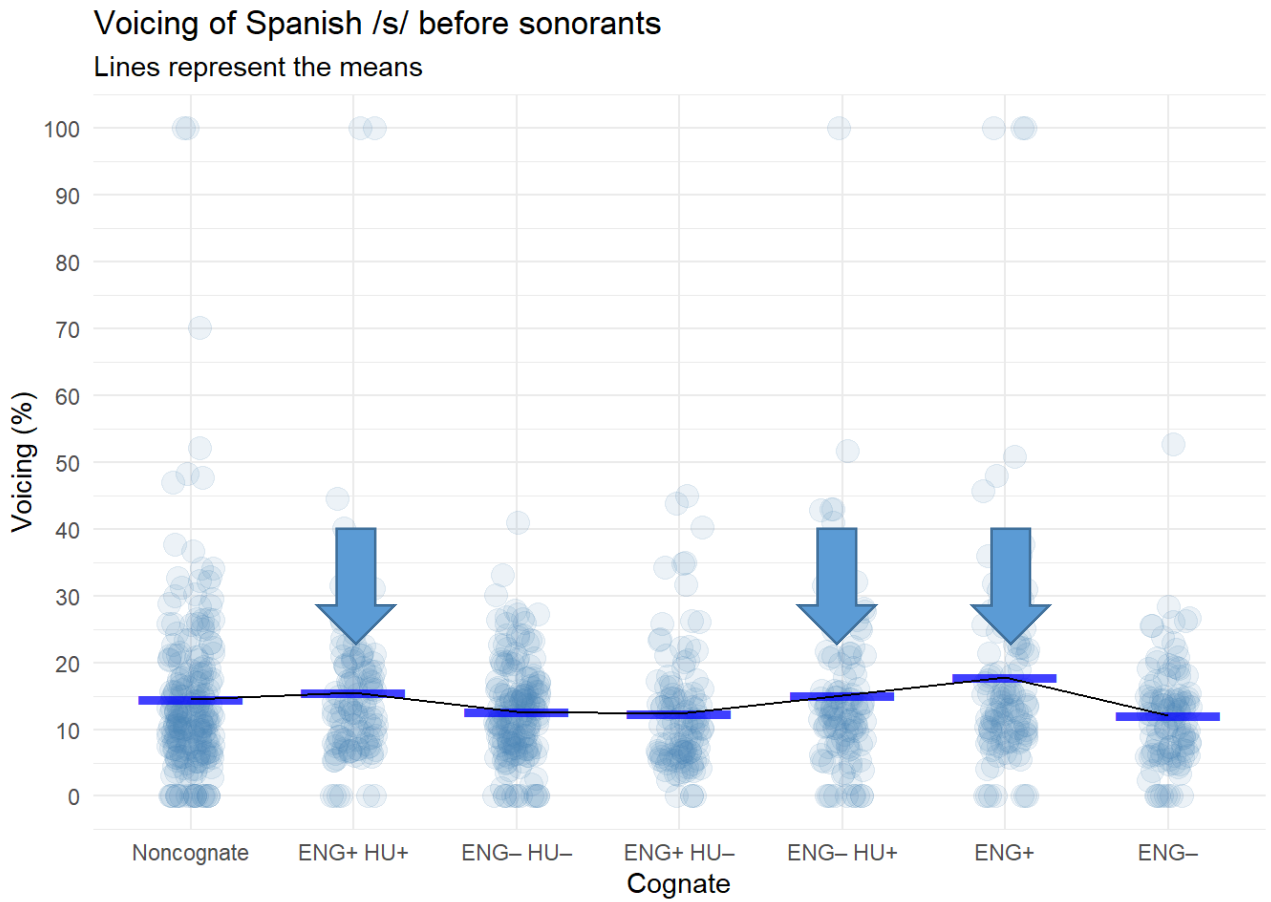
fair amount of voicing; cognate status effect: **SP+ HU–** words decreased voicing (sign. difference from noncognates & SP+)

Results: English pre-sonorant /z/



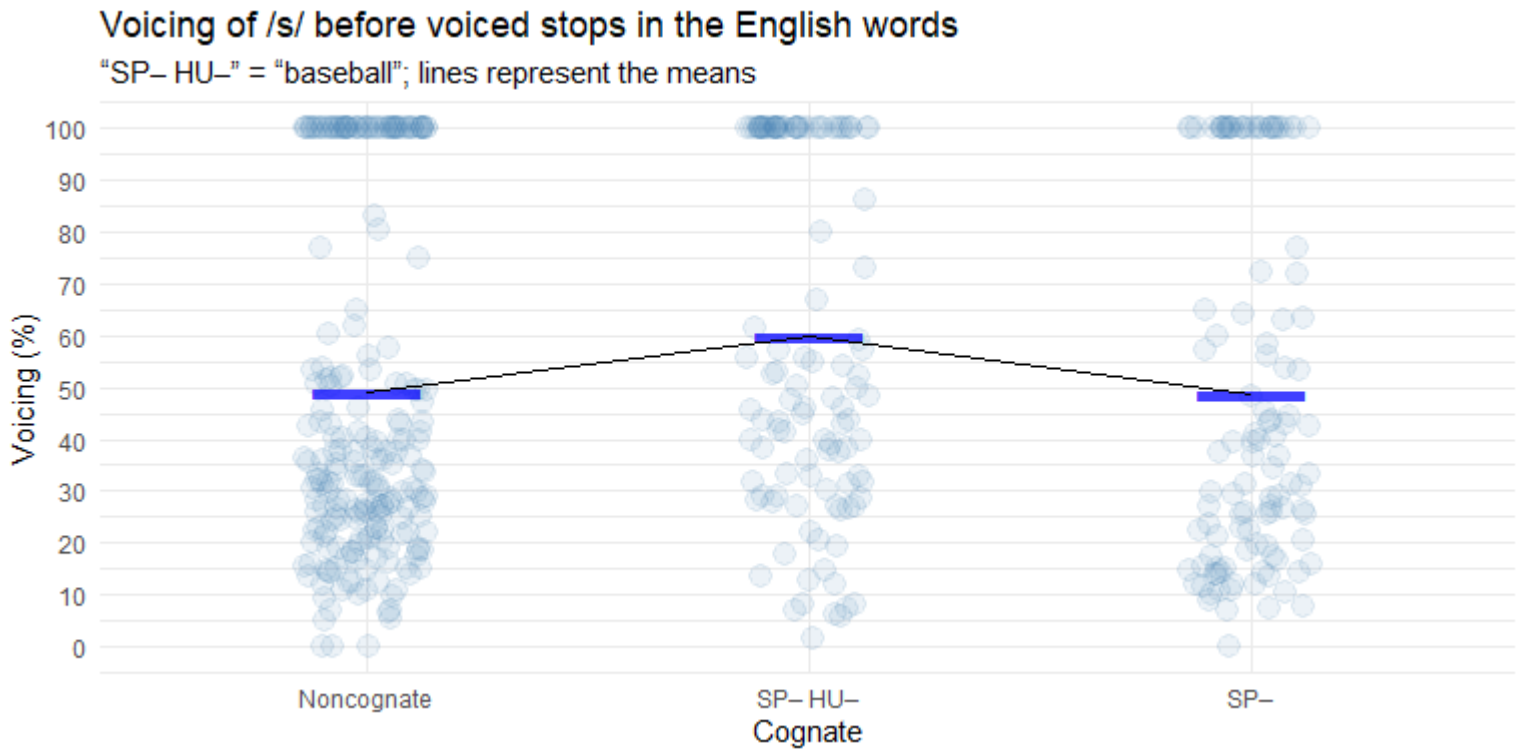
mostly *Bosnia* brought down the mean of SP+HU– words;
sign. different from all words, exc. *Islam*

Results: Spanish pre-sonorant /s/=[z]



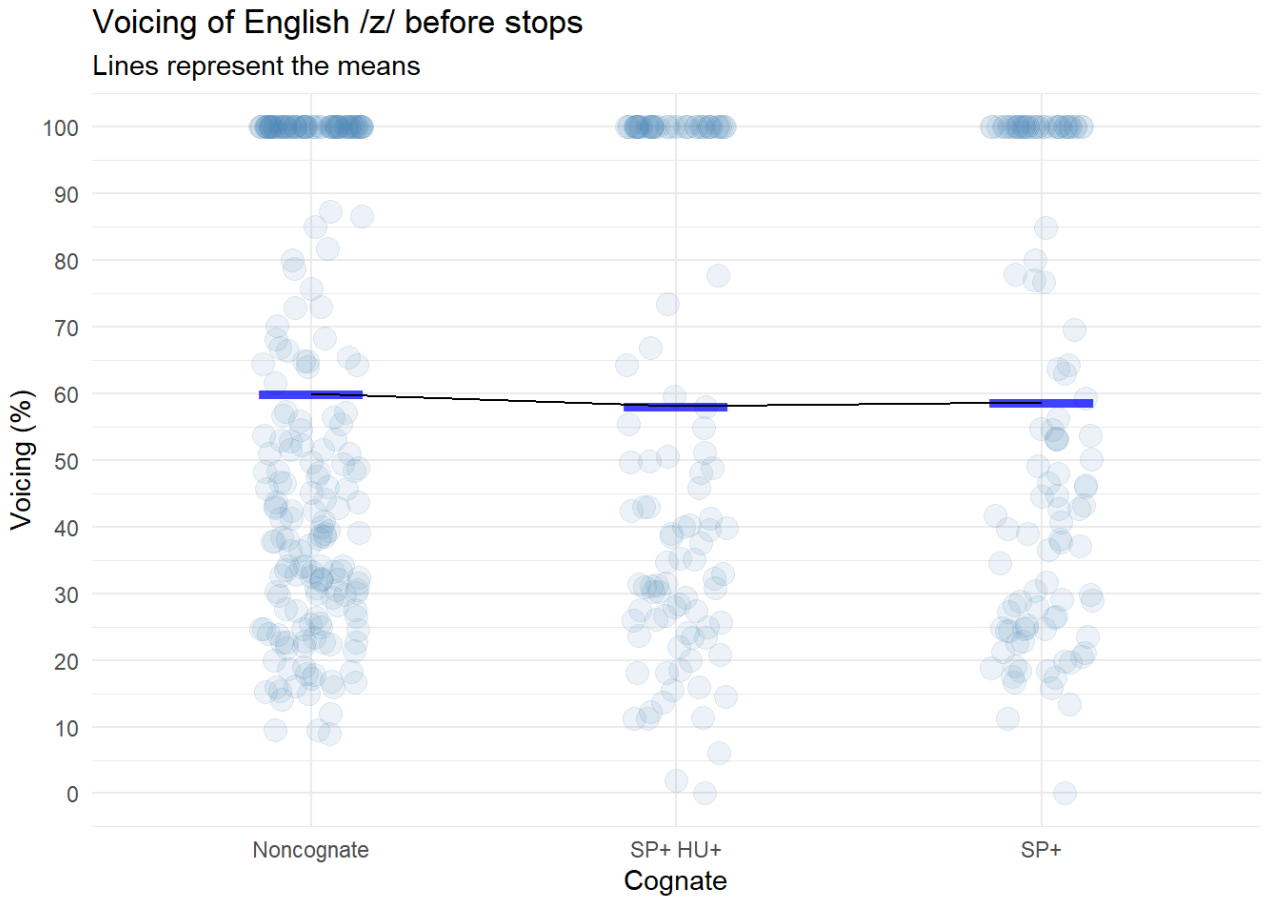
no PSV at all; no cognate status effect,
even in words like *cosmos, plasma, Yasmin…*

Results: RVA in the English words with /s/



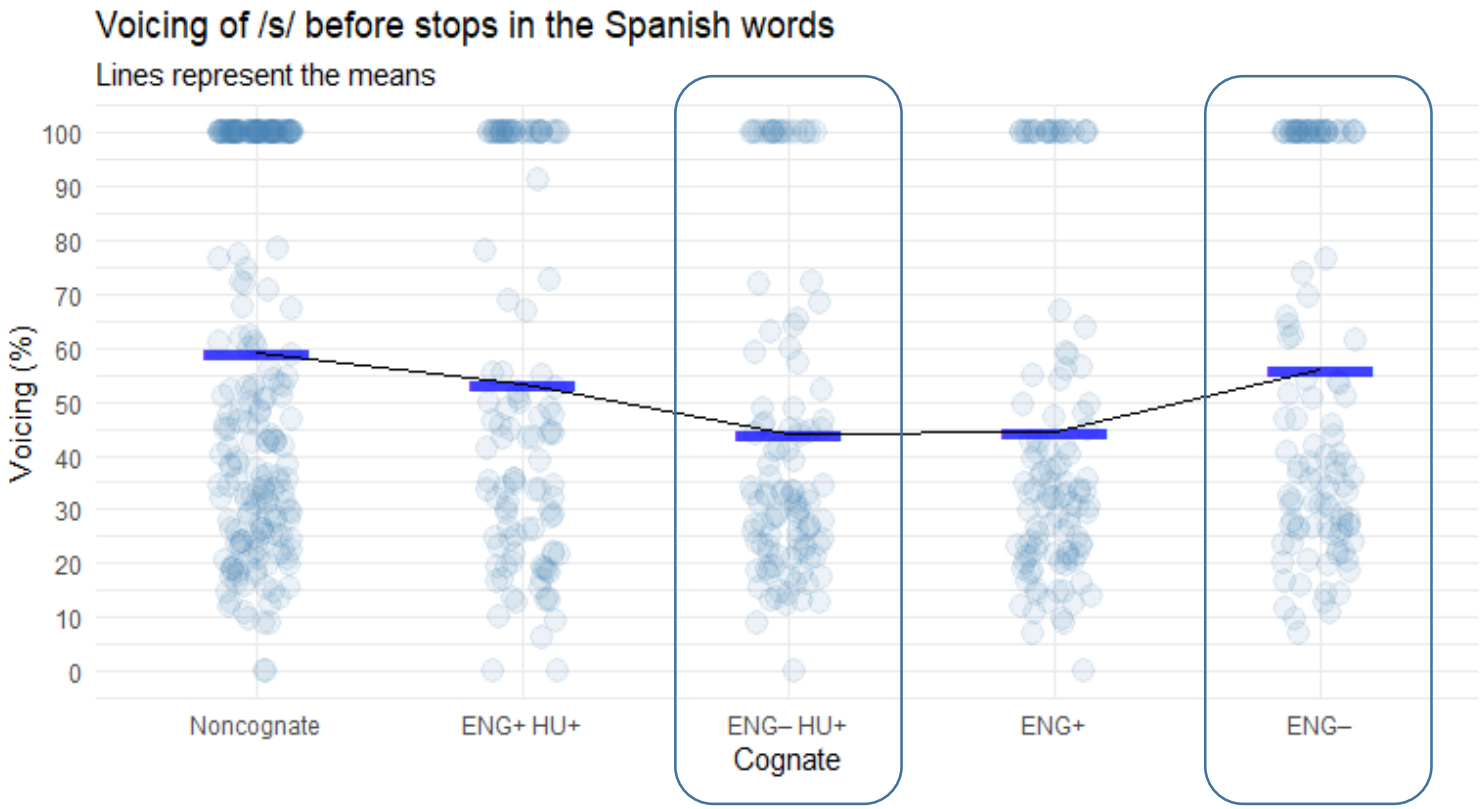
fair amount of voicing everywhere;
no sign. cognate effect but increased voicing in SP–HU–

Results: RVA in the English words with /z/



fair amount of voicing everywhere here, too
(no sign. cognate effect)

Results: RVA in the Spanish words with /s/ [z]

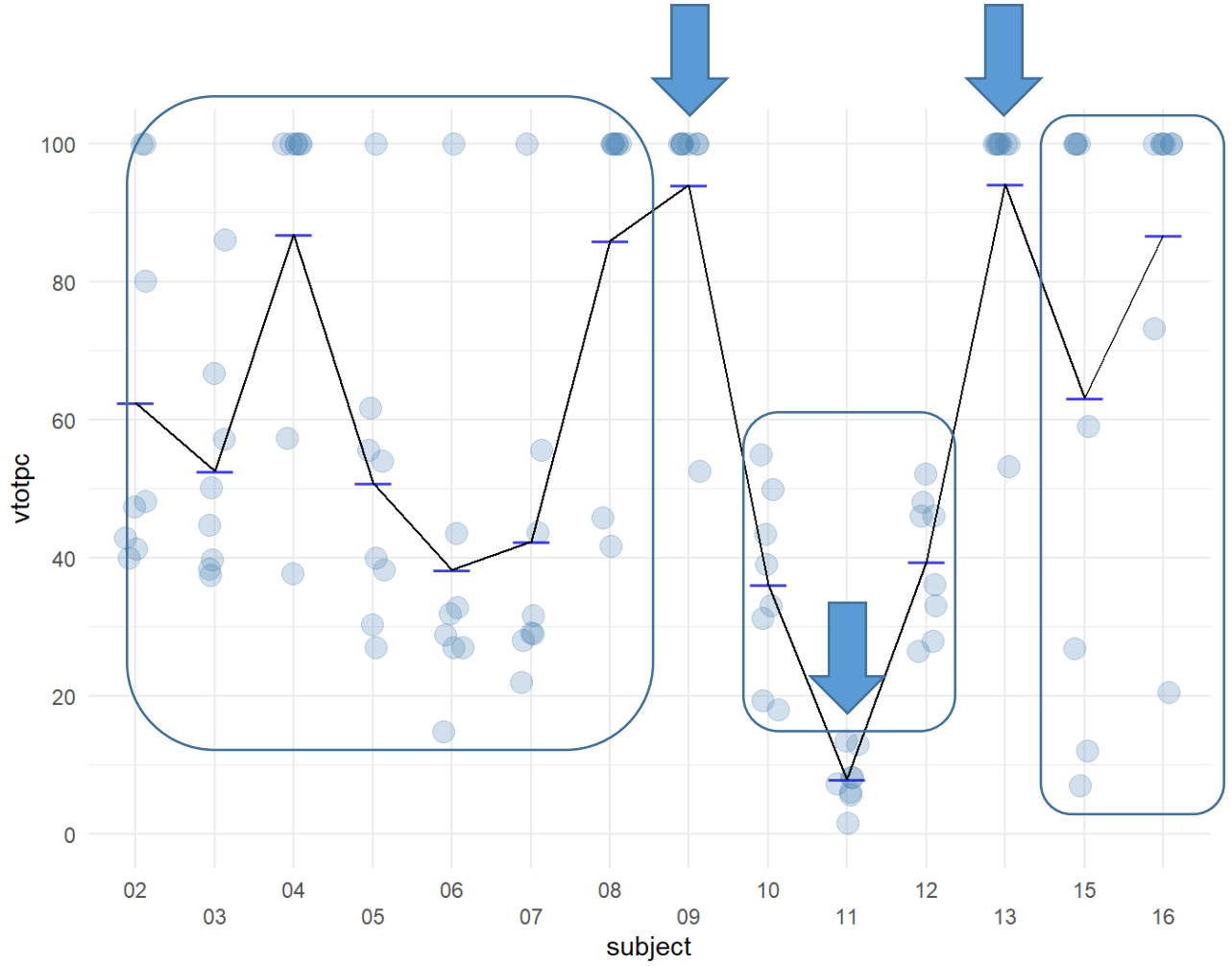


fair amount of voicing everywhere (compare the internal env.!);
English unable to bring down voicing

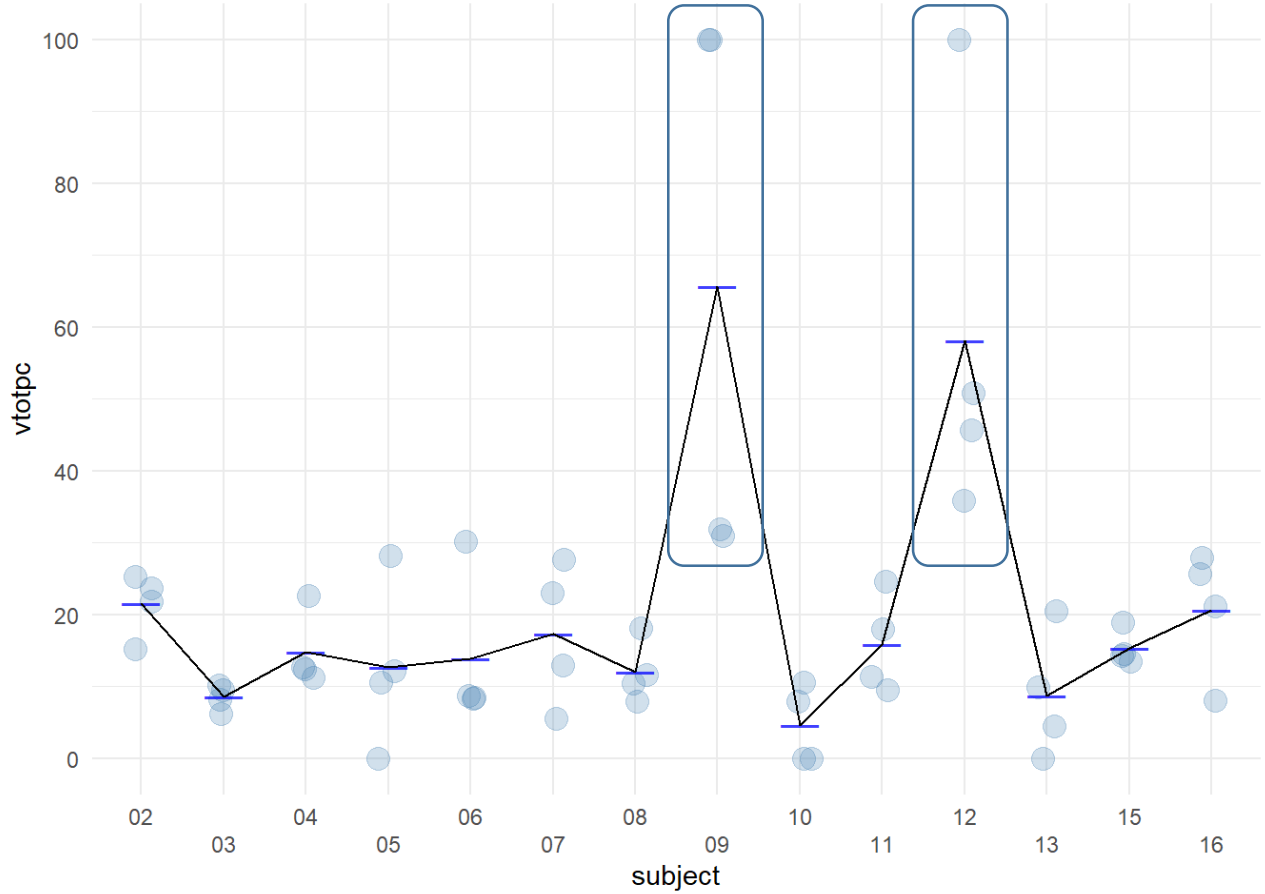
Individual variation

- the averages often hide significant participant variation
  - **inter**speaker variation: mean differences **between** speakers
  - **intra**speaker variation: differences **within** same speaker
- if you record only one instance from a speaker, that will hide the potential variation (too many repetitions are also problematic though)
- proper statistical models can incorporate variations like this
- **always check individual variation in your data!**

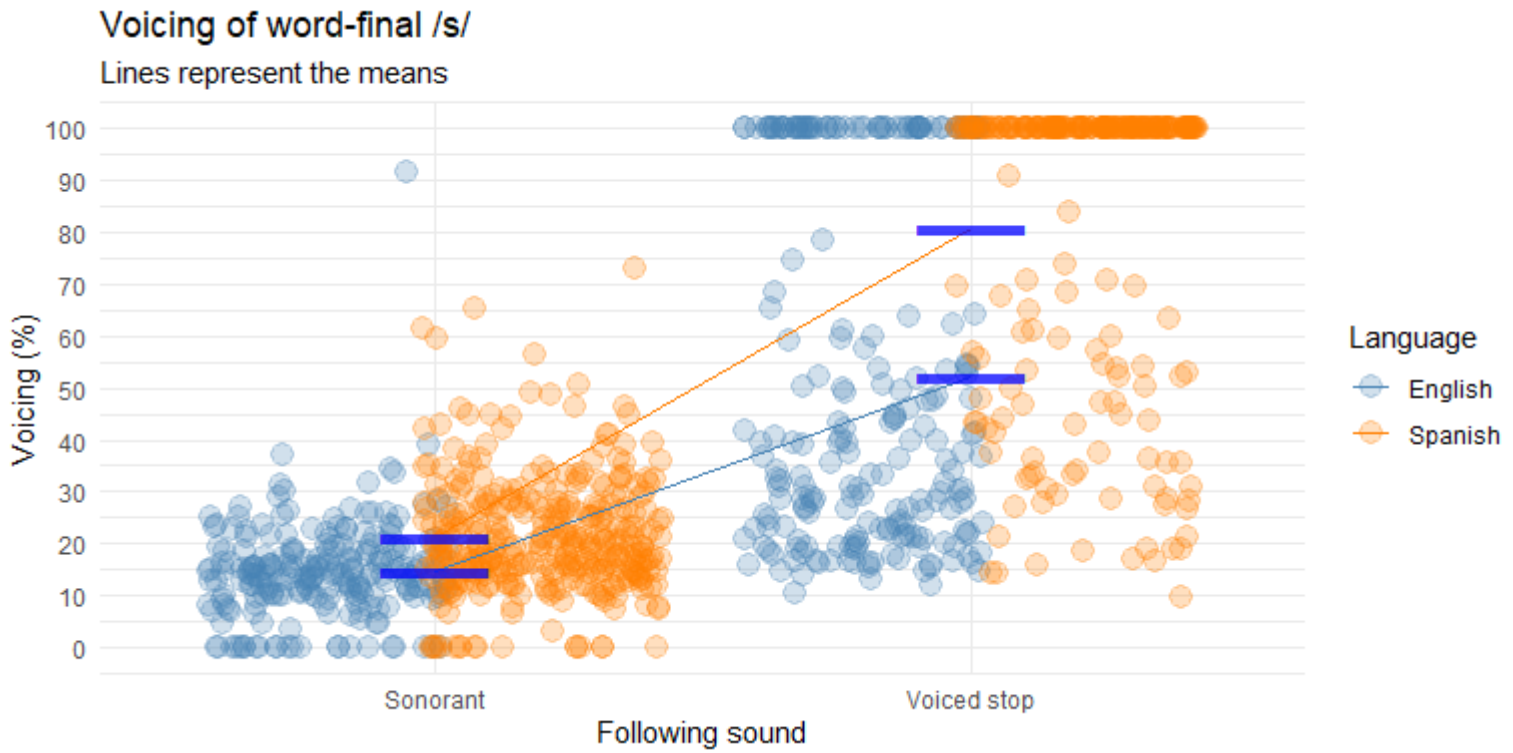
Individual variation example: English *baseball*



Individual variation example: Spanish *fantasma*

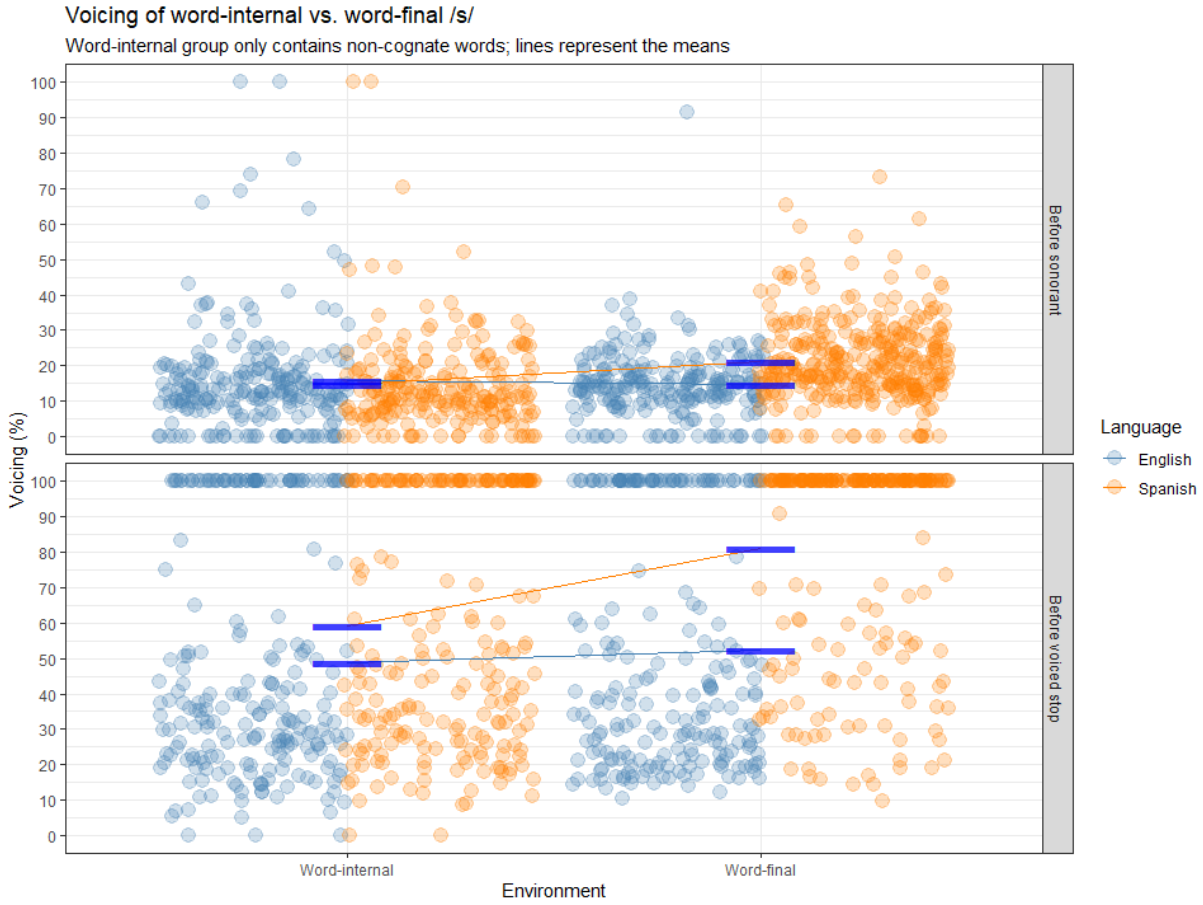


Results: PSV & RVA across the word boundary



–no voicing before sonorants, even in SPA;
–strong voicing before voiced stops, even in ENG;
–more voicing in Spanish

Results: /s/-voicing internally vs. finally



–no difference before sonorants: **no PSV** in either context;

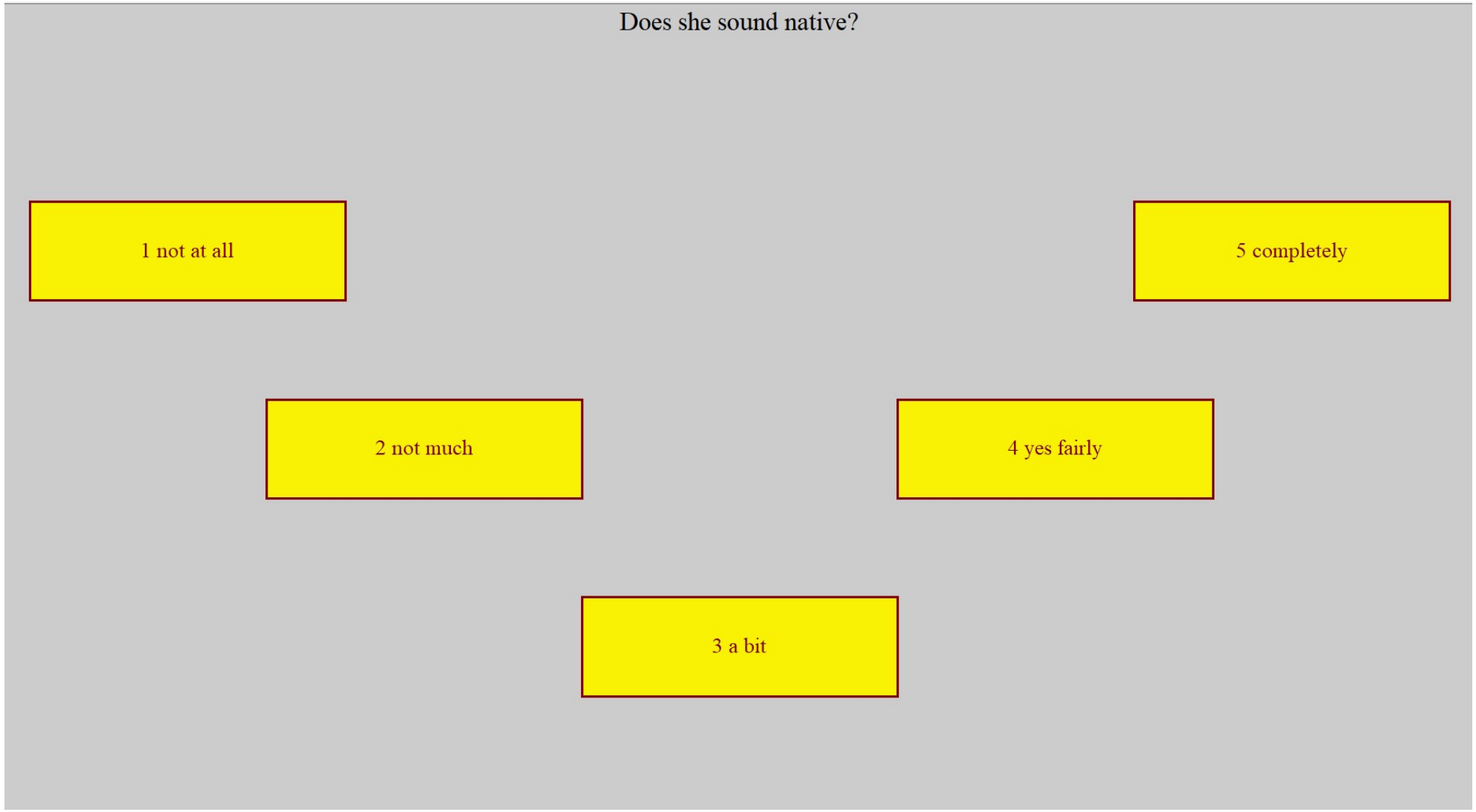
–RVA: **much more voicing** than before sonorants;

–RVA: more voicing in Spanish finally

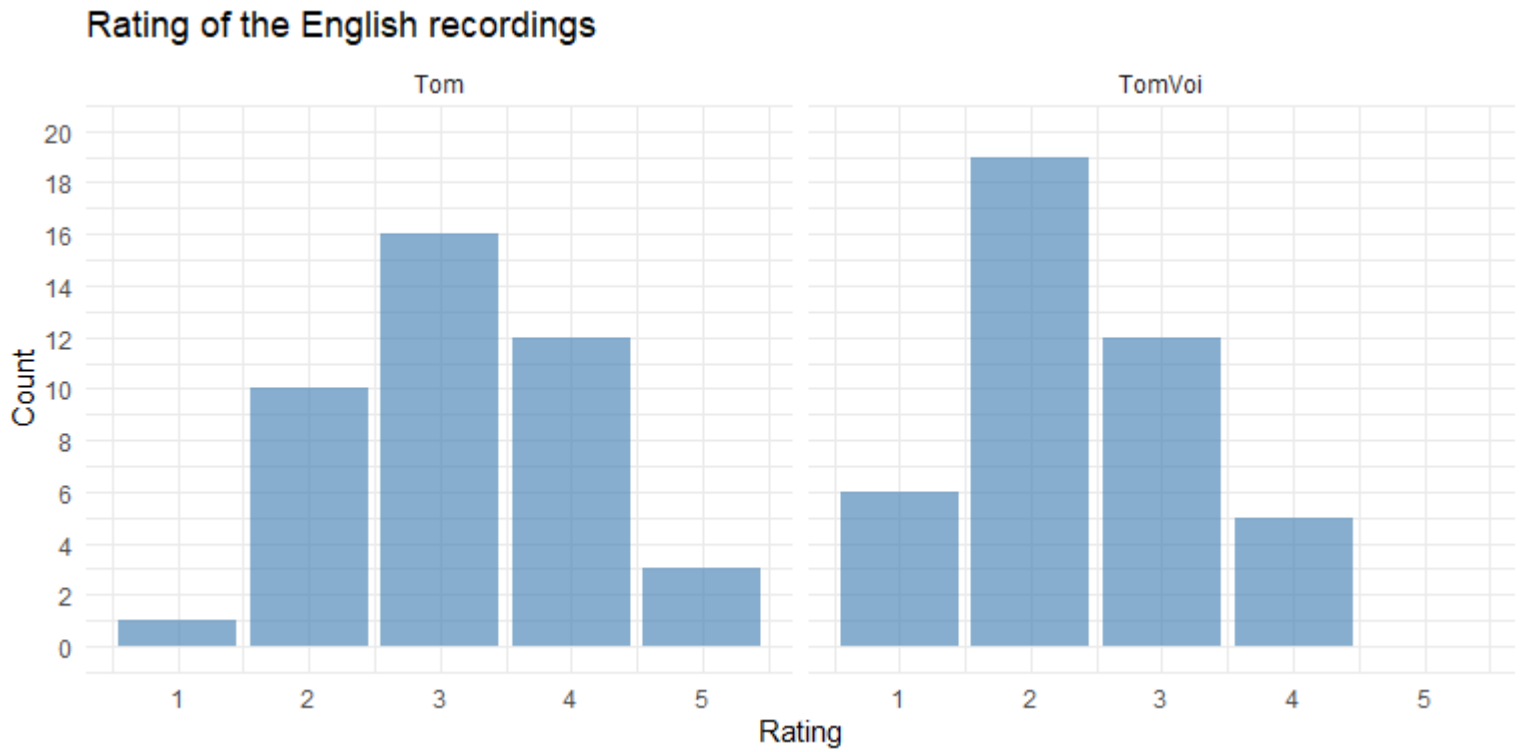
Perception experiment: methodology

- a short (approx. one-minute long) story was recorded in both L2/L3 by two phonetically trained bilingual female speakers with native-like proficiency in both languages
- the same short story was recorded, but this time in the English text RVA was applied as would be in Hungarian, and in the Spanish text no PSV was employed to mirror the L1 laryngeal patterns of listeners
- all other aspects were native-like
- same participants as in the production experiments;
  listened to each text three times in random order wearing a headphone
- blank screen while listening, then: rank on a scale from 1 to 5 how native-like the speaker sounded (with **1: not at all native-like** and **5: completely native-like**)

Perception experiment: rating choices

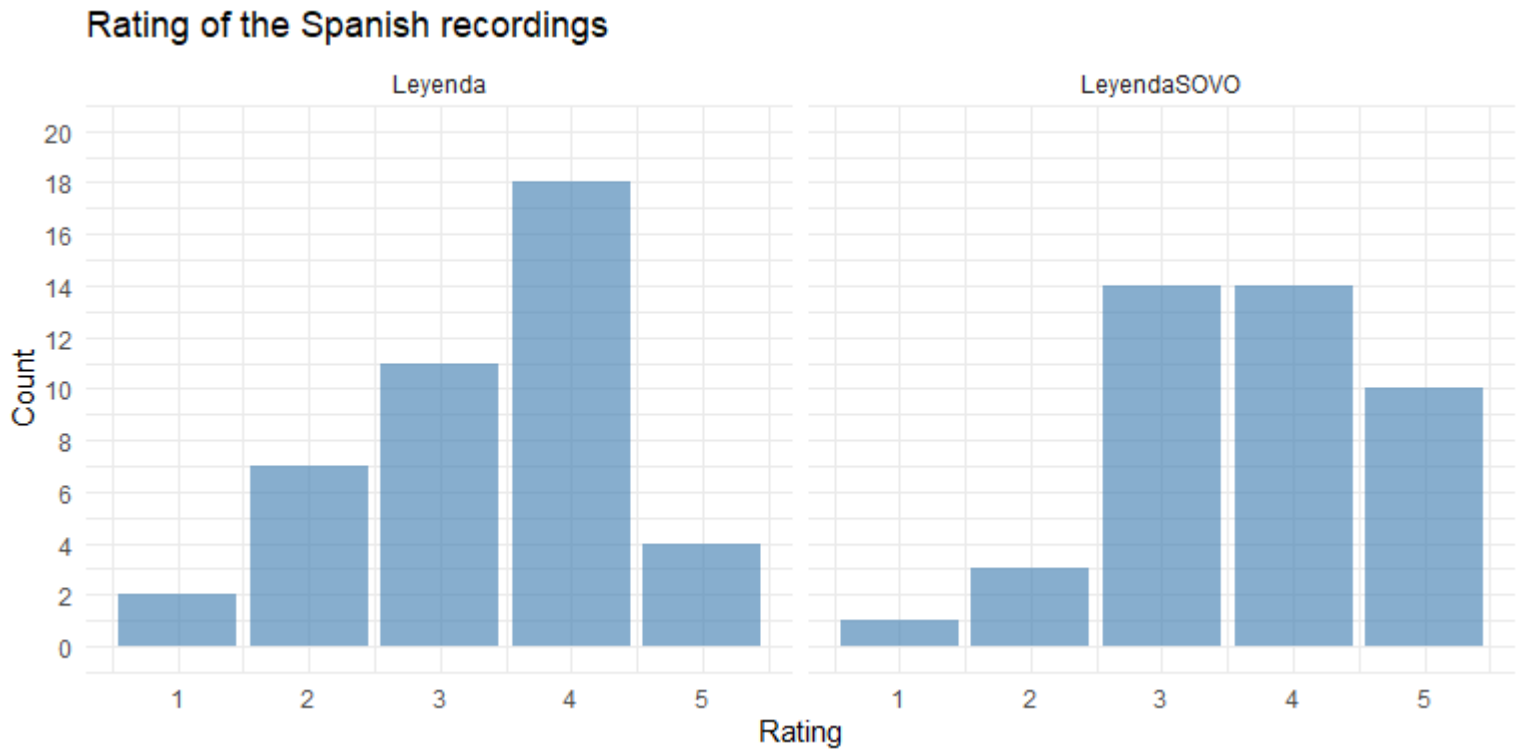


Perception results: English texts



–non-native text sign. decreased the ratings, i.e., lower ratings were more likely; reliably differentiated between recordings, and rated the non-native one (with RVA applied) much lower

Perception results: Spanish texts



–no sign. difference here; did not reliably differentiate between the native recording (with PSV) and the non-native recording (without PSV)

Discussion: cognate effect b. sonorants in ENG

- In the presonorant voicing context, ENG **/s/** showed increased voicing in cognates where L1 is inhibitory (= HUN has a /z/) ⇒ 👆**H1**
- caution: *Yasmin* caused the effect (might be with /z/ in some accents)
- caution: *Iceland* may not be a good cognate
- preson. ENG **/z/** also showed cognate effect *(Bosnia, Islam)* ⇒ 👆**H1**
- the facilitative effect of SPA could not counterbalance the inhibitory effect of L1 HUN (= HUN “won”) ⇒ 👆**H3**

Discussion: cognate effect b. sonorants in SPA

- SPA production data do not show any cognate effects; a steady absence of PSV ⇒ 👎 **H1**
- facilitative cognates do not differ from non-cognate realisations *(co**s**mos, pla**s**ma, I**s**landa, Ya**s**min)* ⇒ 👎 **H2**
- why do participants behave differently in their two non-native Ls?
- putative factor: phonemic encoding during the acquisition of words
- in ENG the /s/–/z/ contrast is robust just like in HUN (e.g., many minimal pairs) but no such contrast in SPA; [s]–[z] is mapped to 2 categories for ENG vs. just 1 category in SPA:

ENG [s] → HU /s/	but	SPA [s] → HU /s/
ENG [z] → HU /z/		SPA [z] → HU /s/

Discussion: cognate effect before voiced stops

- strong RVA across all groups in both languages, overriding cognate effects: cognates are not significantly different from non-cognates
- **H1** was supported here, too
- **H3** was supported: L2 ENG in itself cannot induce any cognate effect
- **H2** unsupported: L1 cannot induce + effect
- RVA simply overrides (“stronger”) any lexical effect (like cognateness)

Discussion: PSV across word boundary (sandhi)

- patterns we observed are similar to those within the word
- **H4 supported:** /s/ had little PSV, which is expected ENG, but had PSV been learned, more voicing would have been in SPA
- **HUN advanced learners simply do not produce and perceive PSV in Spanish anywhere**
  - HUN & SPA are **similar** enough to be treated as the 'same' (voicing languages, both display RVA between adjacent obstruents)
  - PSV in SPA is **variable** (gradual or optional), it might not serve as sufficient and salient input for learners to be "discovered"
  - PSV is typologically relatively **rare**, too
- this is supported by the **perception** experiment: PSV was **unnoticed** and as a result it fails to be acquired (learners may hear it but treat it as "background noise")

Discussion: RVA across word boundary (sandhi)

- patterns we observed are similar to those within the word again
- **H5 is supported**
- RVA in Spanish is on-target and was produced, but in ENG it is non-target yet it **failed to be blocked even though its "misapplication" was strongly perceived**
- ⇒ nonperception & nonproduction go hand in hand (SPA PSV), but perception & production may not!

Some implications & future research

- the results indicate the **overall primacy of L1** in dynamic phonological processes in multilingual speech**:**
  - cognate status effect comes from only **L1**
  - establishing contrastive categories depends on **L1** contrast: if target language doesn't have enough evidence for **L1**-type of contrast (Spanish /s/), a single category is created, otherwise the same contrast as in **L1**
  - applying dynamic phonological processes depends on **L1**, too
- the **L1** laryngeal system is transferred to L2/L3 once the category/-ies are created, regardless the typological similarity/difference & perception:
  - no PSV but RVA in Spanish — just like in **L1** HUN
  - no PSV but RVA in English, too — just like in **L1** HUN, despite HUN being a different laryngeal system and despite learners perceiving it
- what is the internal vs. final asymmetry due to in Spanish?
- L1 with both PSV & RVA is predicted to behave differently


"That's all Folks!"