Phonological awareness and conventionalization in sound change

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Example of unremarkable sound change: Western Romance Voicing
p t k > b d g / V___V

	Latin	Italian	Spanish
p	sa**p**ēre	*sapere*	*sa**b**er*
t	vī**t**a	*vita*	*vi**d**a*
k	amī**c**a	*amica*	*ami**g**a*

Stage I (Latin)

/p/ porta ‘door’ , corpus ‘body’ , lupum ‘wolf’

/b/ bucca ‘mouth’, herba ‘grass’

Stage II (Spanish)

/p/ puerta, cuerpo

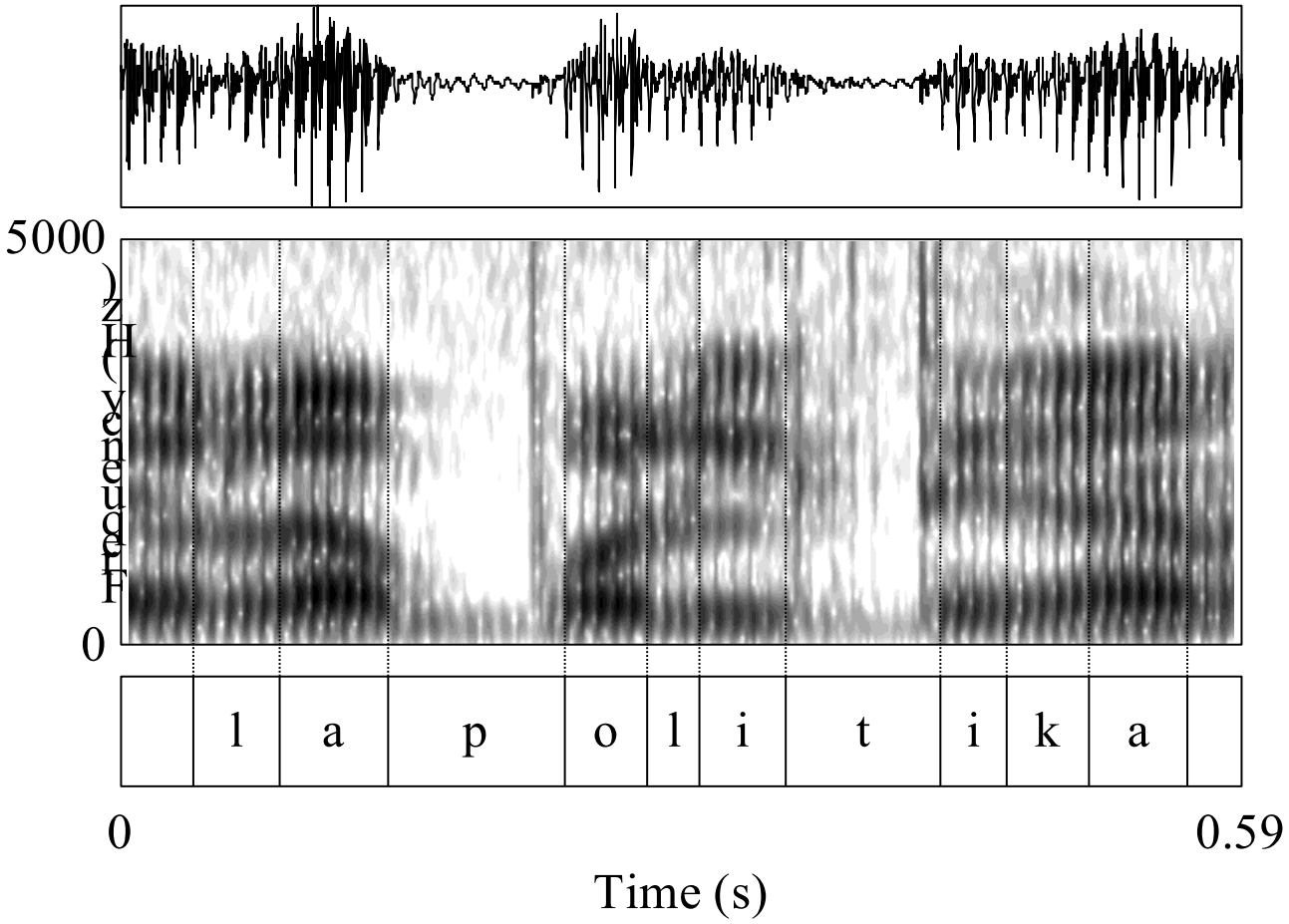
/b/ boca, hierba, lobo

Phonetics vs phonology in sound change

1. /p/ → [b] / V__V voice assimilation
2. /p/ > /b/ How?

On-going phonetic voicing of intervocalic /ptk/ in Spanish

*Second round of voicing? No awareness of sound change in progress



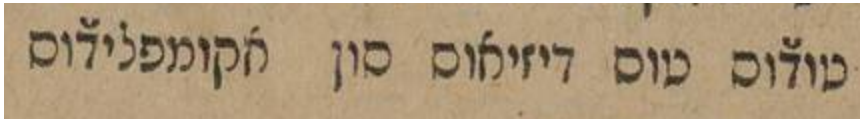
allophonic voicing =/ sound change

Allophony of voiced obstruents in Spanish

/d/ [d] – [ð]

día [día] ‘day’ *cada día* [káðaðía] ‘each day’

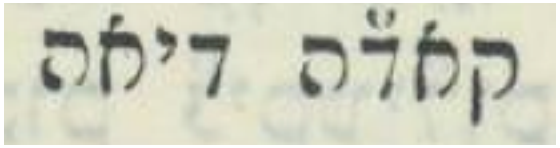
19th-20th cent. Judeo-Spanish texts in Rashi script published in Salonika and Constantinople



Tođos tus dezeos son akompliđos
‘ All your desires are fulfilled’

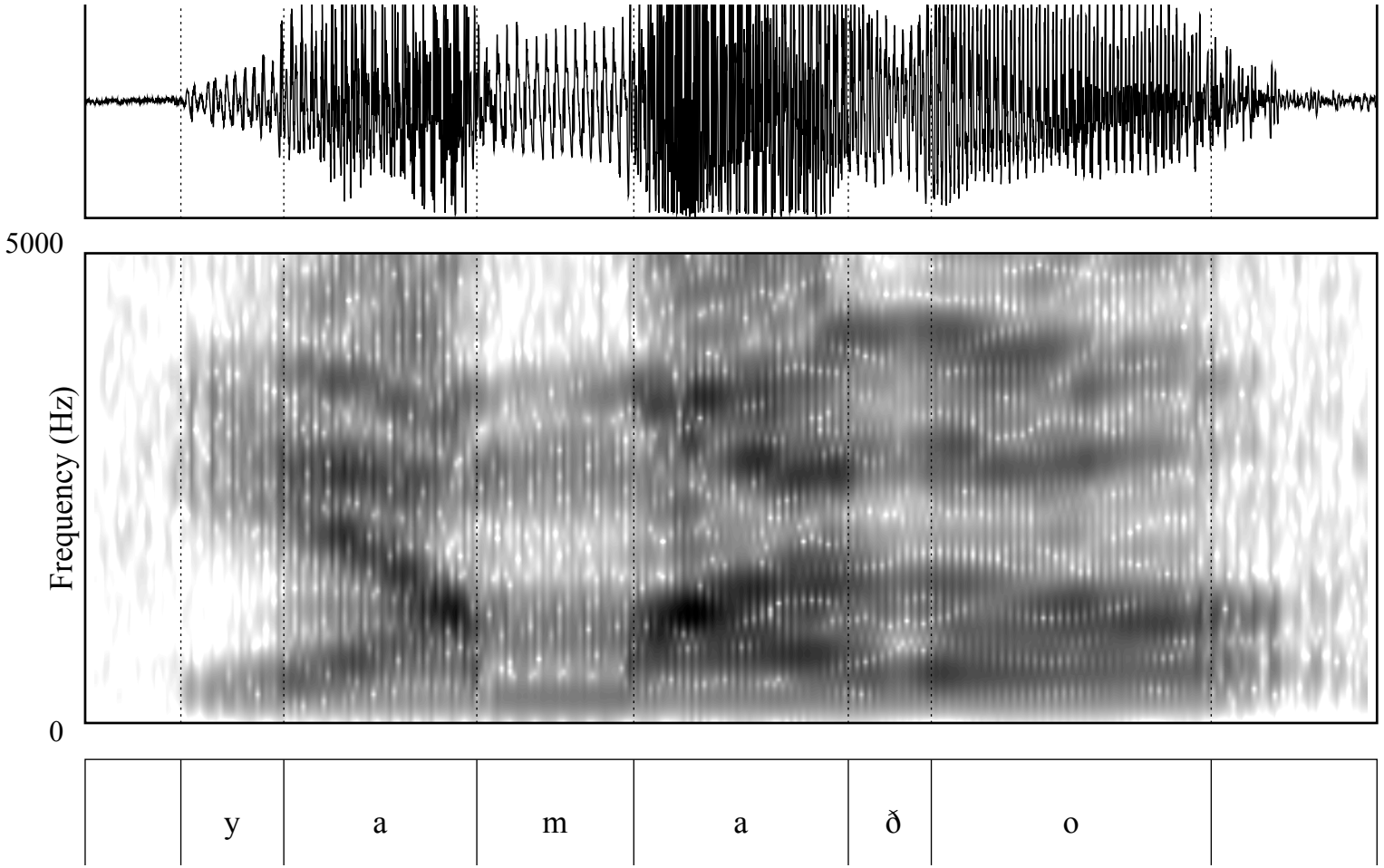
Karmona, Eliyahu R. 5683 [1923]. *La ija de la lavandera*. Constantinople [Istanbul]: Henri Chittiel.

Istanbul Judeo-Spanish

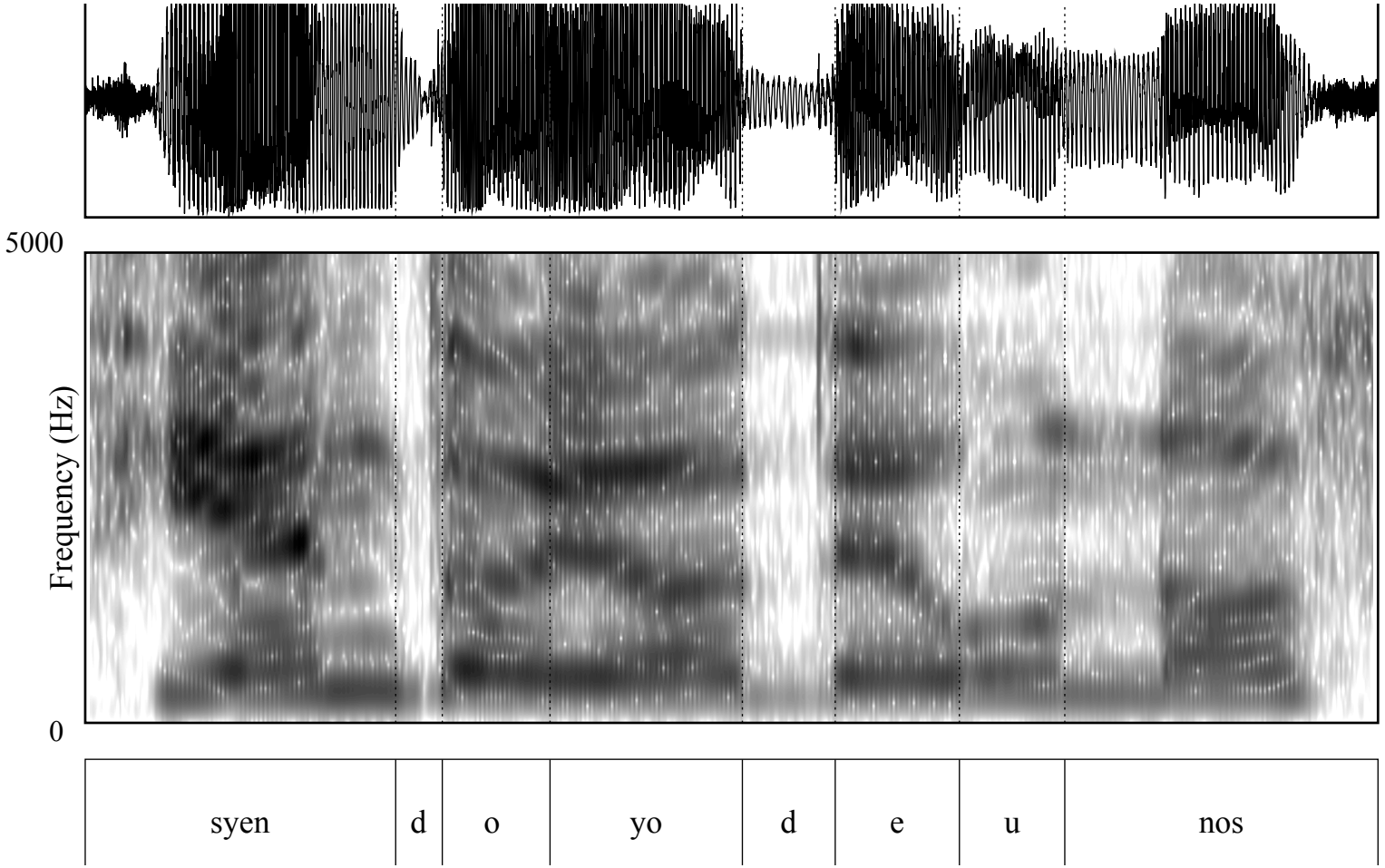


kađa dia

yamado



syendo yo de unos



Intervocalic /ptk/

Latin	Spanish	Latin	Spanish
sa**p**ēre	*sa**b**er*	illa **p**orta	*la **p**uerta*
vī**t**a	*vi**d**a*	illa **t**urre	*la **t**orre*
amī**c**a	*ami**g**a*	illa **c**asa	*la **c**asa*

Voicing word-internally only

- Restriction to word-internal context related to phonological recategorization.

Language contact and awareness of allophony

- In JSp /d/ vs /ð/ phonemic split influence from Greek and Turkish

[káða] ‘each’ vs [adá] ‘island’< Turkish

- Sp/Eng bilingual child

ithyota *idiota*

amos etho *hemos ido*

- Also examples of [d] vs [ð] in ‘aljamiado’ Spanish

Prepalatals

OSp /ʒ ~ ʤ/

ojo [oʒo] ‘eye’

gente [ʤente] ‘people’

la gente [laʒente] ‘the people’

a. Catalan: [ʤ]*ent* ~ *molta* [ʒ]*ent*

b. Lekeitio Basque :

[ʤ]*un da* ‘s/he went’

etxera [ʒ]*un da* ‘s/he went home’

Istanbul Judeo-Spanish: prepalatals

/ʒ/ *ojo* ‘eye’ , *mujer* ‘woman’

jurnal ‘newspaper’

/ʤ/ *kavadjí* ‘coffeshop owner’

djente ‘people’, *djudyó* ‘Jewish’

Istanbul Judeo-Spanish: prepalatals

OSp	IJSp		
ojo	*ojo*	'eye'	/ʒ/
foja	*oja*	'leaf'	
mugier	*mujer*	'woman'	
gente	*djente*	'people'	/ʤ/
judio	*djudyó*	'Jewish'	
jarro	*djarro*	'pitcher'	

*No change in pronunciation from OSp

Phonemic split in Judeo-Spanish by loss of complementary distribution

OSp /ʤ ~ ʒ/

after pause [ʤ]

between vowels [ʒ]

J-Sp

/ʤ/ between vowels in borrowings

/ʒ/ word-initial in borrowings

Elimination of word-initial alternation

OSp [ʤente] ~ [laʒente]

IJSp [ʤente], [laʤente]

Lesson from Judeo-Spanish

- Language contact may lead to awareness of allophonic differences and result in phonological recategorization (sound change)

But what about recategorization without language contact?

Ongoing incipient voicing/lenition of intervocalic /ptk/ in Spanish (Hualde, Simonet & Nadeu, 2011, *Laboratory Phonology 2.2*)

- Our data:

  20 speakers from Spain (native Sp speakers, recorded in Majorca for different project)

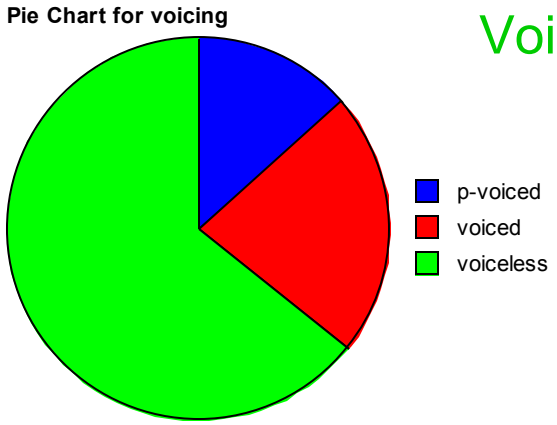
  -directed spontaneous speech

  - read speech

Results: voicing of intervocalic /ptk/ (spontaneous speech)

- intervocalic /ptk/

Fully voiced = 22% (106 tokens),
Partially voiced = 13.7% (66 tokens)
Voiceless = 64% (307 tokens)



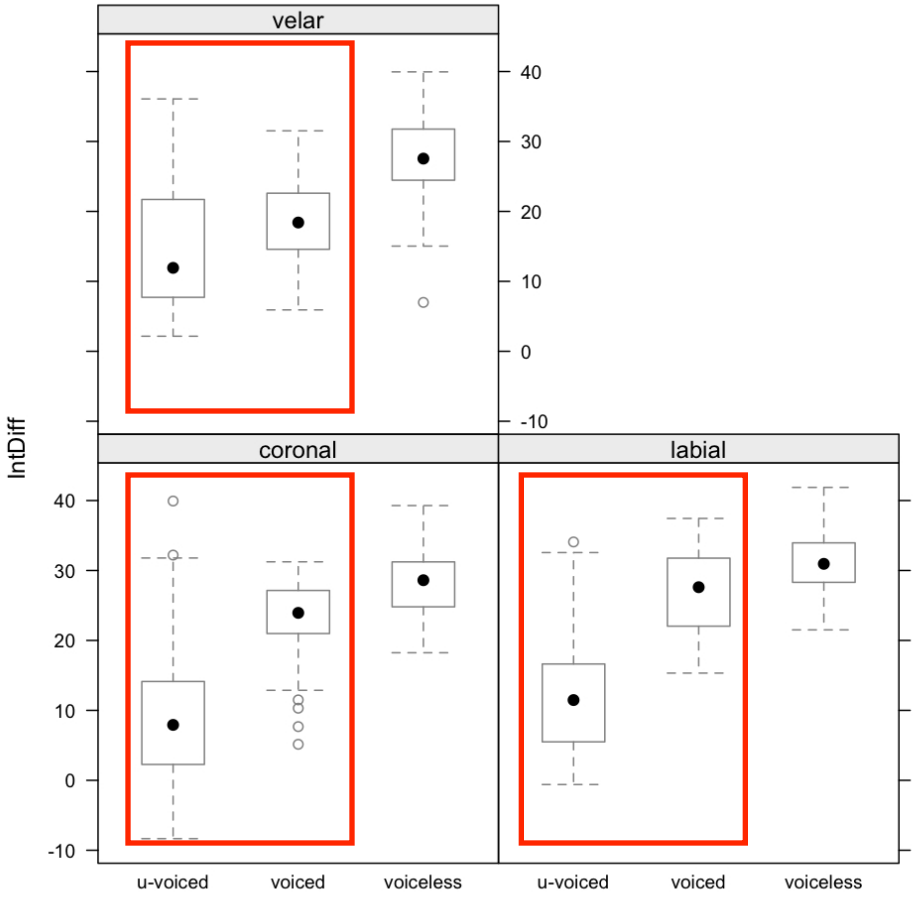
- (In Machuca's (1997) study, the percentage of voiced tokens of /ptk/ is somewhat higher ranging from 34.9 % for one of her four subjects to 64.6% for another subject. If we group voiced and partially voiced realizations, four of our speakers have over 60% of partially of fully voiced productions)

Initial vs. medial /ptk/

Spontaneous speech

	Initial	Medial
Voiceless:	62.9%	64.7%
Partially voiced:	12%	14.7%
Fully voiced:	25.1%	20.6%

Intensity Difference



No massive recategorization expected,

but

Google search for hypercorrection (Spanish-lg pages):

vértigo > *vértico*

pértiga > *pértica*

Experiment II: Rome Italian

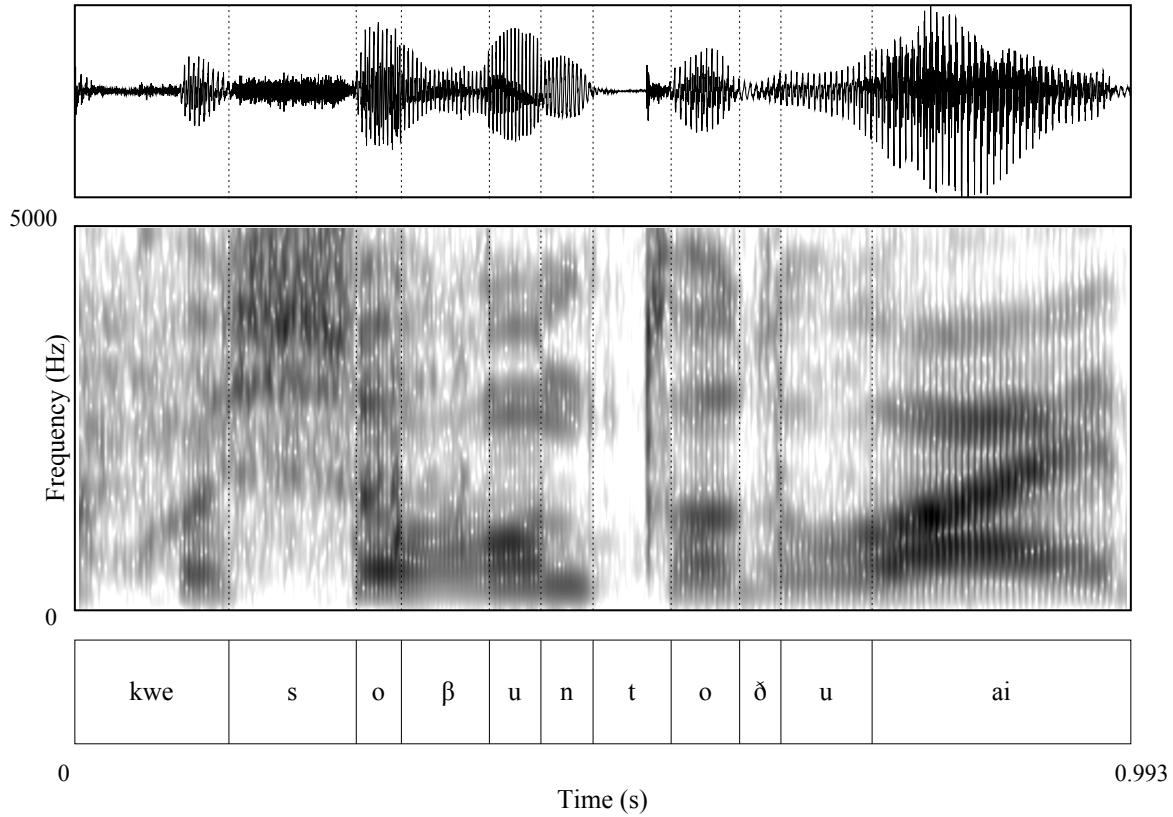
(Hualde & Nadeu, 2011. *Phonetica* 68)

Corpora e Lessici dell'Italiano Parlato e Scritto (CLIPS), directed by Federico Albano Leoni

http://www.clips.unina.it/it/documenti/2_tecniche_di_elicitazione_dialogica.pdf

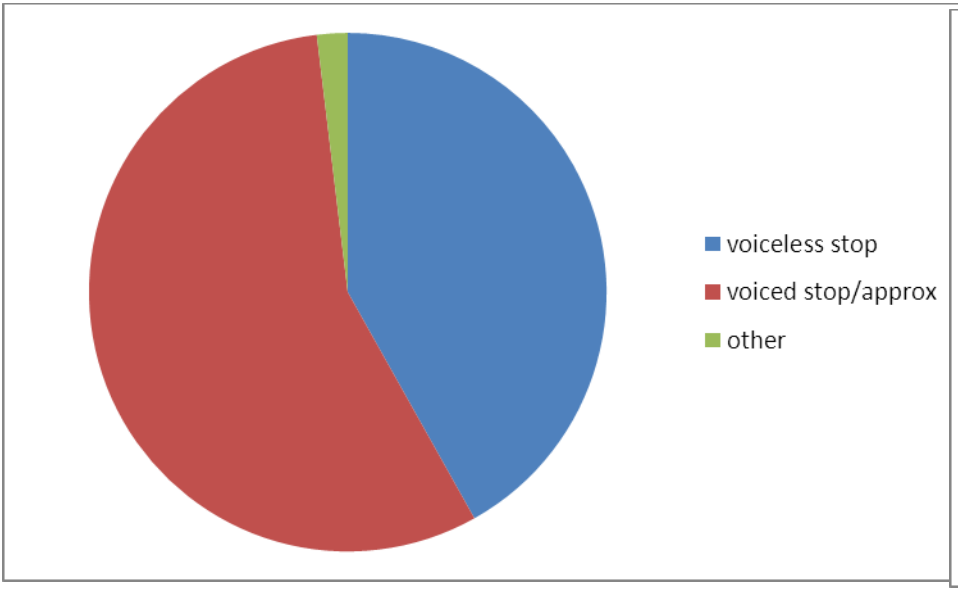
- Rome data from three map tasks and three "find the differences" games

Rome Italian

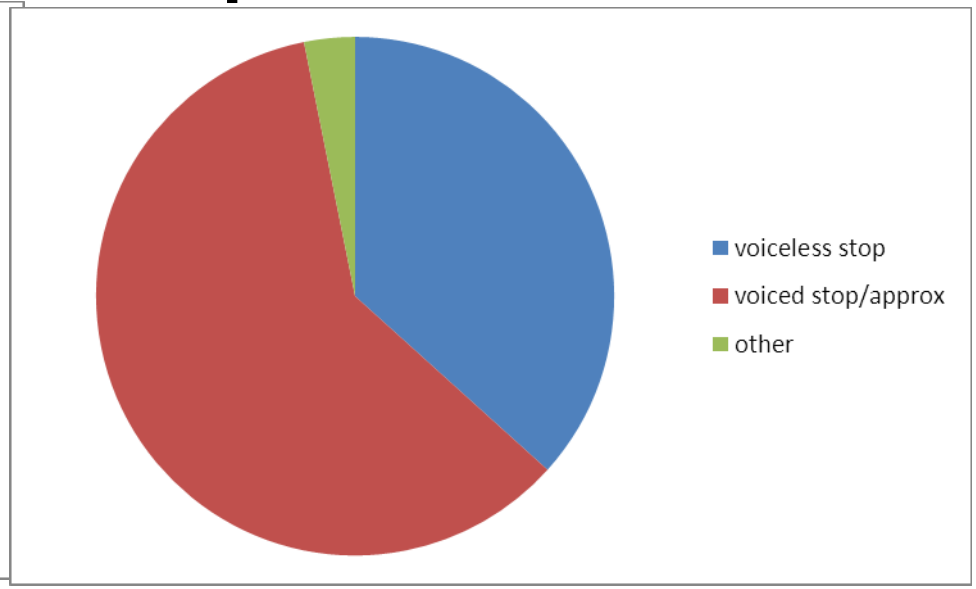


a questo punto tu hai delle sferette colorate

Rome Italian: realization of intervocalic /p t k/

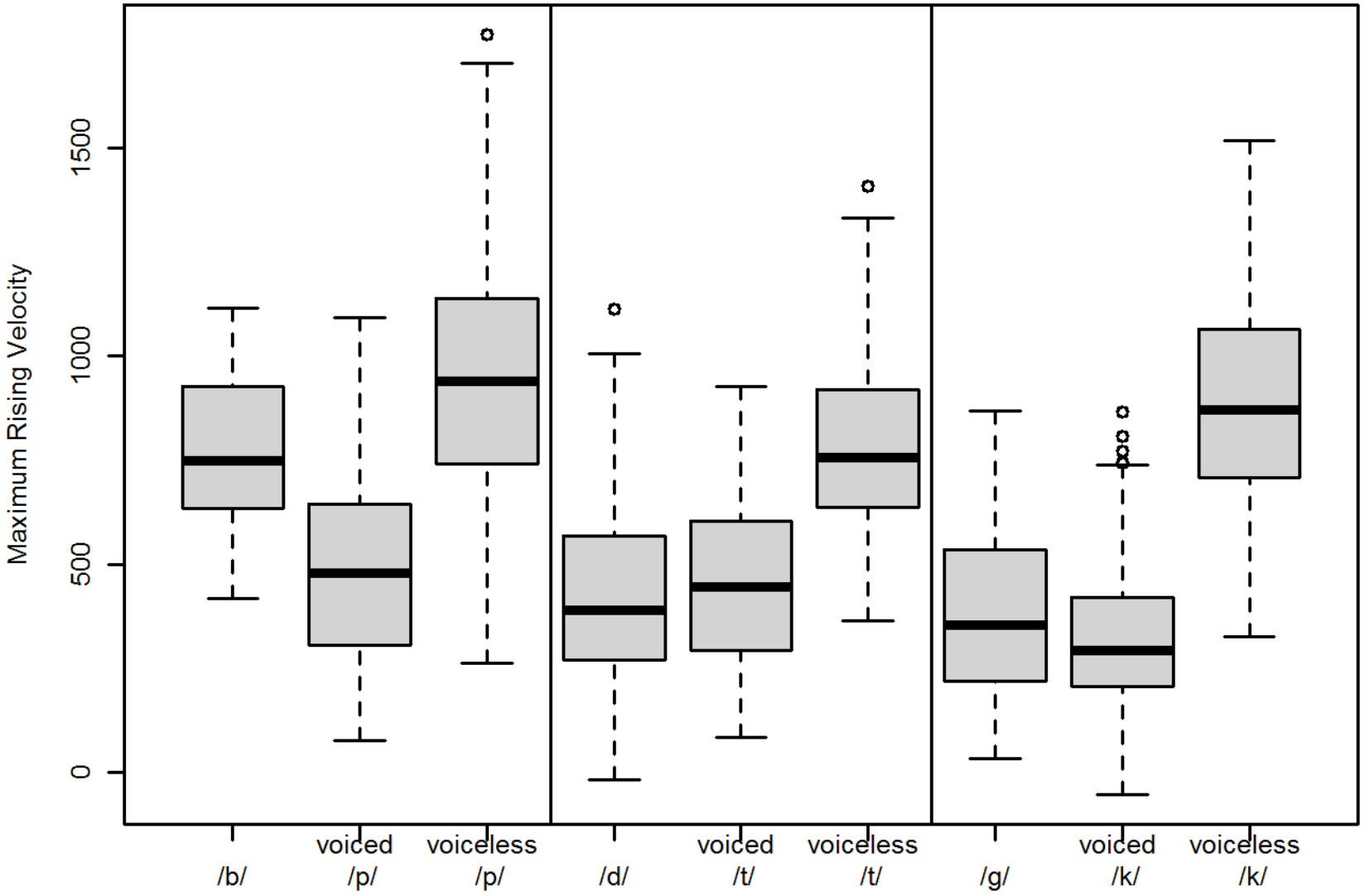


Word-initial /p t k/ (postvocalic)



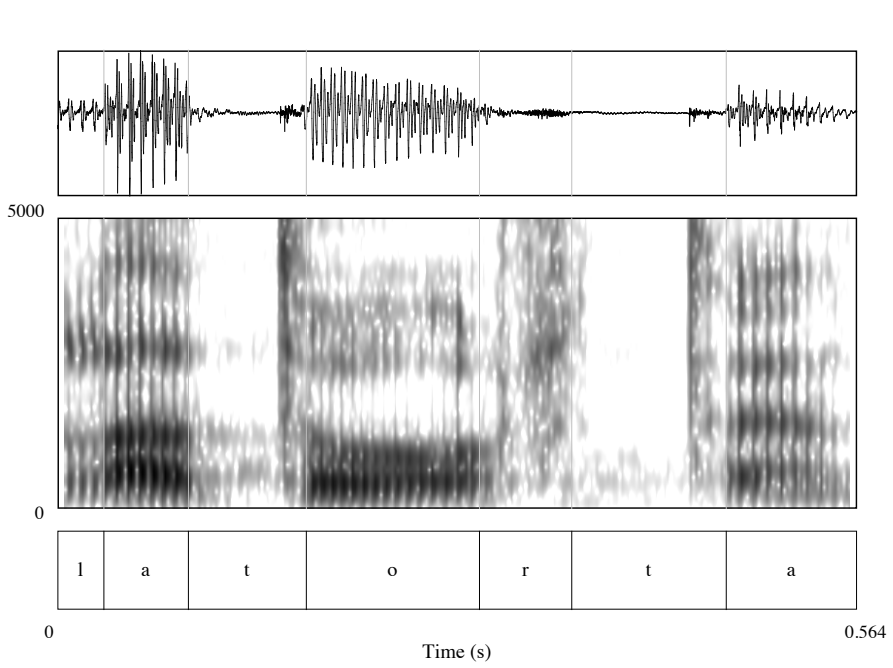
Word-internal /p t k/ (postvocalic)

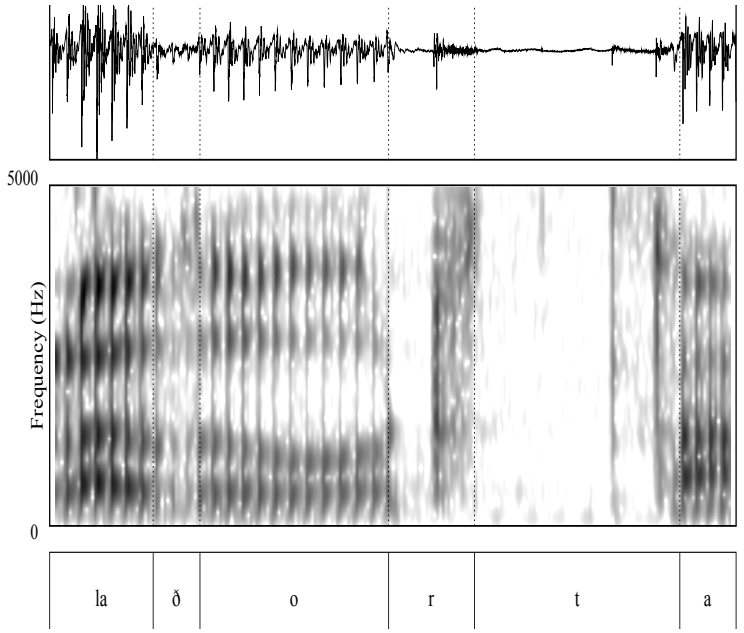
Rome Italian: MaxVel



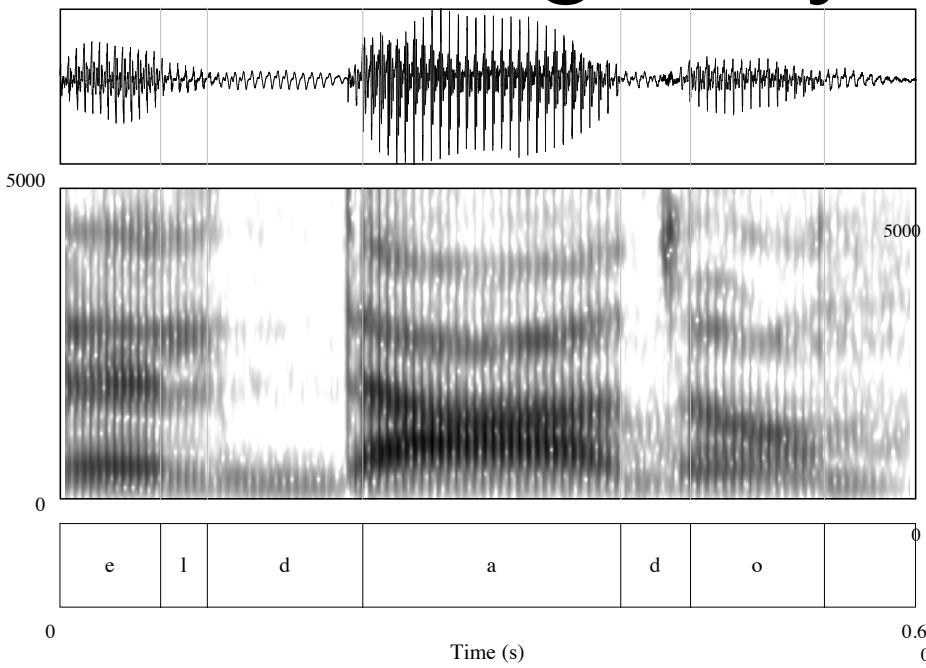
Large amount of phonetic overlap between /t/-/d/, /k/-/g/

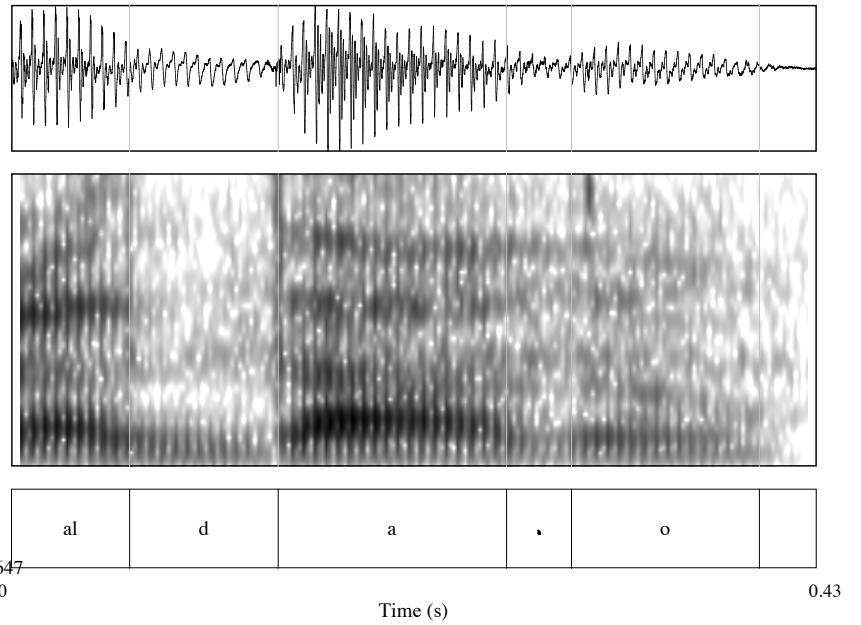
Phonologically voiceless plosives





Phonologically voiced plosives





Evidence for awareness of phonological neutralization

Spelling mistakes (much more common than in Spanish), e.g. *pegorino* for *pecorino, bicamia* for *bigamia.*

Puns:

Se mi dovesse nascere un figlio, sai che nome gli darei? Erno! Così, quando passo davanti agli altri, direbbero "ecco r padre d'Erno" [padre d' Erno =padre eterno]

Lat. *latu(m)* >

- Rome Italian:

  lato [lato] ~ [laṭo] ~ [lado] ~ [laðo]

- Portuguese:

  lado [lado] ~ [laðo] **[lato]

- Spanish:

  lado [laðo] ~ [lao] **[lato]

(Cravens 2006)

To summarize our findings from Spanish and Italian

1. At a first stage in a lenition process morphological boundaries are ignored (phonemes are affected in phonologically defined contexts).
2. Subsequent recategorization affects individual lexical items. Word-initial phonemes are less likely to be recategorized than word-medial ones.

Model of sound change

1) “Online” effects: gesture reduction and overlap

/apa/ [apa] ~ [aba] ~ [aβa]
~ [aɸa]

2) Conventionalization: /apa/ [aba]
(Neogrammarian, phonemes are affected, across word boundaries)

3) Phonemic recategorization:

[aba] /-p-/ > [aba] /-b-/ (lexically gradual, words change) → word-boundary effects at this stage.

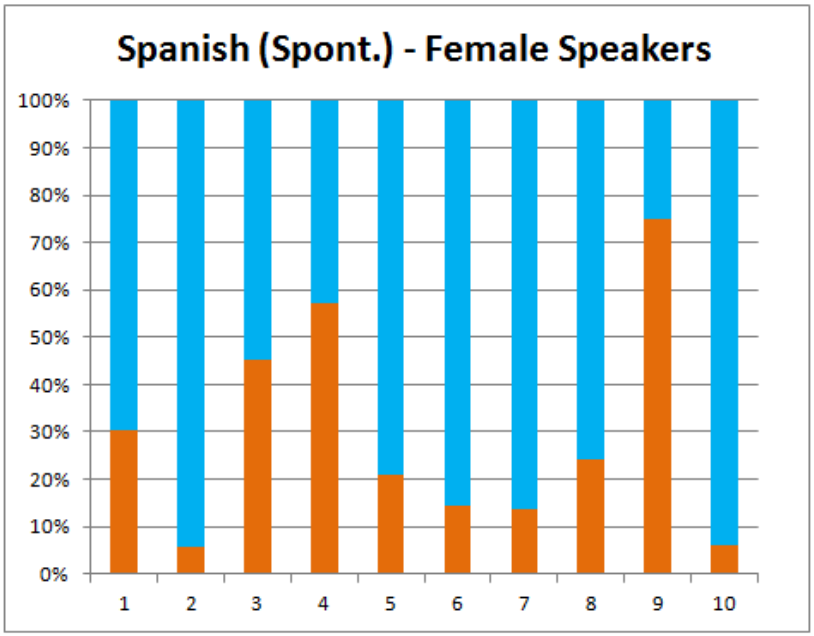
most likely words to be recategorized in reductive process

a) less common words – memory failure
b) words that tend to have low information load –more likely to be realized as reduced and learned that way.

is this enough to explain wholesale recategorization in sound change?

- Possible factor: linkage with sociolinguistic meaning.

individual variation in voicing of intervocalic /p t k/



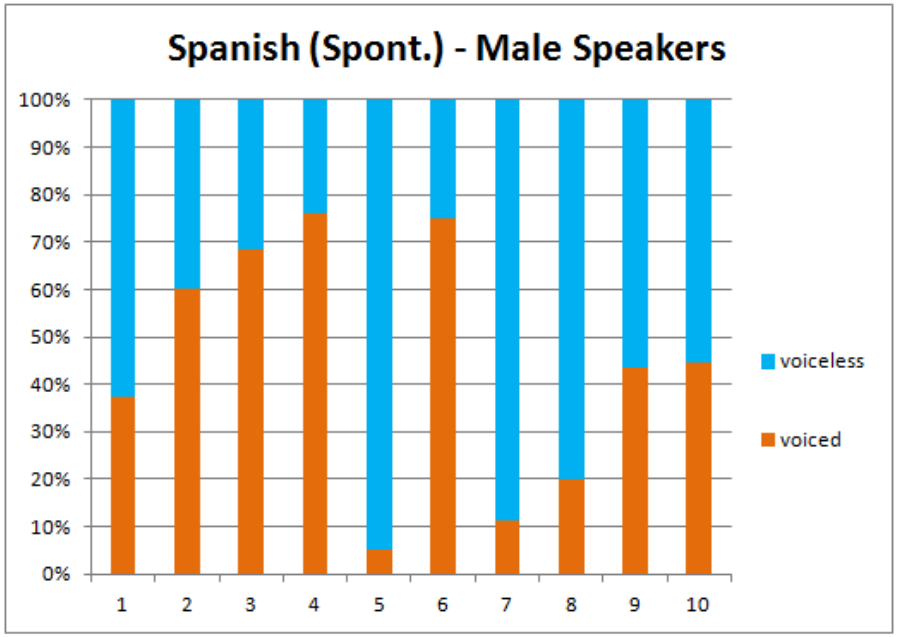
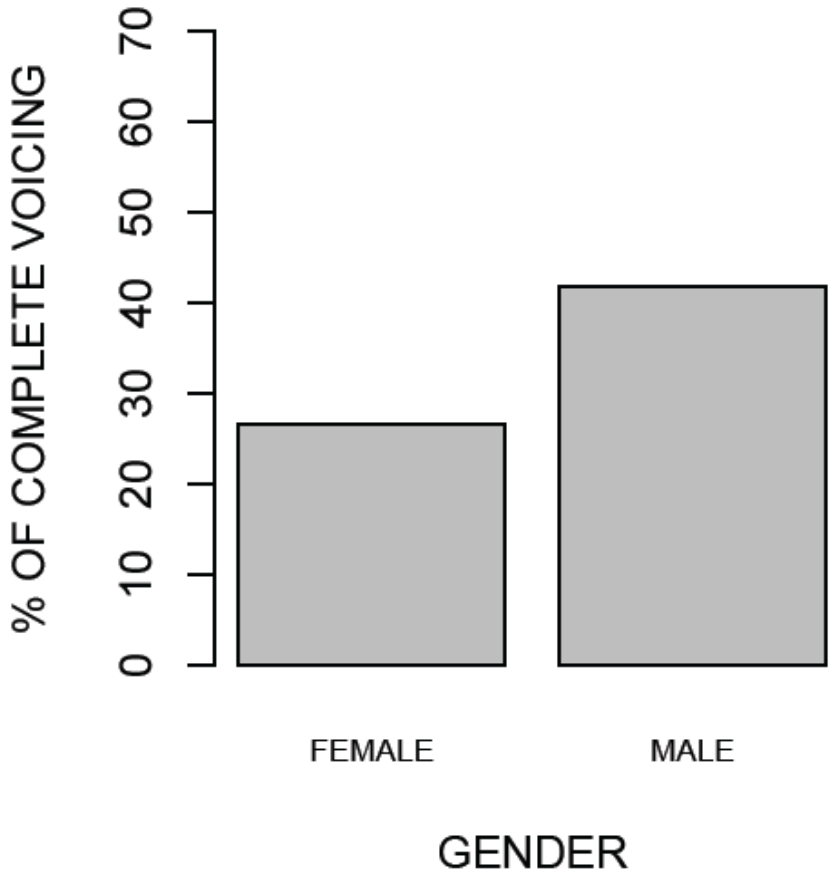


Fig. 1. Percentage of voiced and voiceless realizations of intervocalic /p t k/ in unscripted conversation in Spanish (data from Hualde et al. 2011).

Fig. 2. Percentage of intervocalic tokens of /s/ with complete voicing by gender (52 speakers, from Torreira & Ernestus 2012, figure courtesy of F. Torreira).

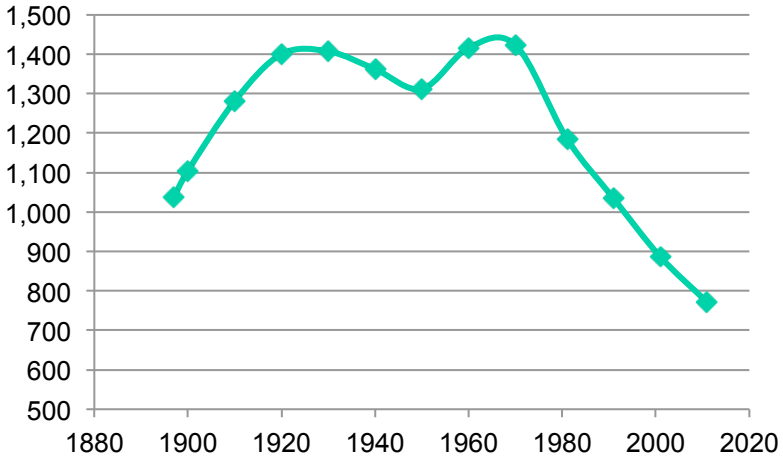


Goizueta Basque

Hualde, Nadeu & Lujanbio (NWAVE 2012)

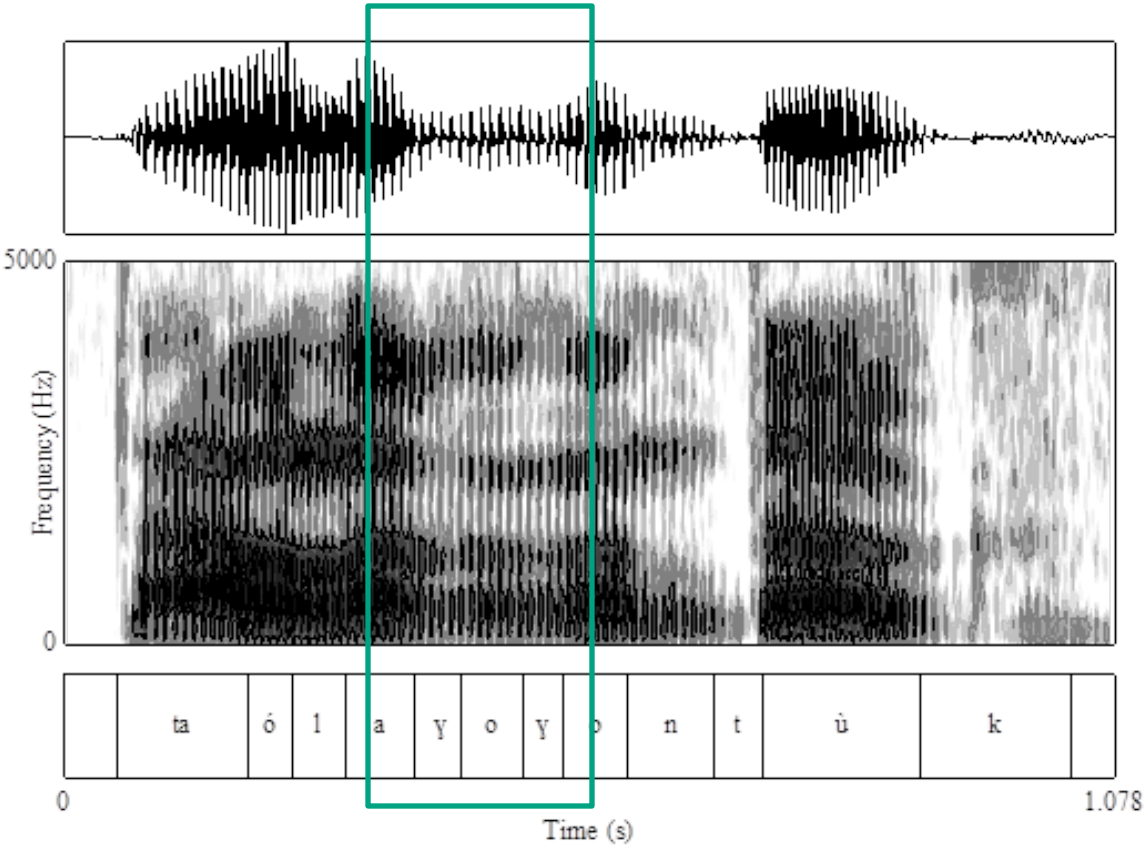
Goizueta: Demographic Evolution

Year	Pop.
1897	1,037
1900	1,104
1910	1,281
1920	1,400
1930	1,407
1940	1,362
1950	1,312
1960	1,416
1970	1,423
1981	1,186
1991	1,034
2001	886
	771

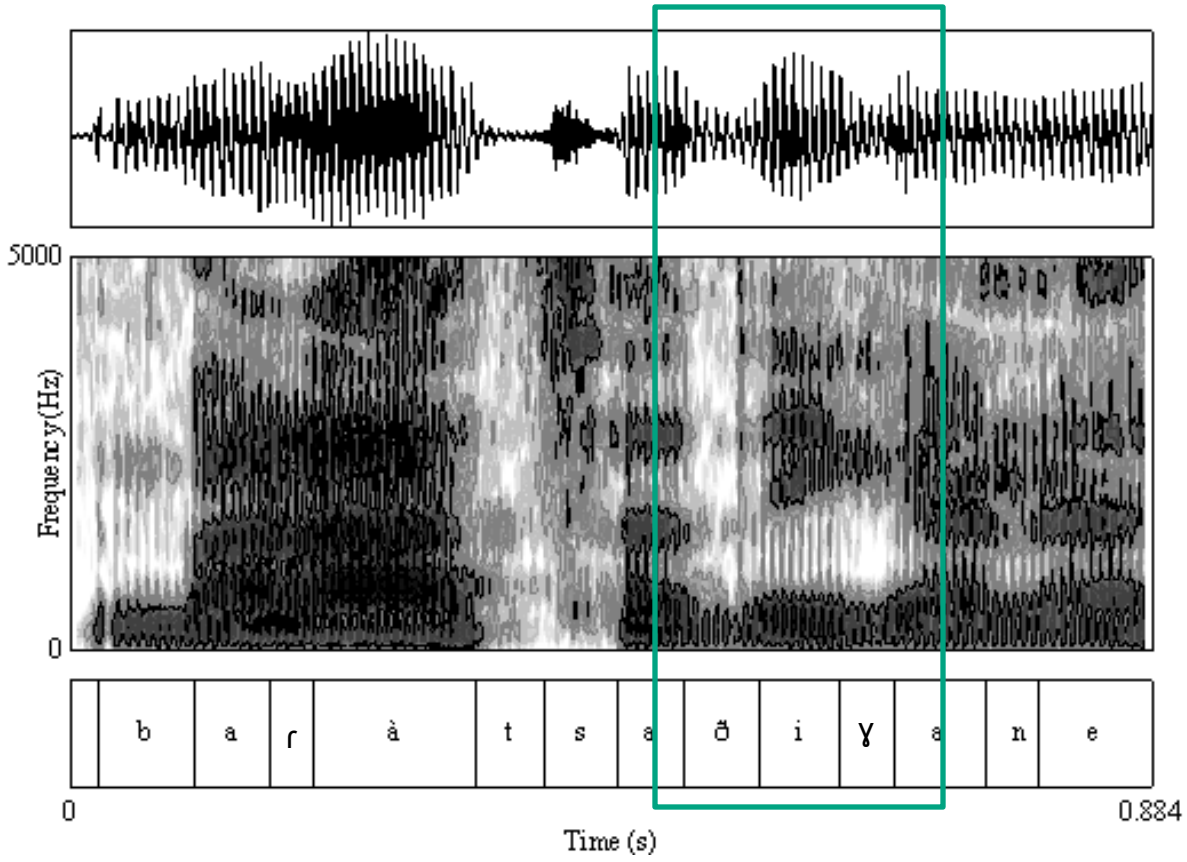


Wikipedia

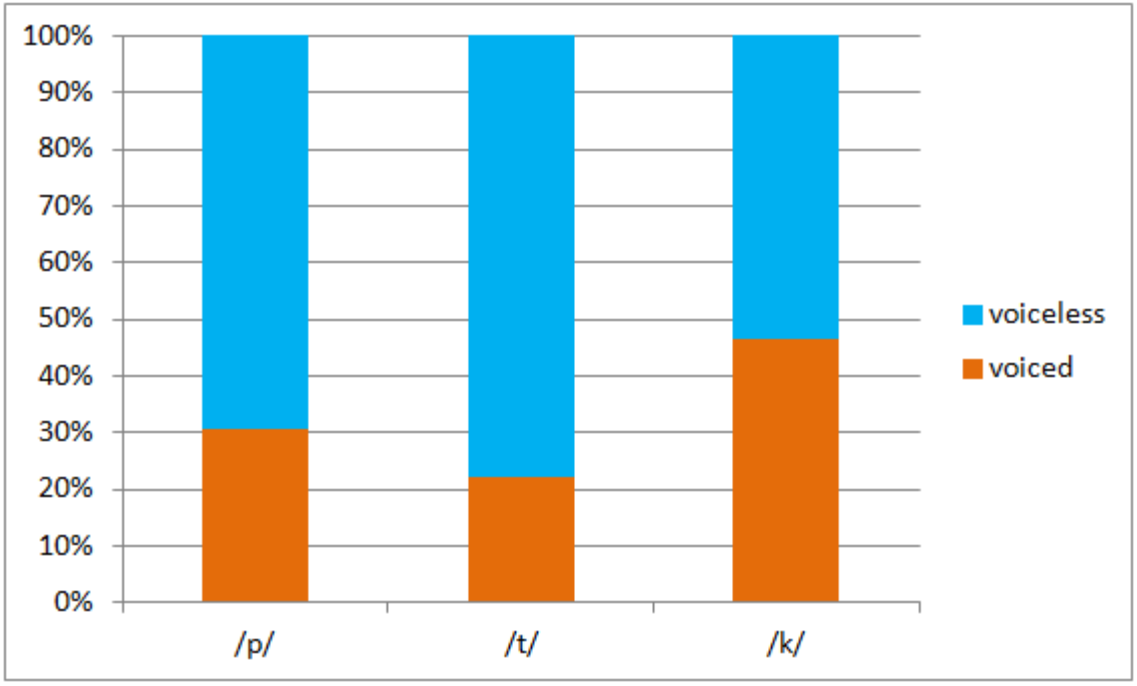
ta olako kontuk
‘and things like that’



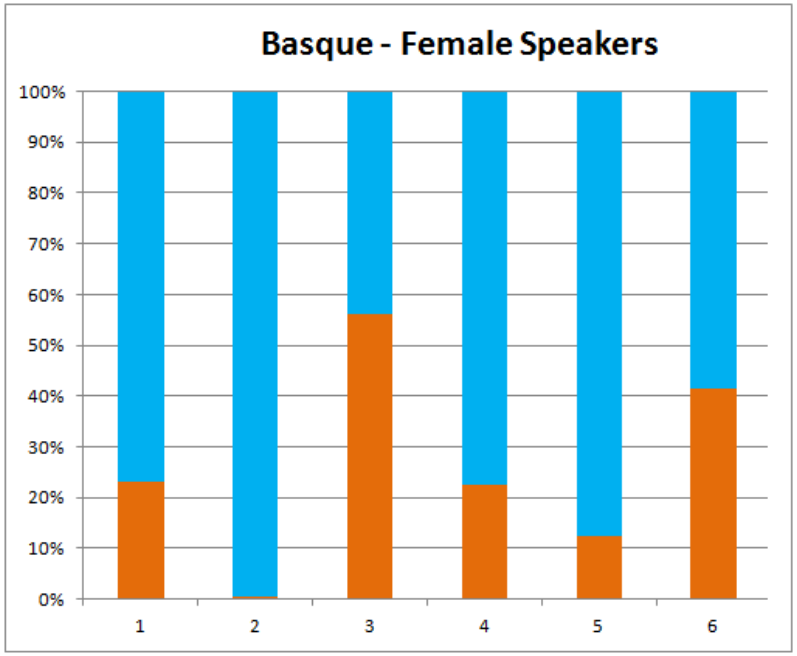
baratzatikan e
‘and also from the garden’

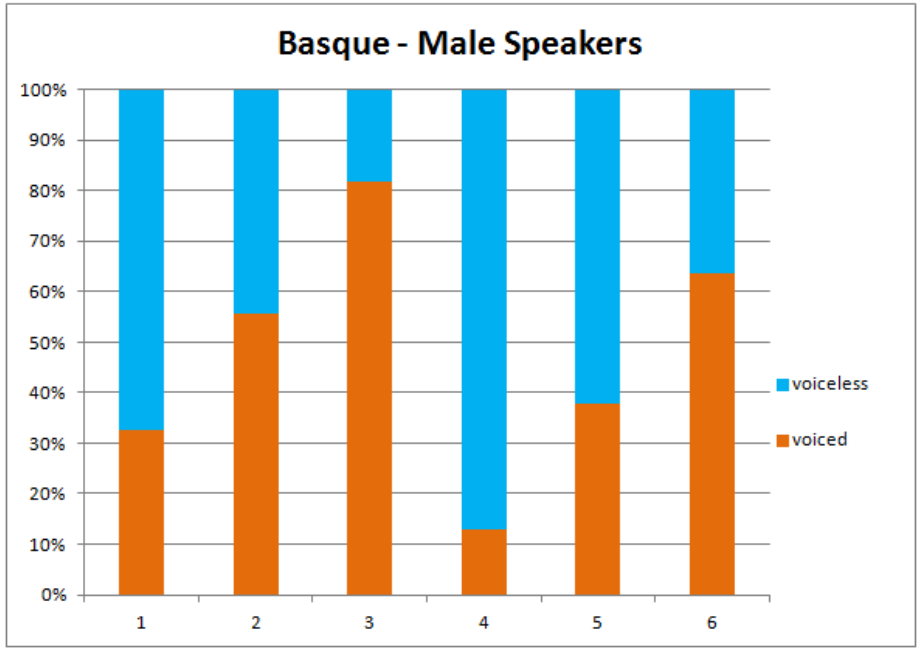


Percentage of voiced and voiced realization of intervocalic /p t k/ in Goizueta Basque (all speakers combined).



Percentage of voiced and voiceless realizations of intervocalic /p t k/ produced by 12 speakers (six female, left panel) of Goizueta Basque.





Voicing by sex

	Females	Males
Voiced /p t k/	154 (23.05%)	257 (47.33%)
Voiceless /p t k/	514 (76.95%)	286 (52.67%)

Proportion of voiced and voiceless allophones of /p t k/ by gender

The difference in the proportion of voiced realizations produced by male vs. female speakers is significant ($\chi^2[1] = 78.73$, $p < 0.001$).

source of variation?

This phonetic variation may have a biological basis: The larger average size of men's larynxes may result in a more difficult control of cessation of voicing in the intervocalic context (Lucero & Koenig 2005).

Another, complementary, hypothesis is that differences among speakers are due to speech rate: Faster speech results in more voicing.

Experiment: Testing the effect of speech rate

- Participants: 8 speakers of Iberian Spanish (4m, 4f)
- Task: Reading of nonce words in a carrier phrase at two speeds, normal and fast

Nadeu & Hualde (submitted)

Voicing of intervocalic /p/ in normal and fast speech

Data collection. Normal condition (task 1):

Carrier sentence *Digo* [target word] *tres veces*

‘I say [target word] three times’

Target words: /pipe/, /pape/, etc

[10 target sentences + 30 filler sentences] * 5 blocks

Each block had a different pseudo-randomized order (no two target sentences were presented consecutively). The blocks were presented to participants in a randomized order.

Instructions: Participants were instructed to read the sentences at their normal speaking rate. This was repeated at the beginning of each block.

Fast condition (task 2):

Same carrier sentence

[10 target sentences + 10 filler sentences] * 3 blocks

Pseudorandomized order, blocks in randomized order.

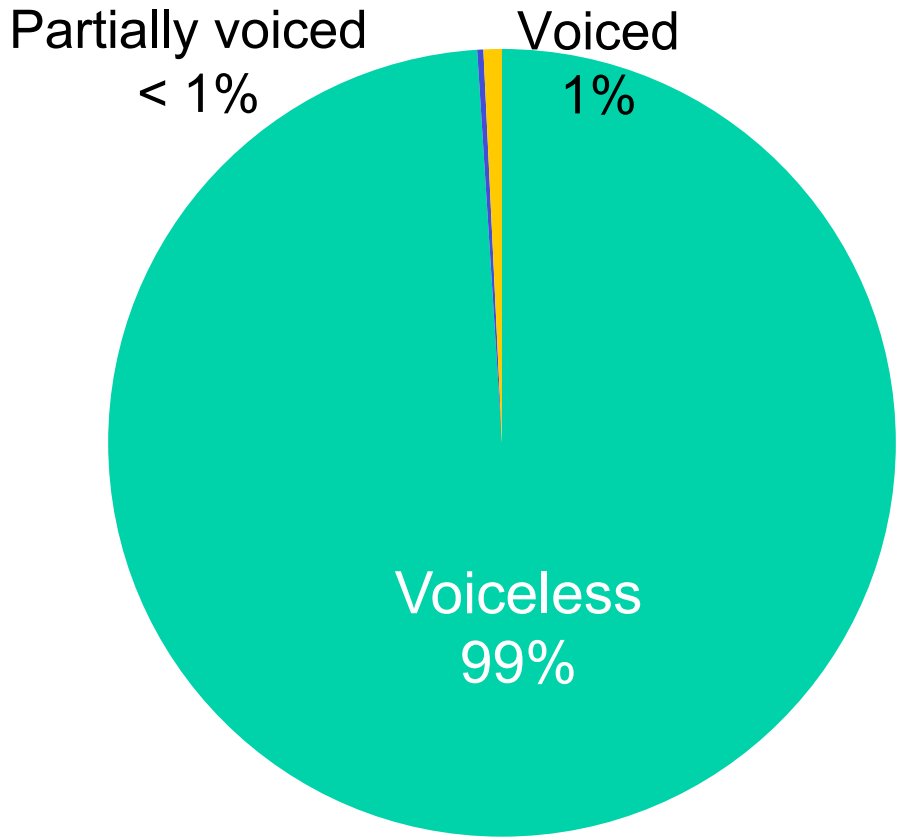
Instructions: Participants were instructed to first read the sentence in silence. When they were ready, they had to press a button on the screen. As soon as they heard the first beep, they were asked to start repeating the sentence as quickly and as many times as possible, until they heard the second beep (lapse between beeps was 4 sec)

Number of repetitions varied between 3 to 5 repetitions

For each participant to be included, they needed a successful speech rate manipulation. This was assessed by comparing the duration of the first vowel in the two conditions (one t-test per participant). All participants were successful in producing faster than normal speech.

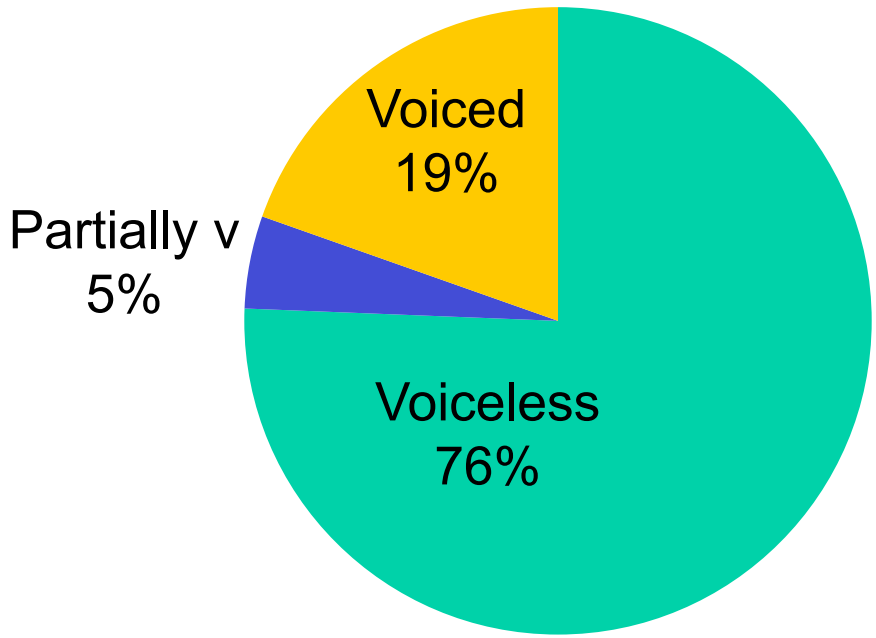
Results

Normal speed

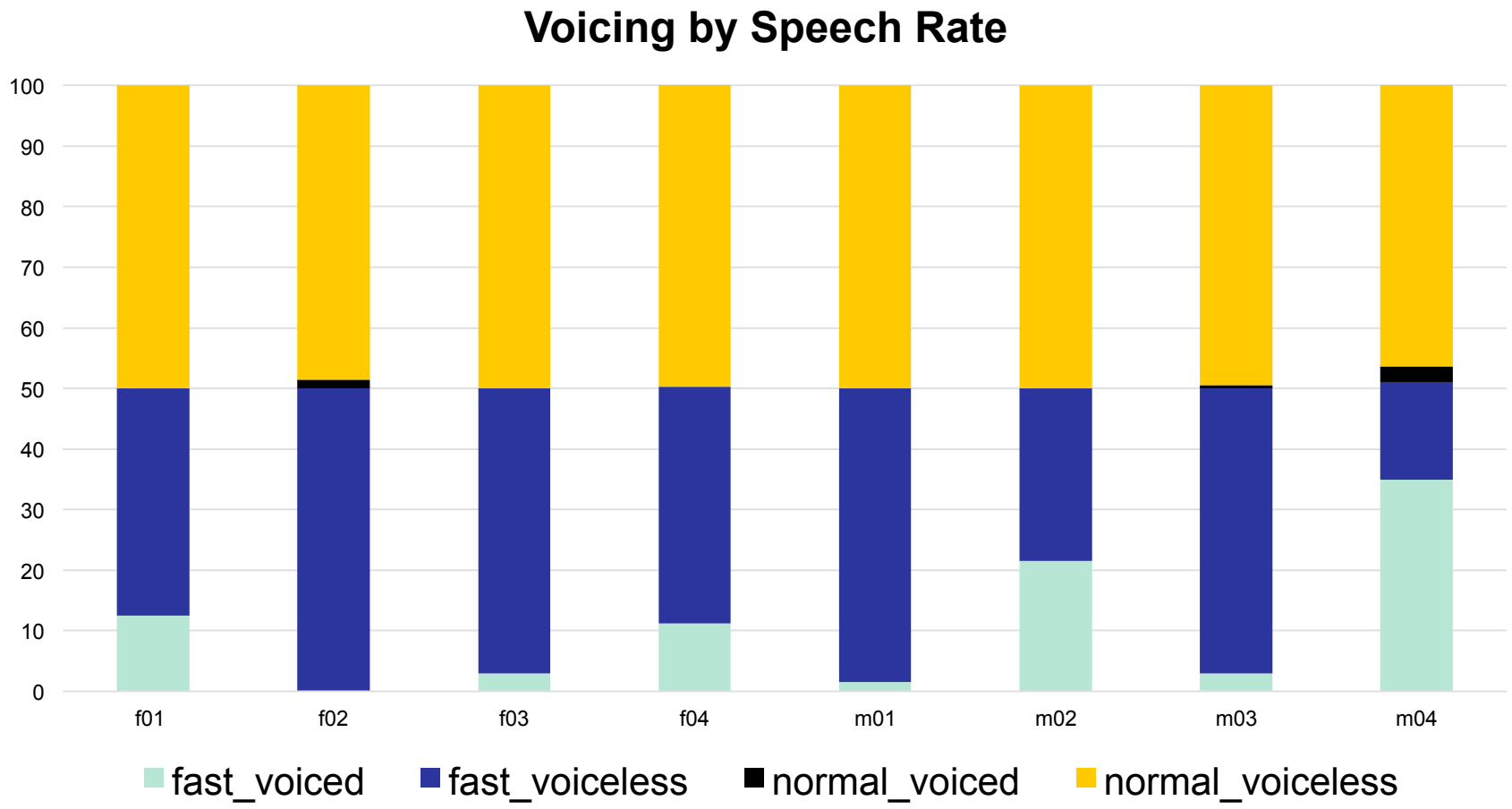


Results

Fast speed



Voicing and speech rate



Experiment: Conclusions

-Faster speech results in more intervocalic voicing, but

-Intervocalic voicing is not a predictable effect of faster elocution.

-There are important individual differences.

Male ‘voicers’ voice more that female ‘voicers’ (consistent across studies)

Experiment: Discussion (1)

Intervocalic voicing of obstruents is a somewhat conventionalized process of phonetic reduction in the languages under study (as opposed to, e.g., French where the phenomenon has much lower incidence, Torreira & Ernestus 2011).

Partial voicing may be biomechanically conditioned by factors such as a larger larynx and/or faster articulation.

Experiment: Discussion (2)

A sex-correlated propensity to voice may be interpreted as a marker of male gender, leading to even greater tendency to voice among males. This more frequent production of voiced allophones would be intentional even if it is below awareness.

Experiment: Discussion (3)

Later, a preference for voiced variants may lose its connection to male gender and spread to both genders, eventually resulting in sound change.

Last words: How does sound change (phonological recategorization) take place in lenition processes?

1. As conventionalized synchronic processes, lenitions take place across the board.
2. Increased overlap between phoneme may lead recategorization.
3. Recategorization is expected to be word-by-word in part due to memory failure.

1. Sociolinguistic linkage provides a mechanism for the generalization of recategorized variants.
2. In the particular case of intervocalic voicing, a natural connection between a propensity to voice and male sex may facilitate this sociolinguistic linkage, thus providing a fast track for the generalization of the sound change.

-thank you!

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