Realization of word-final taps in Spanish infinitive verbs

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Abstract

Word-final rhotics are realized differently across the various dialects of Spanish. This research contributes to our knowledge of this variation by investigating the production of the voiced alveolar tap in Castilian Spanish in word final position by analysing infinitive verbs. The present study analysed spontaneous speech from speakers living in Madrid, Spain. Word-final /r/ tokens were coded as one of four possible realizations: taps, approximants, deleted, and other. An acoustic analysis of 374 tokens was performed. It was found that the 56.42% of final /r/ realizations resulted in considerable reduction. This reduction consisted of the tap being deleted or replaced with a different sound. The rest of the tokens were classified as rhotics, from which the most common variant were approximants, consisting of 27.54% of realizations. True taps only accounted for 16.04% of tokens. These results are in line with previous findings from other dialects that indicate reduced variants more common than true taps.

Introduction

Phonetics described by Whalen 2019:
“Phoneticians study the anatomy and physics of sound generation, acoustic properties of the sounds of the world’s languages, the features of the signal that listeners use to perceive the message, and the brain mechanisms involved in both production and perception.”

I

Background Information

Speech reduction

A common speech phenomenon of variation. It is more frequent but not limited to spontaneous speech. A speaker may shorten, weaken, or skip segments of a word (Ernestus & Warner, 2011)

An example of this can be: Entonces [entonθes], which can be pronounced as [tos]. Notice that two syllables were completely deleted

Why speech reduction?

It is a phenomenon that is highly prevalent in everyday life, as all speakers reduce to some extent (Ernestus & Warner, 2011)

Studying reduction has many applications, it can help with understanding perception, training speech recognition software to be more accessible, and supporting second language acquisition.

II

Spanish phonology

/r/ in Spanish

In linguistics, /r/ sounds can be referred to as rhotics, which can vary greatly across languages, as such rhotics do not have a single attached phoneme Spanish rhotics are taps or thrills, where the tongue flicks quickly to make brief contact with the alveolar ridge, located behind the upper front teeth. It results in a constriction of the airflow accompanied with vibrations in the vocal folds (Hualde, 2005)

- A similar sound is produced in North American English in words like ‘butter’

Word final /r/

- In Spanish, word final taps are mostly found in infinitive verbs, such as *ser* (to be).
- Hualde (2005) describes word final /r/ as variable rhotics (meaning that they can be realized as either a tap or a thrill) that are most often realized as a tap when they are followed by a pause.
- When they are followed by a vowel they are always taps, so this will be the focus of this presentation.

Spanish taps and reduction

- Taps are especially vulnerable to reduction, to the point that their many different variants are closely associated with dialects
- Willis & Bradley (2008) found that 49% of taps are reduced in Dominican Spanish
- By analysing corpus data, Turizo (2020) found that 46% of word final /r/ are deleted, and only 17% of variants were considered true taps in Colombian Spanish

Ways that /r/ can be realized

True tap

Characterized by a noticeable dip in intensity, a burst release, and the interruption of the surrounding formants (Willis & Bradley 2008)

Approximant

Has a partial dip in intensity, lacks a burst release and may not interrupt formants

Deletion

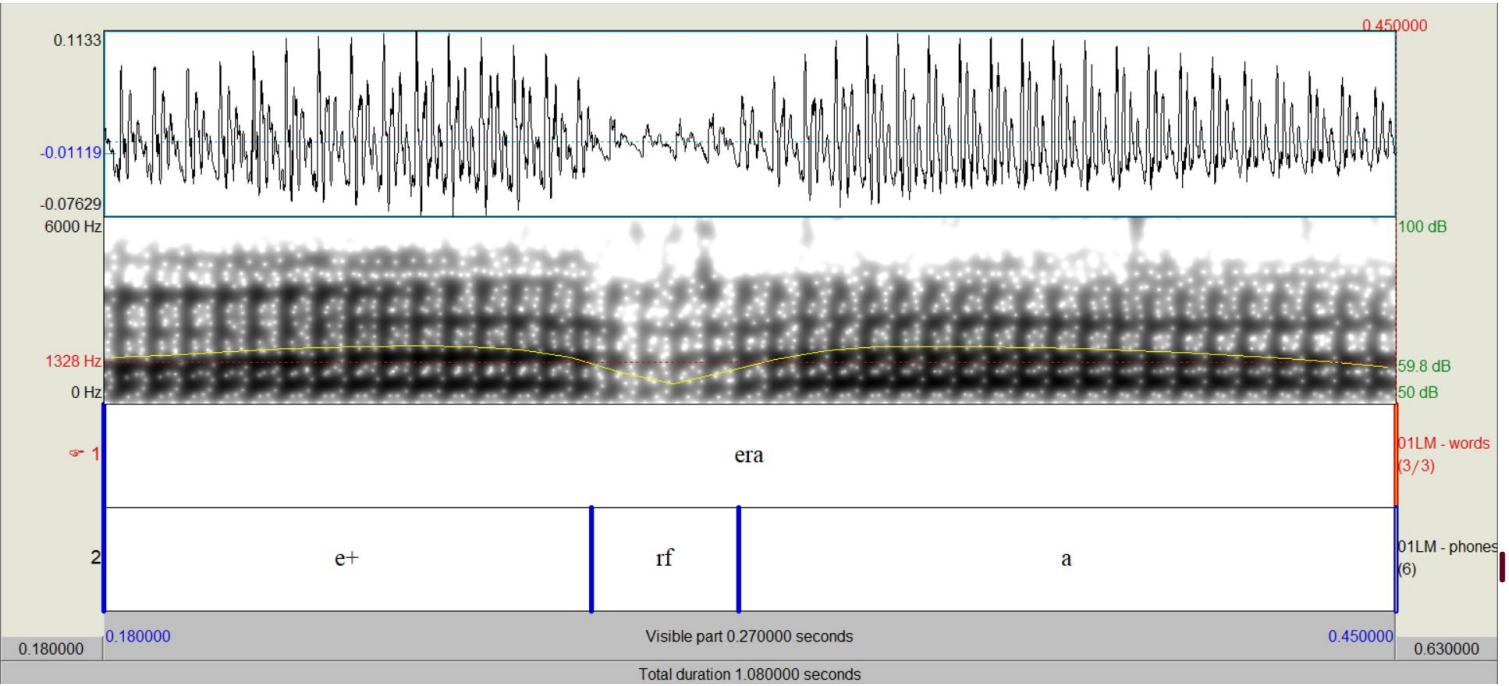
Tap is not realized

Other

It can be replaced with a different phoneme

Visualizing Sound

This is a screenshot of Praat, the software used to process the speech data

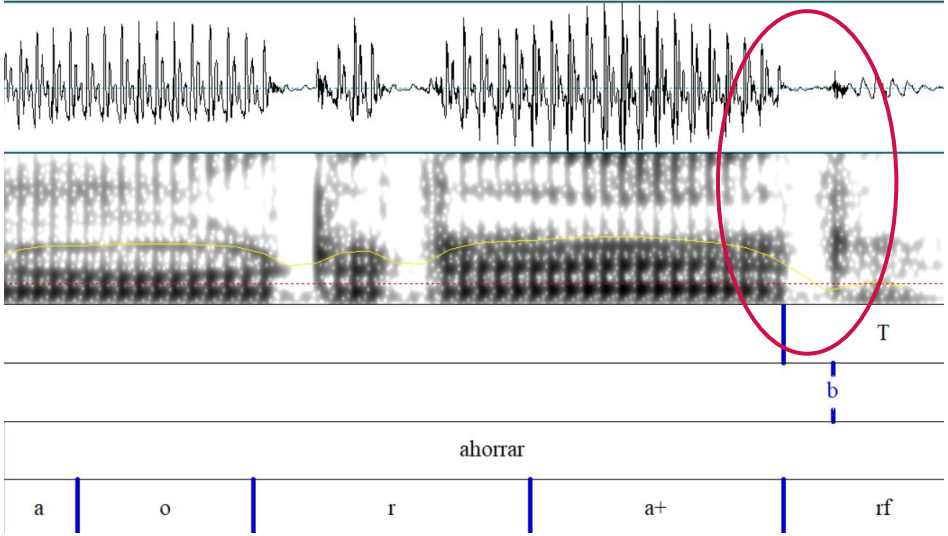


Waveform
2D image of sound

Spectrogram
3D image of sound

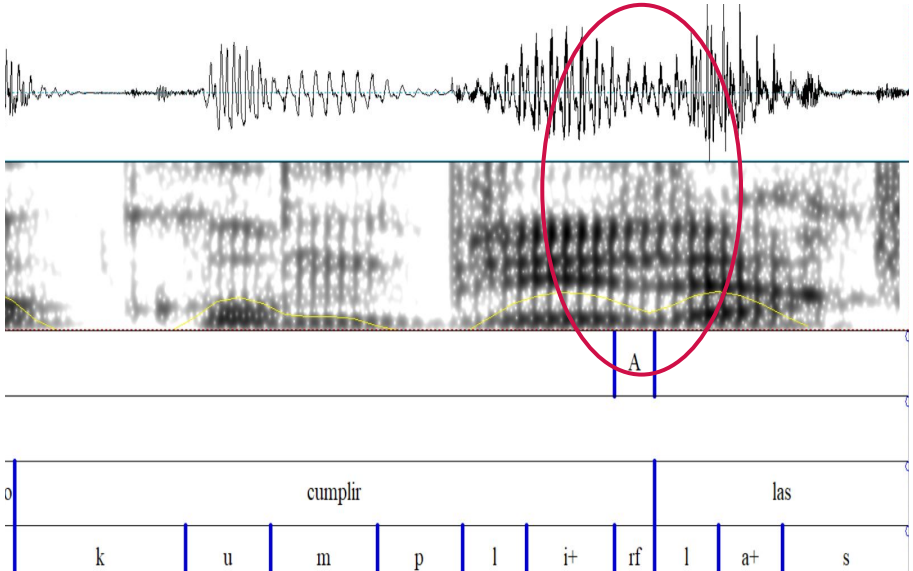
Transcription

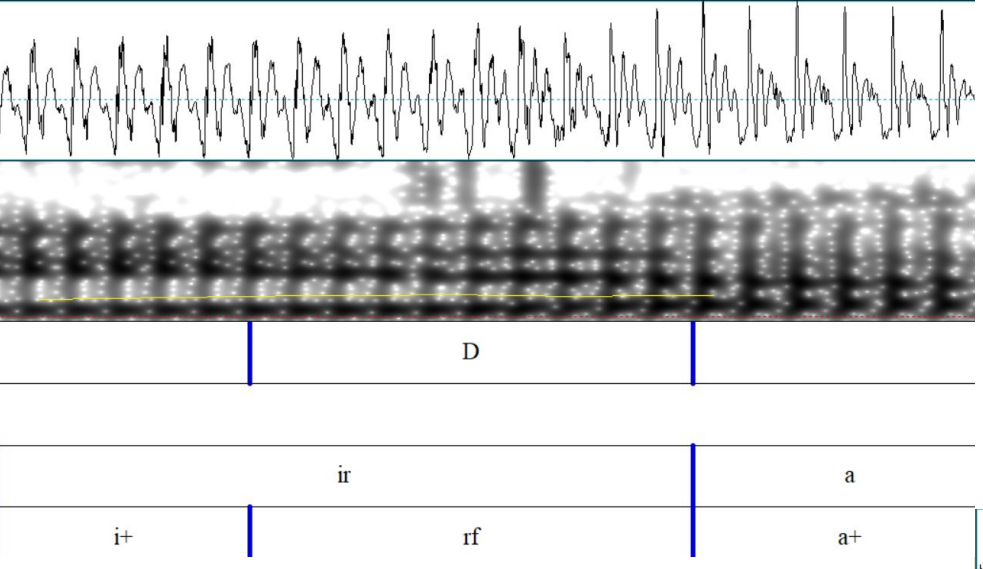
Individual phonemes



Tap: The yellow line displays the intensity, where a significant dip can be observed, along with a burst release

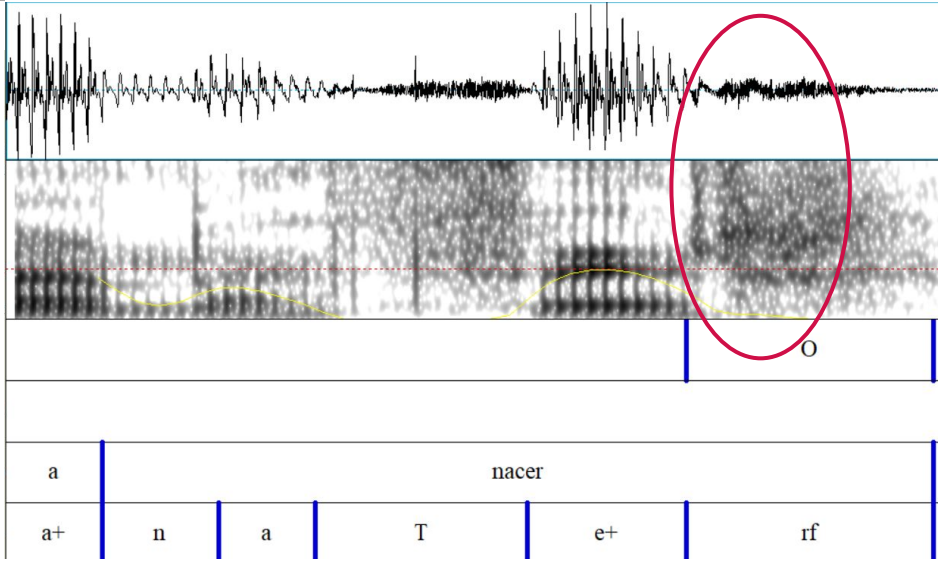
Approximant: The waveform is reduced, there is a lesser dip in intensity, and there is no burst release





Deletion: No difference in intensity

Other: The realization resembles an /s/ sound instead



III

The study

My Research

It focused on the realization of /r/ at the end of Spanish infinitive verbs, and how surrounding phonemes can affect reduction.

- Existing studies on tap realization focus on specific dialects of Latin American Spanish, such as Dominican Spanish with (Bradley & Willis, 2008) and Venezuelan Spanish (Ugueto & González, 2013).
- My research focuses on Castilian Spanish

The study analysed recordings from the Nijmegen Corpus of Casual Spanish (Torreira and Ernestus, 2010).

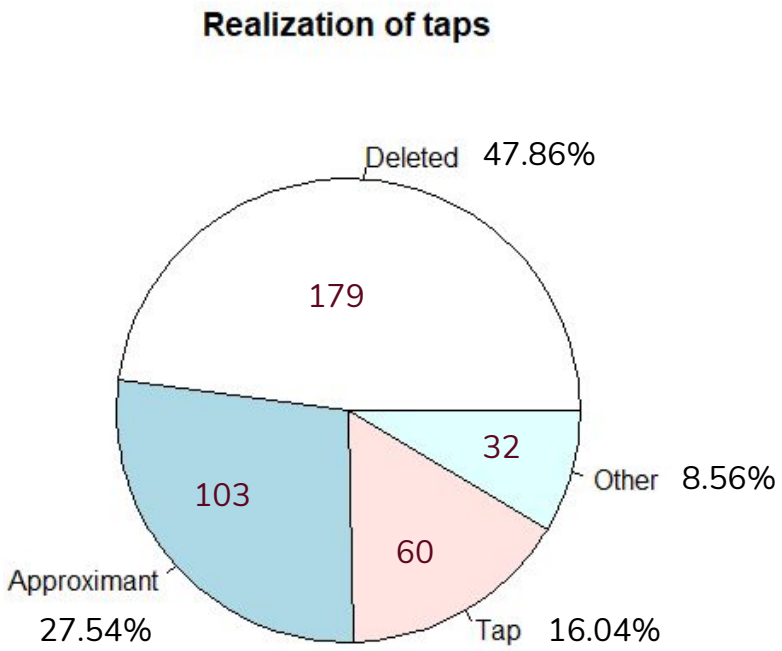
The speakers are 52 (27 females and 25 males) monolingual University students from Madrid, Spain engaging in spontaneous conversations with their peers.

Methods

- The corpus data was processed and transcribed using Praat
- 500 tokens containing the target endings were extracted and categorized into the four tap realizations
- The transcriptions were then manually corrected
- 124 tokens were excluded as they were followed by silence

- To obtain an intensity measure, the lowest intensity point in the identified /r/ phoneme was subtracted from the highest intensity of the preceding sound
- The duration of the perceived taps was also measured with the manual correction of the tokens.

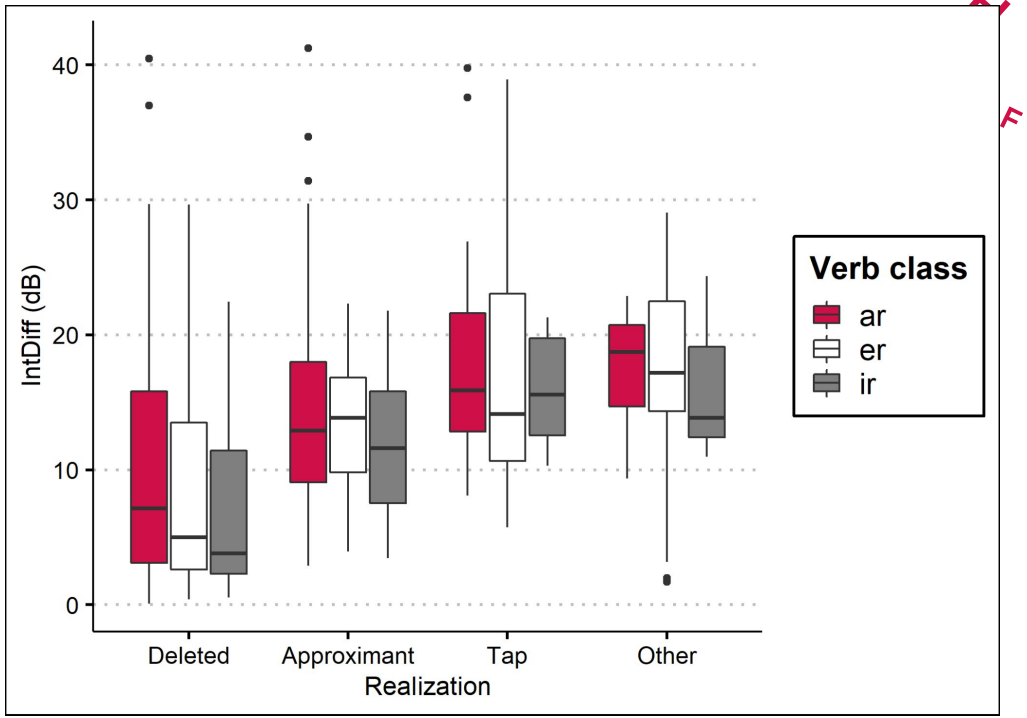
Findings



- As expected with spontaneous speech, the majority of tokens were greatly reduced.
- 43.58% of measured tokens were found to contain at least some constriction of the airflow attributed to taps
- The other 56.42% did not contain sufficient tap characteristics, these ellisions ranged from insufficient difference of intensity to a phoneme replacement

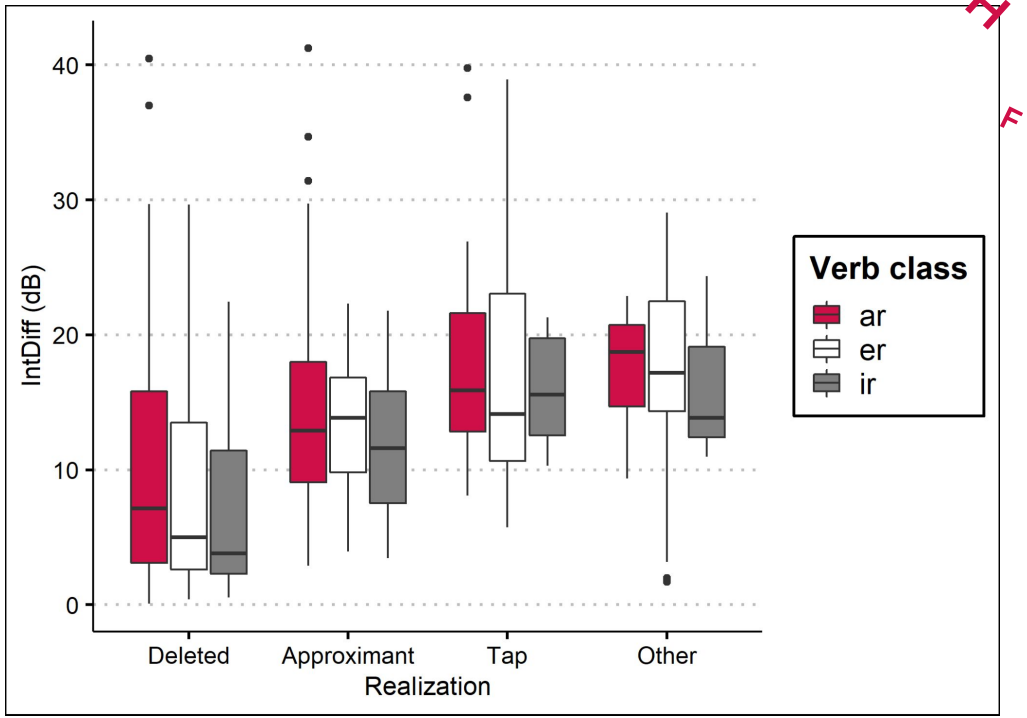
Findings-Taps

- Along with the ‘other’ category, taps have the highest mean difference in intensity
- This is due to the tap production
- The contact that the tongue makes with the alveolar ridge results in a brief constriction of the airflow that interrupts the preceding sounds and causes the dip in intensity



Findings-Approximant

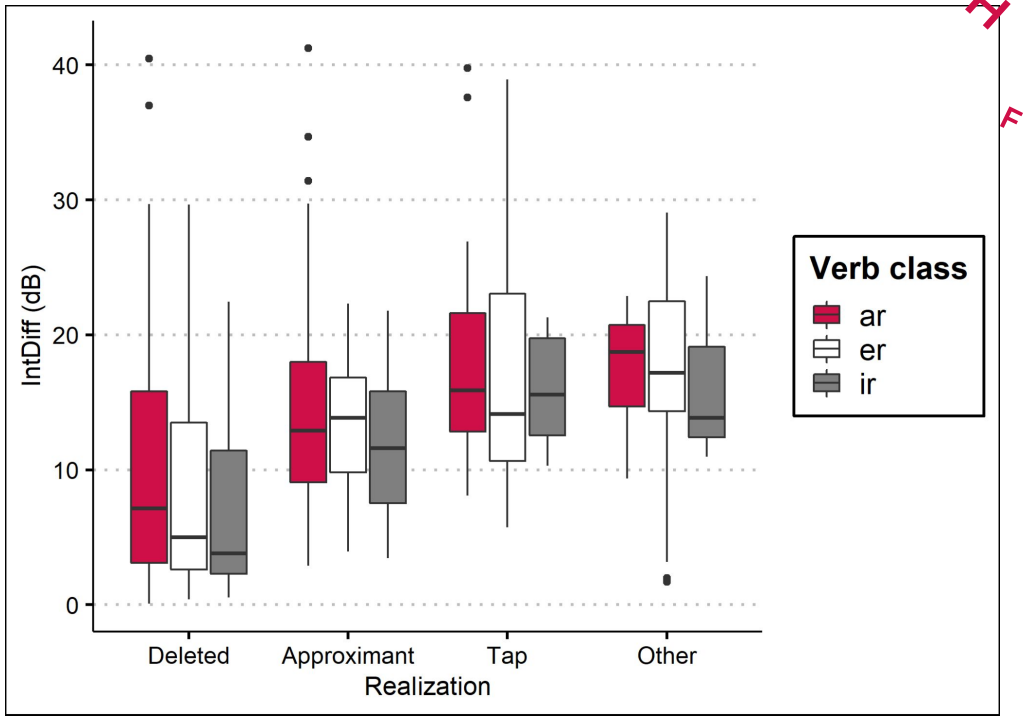
- Approximants lack some tap characteristics such as a burst release, but still contain a consistent difference in intensity and are still classified as rhotics
- The tongue may have approached the target, causing a slight constriction in the airflow but not enough to fully realize the stop like dip found in taps



Findings-Deleted

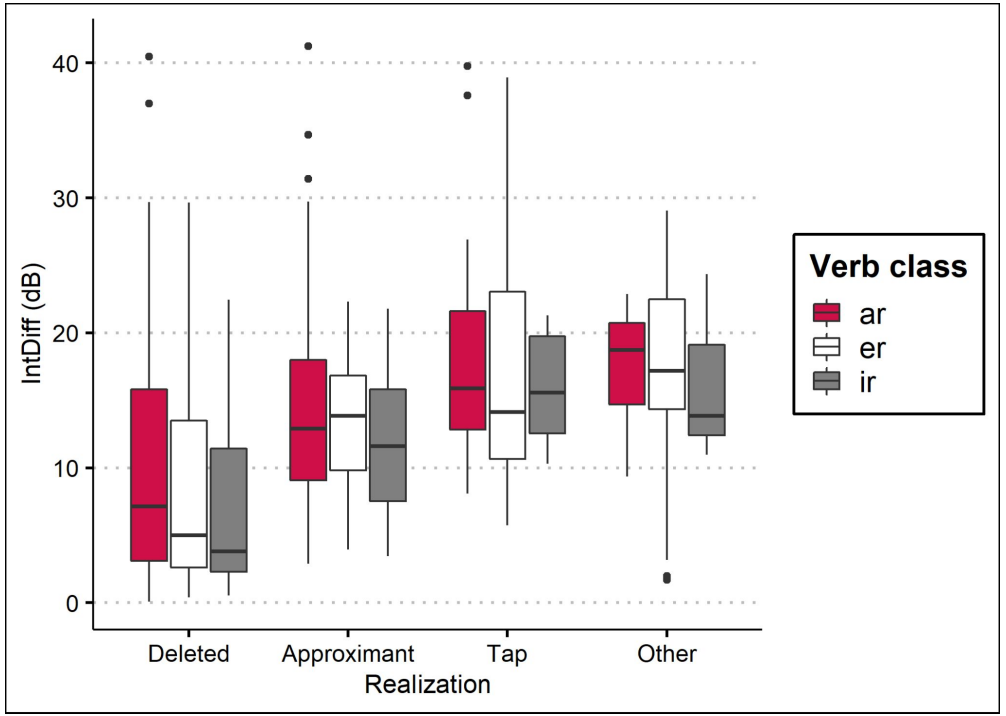
- As taps are deleted, they instead may extent the preceding sound, as such, tokens marked as ‘deleted’ showed considerably less difference in intensity compared to the other codes

- The deleted category most clearly display the trend of verbs ending with -ir having the lowest intensity difference in their respective categories



Findings-Other

- The ‘other’ category consisted of different phonemes that did not correspond to tap realizations, although some contain dips in intensity t, their realization becomes voiceless, making them look more like a fricative (such as /s/)



Conclusion

In Castilian Spanish word final taps can have many different realizations, especially during spontaneous speech. Most taps are considerably reduced, and as such most of these realizations can be identified by measuring the difference in intensity between the preceding phoneme.

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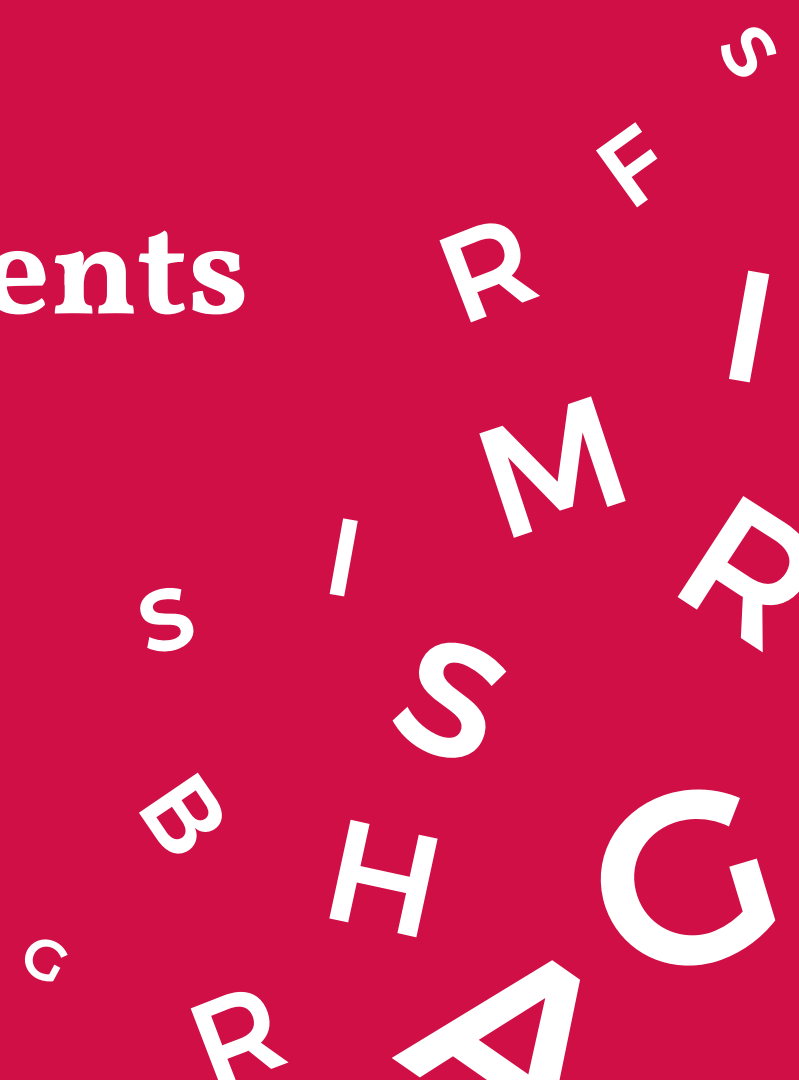

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