Allophonic Variation of /tr/ in Semi-Formal Chilean Spanish

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S1658026

Master's Thesis

MA Linguistics, Specialization Linguistics

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Leiden University

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11 April 2023

Abstract

This thesis describes the allophonic variation of /tr/ produced by five native speakers of Chilean Spanish in semi-formal language style, identifying some linguistic features and social aspects that prompt such variation. Two corpora are gathered in two speech styles, formal and semi-formal, to establish clear differences; the formal corpus consists of speech data produced by five radio anchors, whereas the semi-formal corpus involves the oral production of five Chilean politicians for online interviews. A total amount of 100 instances of /tr/ are assessed per corpus by means of acoustic phonetic analyses on PRAAT as well as by descriptive statistics. The results indicate that two allophones are produced in semi-formal style, namely [t̠ɾ] and [t͡ɕʰ]. The overt variant [t̠ɾ] is largely produced in semi-formal speech style and significantly more produced in the formal style corpus. Conversely, the preference in the usage of the covert allophone [t͡ɕʰ] correlates with less formal styles of speech, as most instances of [t͡ɕʰ] occur in the semi-formal corpus, while in the formal corpus such variant is only pronounced in less formal news broadcasting.

Keywords: allophonic variation, formal and semi-formal speech style, language attitudes, sociophonetic description.

Table of Contents

List of Figures and Tables

List of Abbreviations and Notational Conventions

BCN   Biblioteca del Congreso Nacional de Chile (National Congress Library of Chile)

IPA   International Phonetic Alphabet

OED   Oxford English Dictionary

SE   Standard Error

SD   Standard Deviation

VOT   Voiced Onset Time

< >   Orthographic representation

/   /   Phonemic/broad transcription

[   ]   Phonetic/narrow transcription

ˈ   Main/primary stress

.   Syllable boundary

Chapter 1: Introduction

Some instances of allophonic variation can be distinguished even by untrained ears, such as the usage of the allophones [ʎ] and [ʝ] that are indiscriminately used in words such as <ella> [ˈe.ʎa, ˈe.ja] 'she' in some Spanish-speaking countries. Nevertheless, describing the differences involved in the pronunciation and usage of such variants comprises major challenges. This research attempts to accept such a challenge by offering an in-depth analysis of variants of /tr/ produced within formal and semi-formal speech styles in Chilean Spanish. In the present chapter, I firstly present an overview of the articulatory and phonological nature of /r/ in the Spanish language, revising the ongoing sociolinguistic discussion regarding /r/ and its allophonic variation identified across realizations of the consonant cluster <tr>. Secondly, I examine the existing studies on such variation, their methodologies and findings in order to determine their similarities and discrepancies. Finally, I introduce my contribution to this sociolinguistic debate by presenting my statement of purpose, my research questions, as well as my hypotheses concerning native Chilean Spanish speakers and their production of variants of /r/ when pronouncing <tr> within semi-formal style of speech.

The Articulatory Nature of /r/ in the Spanish Language

Spanish is a Romance language characterized by its large number of native speakers, as it is an official mother tongue in more than 18 countries around the globe (Moreno-Fernandez, 2020). Moreno-Fernandez (2020) argues that geography plays an essential role in providing different linguistic characteristics (e.g., specific vocabulary or pronunciation patterns) to every variety of Spanish. However, he also underlines that several features concerning canonical language usage are very similar across Spanish varieties due to their shared colonialist origins. The linguistic features of /r/ discussed in this section apply to most varieties of Spanish.

The articulatory phonetics of the Spanish language identifies two rhotic sounds among the canonical realizations for the letter "r": a tap [ɾ] (also known as flap[1]) as in <pero> [ˈpe.ɾo] 'but', and a trill [r] (also identified as roll) as in <perro> [ˈpe.ro] 'dog' (Campos-Astorkiza, 2018; Hualde, 2013; Ladefoged & Johnson, 2015; Quilis, 1993). Both segments are produced by gently placing the tip of the tongue against the alveolar ridge while the rest of the air flows without any obstruction over the sides of the tongue, resulting in a brief obstruction of the airflow along the center of the oral cavity, as shown in Figure 1.1. The

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[1] According to Ladefoged & Johnson (2015), flaps are characterized as retroflex articulations, i.e., the direction of movement of the tongue comes from back to the front of the vocal track, instead of being an up and down movement, as it occurs in the Spanish language. Therefore, in this research, I refer to the segment [ɾ] as a tap sound only.

vocal track is kept almost completely open and the vocal folds remain very close, vibrating when the airstream passes through them and producing, through such a state of the glottis, a voiced sound. This is almost the same manner of articulation executed in the production of vowel segments, and therefore /r/ is identified as an approximant sound (Ladefoged & Johnson, 2015).

Figure 1.1

The Position of the Vocal Organs in the Realization of /r/ (Adapted from Quilis, 1993)

Note: Quilis (1993) transcribes the phoneme /r/ in Spanish as [r̄].

A single contact between the tip of the tongue and the alveolar area is enough to produce a tap, while we need to let the airstream flow, setting the tip of the tongue into motion in order to realize a trill. More specifically, when producing [ɾ], the tip of the tongue is quickly thrown against the alveolar region and placed immediately down to the center of the mouth in order to produce the next phoneme, which is always a vowel sound in Spanish. On the contrary, when realizing [r], the tip of the tongue is not moved by the muscle itself but by the aerodynamics of the streamflow, producing several up and down movements against the alveolar ridge, i.e., generally two or three times, in connected speech contexts (Campos-Astorkiza, 2018; Henriksen, 2014; Hualde, 2013; Ladefoged & Johnson, 2015; Quilis, 1993).

The Phonological Nature of /r/ in the Spanish Language

Regarding the phonological nature (i.e., speech sounds in context) of the Spanish tap and trill, a specific contrastive property conditions their phonetic distribution, namely when <r> occurs in intervocalic environments and within words only, as shown in Table 1.1 (Amengual, 2016; Campos-Astorkiza, 2018; Henriksen, 2014; Hualde, 2013; Lenz, 1940; Quilis, 1993).

Table 1.1

Distributions of Spanish Rhotics Regarding their Phonological Context

Phonological context	Realization	Example
1. Word-initial (#__)	[r]	[ˈro.pa] 'cloth'
2. After heterosyllabic consonant (C_)		[son.ˈri.sa] 'smile'
3. In complex onset (C__)	[ɾ]	[ˈbɾo.t̪e] 'outbreak'
4. Intervocalic (V__V)	/ɾ/-/r/ contrast	/ˈpaɾa/'for' vs. /ˈpara/'vine'
5. Before consonant (V__ #C)	Variable rhotic	[ˈmar.t̪es]~[ˈmaɾ.t̪es] 'Tuesday'
6. Word-final before pause (V__ #)		[mi.ˈrar]~[mi.ˈɾar] 'to look'

The tap [ɾ] is produced when <r> is found in between vowels only and under two circumstances: within words, as in <pero> [ˈpe.ɾo] 'but', as well as when found in word-final position and a vowel sound is the next phoneme, as in [paˈɾaɾ.a] 'stopping to' (Amengual, 2016; Araneda *et al*., 2019; Figueroa *et al*., 2010; Hualde, 2013). As a result of such a phonological constraint, the trill [r] is always realized in word-initial and, mostly, in word-final position, as in <rato> [ˈra.t̪o] 'while' or <parar> [paˈrar t̪u] 'to stop your'. Thus, the realization of a tap in word-initial or final position does not occur often among native speakers of Spanish. However, degrees of allophonic variation has been observed in L2 Spanish speakers, since the trill is a phoneme L2 speakers find difficult to articulate (Amengual, 2016; Rafat, 2015). Furthermore, the digraph <rr> occurs only in intervocalic position within words as a sign that the rhotic phoneme in such an environment corresponds to [r] instead of [ɾ], as in <perro> [ˈpero] 'dog', since the production of a tap phoneme under such a context modifies the word semantically. This intervocalic contrastive feature can be clearly identified when comparing minimal pairs of such two phonemes in Spanish, as presented in Table 1.2.

Table 1.2

Contrastive Distribution of /r/: Examples of Minimal Pairs

Tap /ɾ/		Trill /r/	
/ˈpaɾa/	'for'	/ˈpara/	'vine'
/ˈpeɾa/	'pear'	/ˈpera/	'female dog'
/ˈpeɾo/	'but'	/ˈpero/	'male dog'
/ˈkaɾo/	'expensive'	/ˈkaro/	'car'
/ˈkoɾo/	'choir'	/ˈkoro/	'I run'
/koˈɾal/	'coral'	/koˈral/	'corral'
/ˈmiɾa/	'look'	/ˈmira/	'myrrh'
/ˈmoɾo/	'I live'	/ˈmoro/	'knoll'

Among the phonological constraints of the syllable structure in Spanish (i.e., phonotactics), the consonant cluster <tr>[2] is one of several indivisible obstruent-plus-liquid sequences of speech segments within well-formed complex onsets (i.e., at the beginning of a syllable), such as the fricative sound /f/ plus the lateral /l/ in /**fl**oˈtar/ 'to float', or the stop /p/ plus the approximant segment /r/ in /ˈp**r**ima/ 'cousin' (Hualde, 2013). The sequence <tr> is canonically realized by producing two phonemes: a voiceless dental [t̪] followed by a voiced tap [ɾ]. However, some allophonic variation has been identified in the realizations of /tr/ of native speakers of Spanish in Chile, Costa Rica, Spain and Mexico, since /tr/ is also produced by adding some degrees of friction to the airflow in the oral cavity (Hualde, 2013).

Chilean Spanish

As previously mentioned, several varieties of Spanish share a significant amount of features, since most of them are a result of Spanish colonialism (Moreno-Fernandez, 2020). However, different degrees of variation can be noticed in the consonantal phoneme inventory of some varieties of Spanish. A notorious example is the fricative segment /θ/, which occurs in /ˈgraθjas/ 'thanks', in Peninsular Spanish (i.e., Spanish spoken in Spain). Such a phoneme does not occur in most of the dialects of Spanish encountered in South America. In Chilean Spanish thus, the segment /s/ is used instead of /θ/, as in /ˈgrasias/ 'thanks' (Hualde, 2013).

Chilean Spanish is one of the main five varieties of Spanish employed in the Americas, including as well Mexican Spanish, Caribbean Spanish, Andean Spanish, and Rioplatense Spanish (Moreno-Fernandez, 2020). Moreno-Fernandez (2020) underscores the role of geography in the division of such varieties, since large mazes of water, such as rivers and ocean, or mountain ranges separate such dialects. In the case of Chilean Spanish, he argues that the Andes mountain range and the Pacific Ocean provide an environment that ensures a 'safe development' of such peculiar variety.

Relevant linguistic features of Chilean Spanish are identified at lexical, grammatical and phonetic level (Hualde, 2013; Moreno-Fernandez, 2020). The Chilean lexicon is quite recognizable by its singularities; several Chilean words and expressions that are based on local indigenous languages and traditions are used by Chilean people only, such as <pololo> 'boyfriend'. All other varieties of Spanish use <novio> 'boyfriend', but <pololo> is a Chilean word derived from the Mapuche language (Moreno-Fernandez, 2020). Regarding its

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[2] In the present investigation, slash lines / / are used to characterize symbols of a broad/phonemic transcription, i.e., when using contrastive phonetic values only, while square brackets [ ] are used in narrow/allophonic transcriptions, i.e., when transcribing with a larger amount of distinctive symbols, such as diacritics, to provide phonetic differentiation, following the phonetic principles of the International Phonetic Association in Ladefoged & Johnson (2015). Meanwhile, < > are employed to represent orthography.

grammar, Chilean Spanish alternately uses two pronouns in second person, singular 'you', namely <tu> and <vos>. Such peculiarity corresponds to Rioplatense Spanish influences (Moreno-Fernandez, 2020). Finally, the most relevant characteristics regarding Chilean Spanish articulation in connected speech include the aspiration or elision of /s/ in coda position, the allophonic alternation for <ch>—namely [tʃ] and [ʃ]—, the assimilation or elision of intervocalic <d>, such as /d/ in <cansado> /kanˈsao/ 'tired', and the sibilant traits attributed to /r/ (Hualde, 2013; Moreno-Fernandez, 2020). The present research examines thus the allophonic variation of /r/ when surrounded by /t/ and a vowel sound in semi-formal style.

1.1 Overview

As previously described, Chilean Spanish is characterized by its large amount of variation; differences are clearly noticed in contrast to other Spanish dialects concerning its vocabulary, grammar, and most importantly, its 'lack' of articulation. The present research assesses the pronunciation of /r/ and its variants present in realizations of /tr/ from a sociophonetic perspective, which is a sociolinguistic approach to the study of the production of /r/. Therefore, the phonetic and phonological qualities of the sequence of segments /tr/ will be analyzed in the light of high-standard native speakers' production of Chilean Spanish, as well as contrasted to individual variants of /tr/. Moreover, non-standard elicited variants of /tr/ will also be phonetically and phonologically defined, identifying plausible nonlinguistic factors such as regional dialectology, which could influence their allophonic variation.

Several studies have attempted to portray the ongoing variation in the realizations of /tr/ in standard and non-standard Chilean Spanish from the viewpoint of sociolinguistics (see e.g., Araneda *et al.*, 2019, Bobadilla & Bobadilla, 1980; Dixon, 2010; Figueroa *et al.*, 2010; Lenz, 1940; Sadowsky, 2015; Zepeda, 2019). Nevertheless, such studies have encountered two main issues. Firstly, no agreement has yet been reached on the phonetic description and narrow transcription for the different variants of /tr/, as well as their total amount. Secondly, the findings from such research are not consistent regarding the values of prestige assigned to some variants of /tr/. Some studies have attributed stigmatized judgments, as well as rejection from higher social class towards affricate and fricative allophones of /tr/ (for such studies, see e.g., Bobadilla & Bobadilla, 1980; Diaz, 1989; Figueroa *et al.*, 2010, Lenz, 1940; Wigdorsky, 1978), while other outcomes assign different degrees of overt prestige to affricate variants of /tr/ (for such studies, see e.g., Dixon, 2010; Flores, 2017; Valdivieso, 1978).

In order to contribute to the sociolinguistic work achieved on the variants of /tr/, the present investigation will provide a thorough phonetic description of variants of /tr/ encountered in this research. Such descriptions will be executed by following the

acknowledged standards of the International Phonetic Alphabet (IPA, 2005), as well as by analyzing such segments through a sociophonetic methodology (for such method, see Smakman 2018). Hence, this study will provide an updated portrait of the dependent variables (e.g., phonological contexts) and the independent sociolinguistic variables (e.g., intraspeaker/interspeaker variation) that are involved in the production of /tr/ and its variants, analyzing plausible relations between them.

1.2 Literature Review

A Phonetic Description of /tr/

The complex consonant cluster /tr/ is an indivisible sequence of segments in a well-formed syllable, in which an obstruent is immediately followed by a liquid sound. Such sequence occurs in onset position only and immediately fulfills the phonotactic constraint of Spanish that allows a maximal string of two segments as onset consonant cluster (Hualde, 2013; Núñez-Cedeño, 2016). Following the same phonotactics, sequences such as /pl/, /pr/, /bl/, /br/, /tr/, /dr/, /fr/, /fl/, gl/, /gr/, /kl/, and /kr/ are as well found in Spanish, being consistently governed by the universal constraint of a sonority scale.

The Oxford English Dictionary (henceforth, OED) defines sonority as "the inherent loudness of a speech sound; especially the loudness of a speech sound relative to others if pitch, stress, and length are kept equal". Thus, a sonority hierarchy dominates the sequence of sounds within the syllable structure throughout several languages such as in Spanish, placing louder sounds, such as nasals and approximants nearer the nucleus (i.e., vowel sounds) of a syllable, as shown in Table 1.3 (Morales-Front, 2018; Núñez-Cedeño, 2016). Similarly, /tr/ is organized by its sonority, as its first segment presents the least sonorous feature while its second segment bears the highest sonority, after vowel sounds (Núñez-Cedeño, 2016).

Table 1.3

Sonority Scale of Chilean Spanish (Adapted from Núñez-Cedeño, 2016)

Sonorants	7 Vowels	/a, e, o, i, u/
	6 Approximants	/ʎ, r l, ɾ/
	5 Nasals	/m, n, ɲ/
Obstruents	4 Voiced fricatives	/ð, v, ɟ/
	3 Voiceless fricatives	/f, s, x/
	2 Voiced stops	/b/
	1 Voiceless stops	/p, t, k/

Nevertheless, a particular allophonic variation has been detected in realizations of /tr/ among Chilean Spanish speakers, which does not affect the pronunciation of other obstruent-

liquid consonant clusters, nor the stop plus /r/ as in /pr/ or /kr/ (Hualde, 2013). The canonical realization of <tr> involves the production of two speech sounds: a voiceless dental stop [t̪] followed by a voiced alveolar tap [ɾ]. However, the allophonic variants produced by native speakers of Chilean Spanish are characterized by degrees of friction added to such canonical manner of articulation (Hualde, 2013; Flores, 2017). Such fricative-like traits are largely identified among researchers as "assibilation", a terminology that will be analyzed in detail later on in this chapter.

Previous Sociolinguistic Discussions on /tr/ and its variants

Lenz's *Chilenische Studien* (1940) is among the earliest and most acknowledged prescriptive sociolinguistics research performed in Chile. By means of a historical sociolinguistic methodology, Lenz describes how the Peninsular Spanish language, brought to Chile through colonialism, starts developing different phonetic changes that are directly related to specific social contexts. Regarding the sounds elicited for the consonant cluster <tr> in Chile, Lenz (1940) identifies two different phonetic realizations. On the one hand, Lenz recognizes a canonical [t̪ɾ], which corresponds to a dento-alveolar voiceless [t̪] followed by a 'simple r' (i.e., a tap sound), as described above. On the other hand, the other sound is characterized as a vernacular [tɻ̝][3] that he described as an apical retroflex voiced [ʈ] followed by a voiceless 'simple' relaxed trill sound, which sounds identical to the articulation of <try> [ˈtɹaɪ] in English. Most importantly, Lenz claims that this vernacular realization of <tr> is strongly influenced by a group of indigenous people living in south-central Chile called Mapuche, who have transferred a similar phoneme from their language into the colonizers' 'good' pronunciation of Spanish (p.107). This association between vernacular realizations of Spanish phonemes and Mapuche influences gives rise to the Indigenist Theory, as well as to an animated debate regarding phonetic variation and indigenous languages that continues to this day (for such studies, see e.g., Alonso, 1953; Oroz, 1966; Rojas *et al.*, 2016; Sadowsky & Zepeda, 2017; Sadowsky, 2020, etc.).

The Indigenist Theory indicates that the phonetic variation that affects canonical Spanish in Chile is a result of the interaction between colonialists and Mapuche people (Lenz, 1940; Quilis, 1993; Zepeda, 2019). Lenz ascribes such a phenomenon to three particular reasons. Firstly, the sequence of two apical phonemes being articulated in the alveolar ridge does not occur often in Spanish. Secondly, Lenz argues there is an allophone of /t/ in the Mapuche language, i.e., Mapudungun, which shares the same articulatory place but is realized

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[3] Lenz (1940) transcribes such phoneme as [t̪ɻ̌], however [tɻ̝] represents the phonetic description provided by Lenz when transcribed by following the IPA (2015) standards.

in a more strident 'assibilated' manner instead of as simple stop sounds. Finally, Lenz claims that the colonialists heard Mapuche's assibilated realization of /t/, understood it wrongly, compared it to their previous knowledge of Spanish, and attributed the unknown new sound to the local pronunciation of <tr>. These arguments are Lenz's justification to the particular development of Peninsular Spanish in Chile (Lenz, 1940; Oroz, 1966).

Nevertheless, such arguments are strongly refuted by some acknowledged European linguists at that time, such as Alonso (1953), Llorente (1965), and Wagner (1949), who advocate the Indigenist theory from their own viewpoints. Alonso (1953) states that the phonetic changes described by Lenz (1940) cannot be a result of Mapuche impact in Chilean Spanish, as such an assibilated development has also been identified in other countries of the Americas where Mapuche people have no history, such as Ecuador and Mexico. Conversely, Wagner (1949) accepts the Indigenist theory partially, as he initially acknowledges new assibilated features of Spanish as Mapuche's influences, but he changes his mind thirty years later, stating there is no phonetic, phonological, or morphological impact from the Mapudungun language on Chilean Spanish, besides some lexical borrowing (Oroz, 1966; Quilis, 1993).

Llorente (1965) describes some variants of /tr/ he recognizes in the Spanish La Rioja region as assibilated fricative phonemes. He defines the sound of such a consonant cluster as a single affricate phoneme that, at that point and location, presents a standard as well as a vernacular variant. Llorente (1965) underlines that the possible origin of assibilated variants is directly related to the post-alveolar articulatory placing of /t/ in that region, which grants its manner of articulation a greater burst of airflow and a slightly protracted fiction. Moreover, Llorente makes reference to the presence of assibilated variants of /tr/ in countries such as Chile and Mexico, arguing that such a variation in Spanish is not strictly delimited by geographical boundaries but by preferences of vernacular language use that take place in provincial contexts.

Similarly, Oroz (1966) argues the Indigenist theory and stated that Mapuche people were utterly uninterested in the new people that came to disrupt their lives. He identifies the missionaries as a possible source of language change, which, in their mission to evangelize the new continent, studied the local languages thoroughly and made modifications to their mother tongue, Peninsular Spanish, in order to make themselves be heard. Consequently, the genesis of numerous studies began, concerning regional as well as social dialectologies and their relation to affricate variants, such as Lenz's [tɽ].

Several sociolinguistic studies have attempted to identify assibilated variants of /tr/ in Chilean Spanish and map their boundaries (i.e., regional dialectology), focusing their attention in cities such as Arica (see e.g., Zepeda, 2019), Antofagasta (e.g., Veliz *et al*., 1977), Santiago (see e.g., Diaz, 1989; Figueroa *et al*., 2010; Wigdorsky, 1978), Rancagua (e.g., Bobadilla & Bobadilla, 1980), Concepción (see e.g., Flores, 2017; Valdivieso, 1978), and Valdivia (see e.g., Cepeda, 1991; Wagner; 1967), among others. In general terms, most of these studies assess their obtained data following elicited language methodologies, thus by means of surveys and interviews. Among their findings, all these studies recognize at least two variants of /tr/, namely, the canonical realization [t̪ɾ] and another voiceless assibilated variant. However, the phonetic transcription provided to variants of /tr/ across the reviewed literature is highly inconsistent. For instance, Bobadilla & Bobadilla (1980) transcribe such assibilated variant as [t̺ɹ̥], Figueroa *et al*. (2010) depict their most relevant variant as [t̺ʂ], Valdivieso (1978) uses [t̺ʂ̥], and Veliz *et al*. (1977) [t͡ʃ].

Although such a discrepancy in phonetic transcriptions prevents an accurate recognition of regional dialectology when measuring different realizations of these variants, most of the reviewed research establishes that assibilated variants occur across the whole country, categorizing such variants as part of social dialectology in Chile (Araneda *et al*., 2019). Therefore, the rest of the performed research simply selects one of these variants of /tr/ in order to explore the extent to which non-linguistic variables such as age, gender[4], and social class are influential factors in the usage of this stylistic variation in Chile.

Outcomes that reveal substantial effects of the social variables gender and age on non-standard variant usage have been consistently achieved, in accordance with previous sociolinguistic research (i.e., Labov, 1990; Meyerhoff, 2011). Regarding gender, studies such as Araneda *et al*. (2019), Cepeda, (1991), and Zepeda (2019) conclude that gender determines the usage of assibilated variants of /tr/, since men have shown a tendency to produce a larger number of marked variants—i.e., assibilated phonemes—than women. Concerning age, studies (such as Dixon, 2010; Flores, 2017; Wigdorsky, 1978; Zepeda, 2019) indicate that age constrains the usage and stigmatization of non-canonical variants, as speakers older than 30 years old produce larger quantities of sibilant allophones of /tr/ than younger speakers, which also convey stronger negative judgments.

Moreover, different attitudes of social class have been detected towards assibilated variants in Chilean Spanish. Initial studies on this phenomenon, such as Bobadilla &

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[4] In the present research, the sociolinguistic factor gender is preferred rather than sex, in accordance with Meyerhoff (2011).

Bobadilla (1980), Diaz (1989), Lenz (1940), Oroz (1966), Wagner (1967), and Wigdorsky (1978), consider assibilated variants as linguistic social markers, as they notice that canonical values are given to [ʈɽ], while stigmatized values are assigned to different realizations of /tr/. Such authors also underline that [ʈɽ] is most pronounced among higher social class speakers as part of their restricted code, whereas working-class speakers tend to produce assibilated variants of /tr/. However, more recent investigations do not always present such a dichotomous preference in language use. On the one hand, Figueroa *et al*. (2010) argue that there is a correlation between high social status and their production of the standard realization [ʈɽ], whereas lower social status produces a larger amount of assibilated variants. On the other hand, other studies suggest that social attitudes towards /tr/ and its variants are fluctuating, since new generations have provided more neutral values to the ongoing allophonic variation of /tr/ (see e.g., Zepeda, 2019), or plainly conclude that new variants of /tr/ are currently gaining overt prestige due to its increased usage among Chilean middle and upper social class population (Flores, 2017).

To properly understand all the achieved findings, clear and consistent depictions of the phonetic features involved in variants of /tr/ are imperative. In order to solve this issue to some extent, Figueroa *et al*. (2010) accomplish a thorough phonetic analysis of /tr/ and its variants that are elicited in semi-formal interviews, collecting a final corpus of 138 tokens from 4 speakers in Santiago city. Among their findings, 4 different allophones of the consonant cluster <tr> are identified and quantitatively assessed: [ʈɽ, tʃ, ᵗɹ̝̊, ɹ̝̊]. Also, Sadowsky & Salamanca (2011) compose a detailed catalogue of 93 allophonic occurrences in Chilean Spanish, including a total of 7 realizations of /tr/, namely [tʃ, t͡ɹ̝, t͡ʂ, ᵗɹ̝̊, ɹ̝̊, ɹ̝, ʂ]. The framework employed for the compilation of this catalogue corresponds to a historical sociolinguistic approach, as the core data involves qualitative sociophonetic descriptions of phonemes that are "theoretically"[5] present in Concepción city (Sadowsky & Salamanca, 2011). Nevertheless, both studies present a clear phonetic description of plausible variants of /tr/; they do not elaborate nor agree on their definition of assibilation, and their use of diacritics for their provided transcriptions.

Araneda *et al*. (2019) aim to identify whether the allophonic variation observed in Santiago (i.e., Figueroa *et al*., 2010) is the same phenomenon unfolding outside that capital city. Thus, a total amount of 2,880 variants of /tr/ are assessed, from participants in 8 different

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[5] Sadowsky & Salamanca (2011) underscored the inconclusive nature of their catalogue since they introduced theoretic data regarding phonetic realizations of /tr/, as well as a list of methodological steps as an invitation to further empirical research on Chilean Spanish allophones.

Chilean cities, namely Iquique, La Serena, Valparaíso, Santiago, Concepción, Temuco, Coyhaique, and Punta Arenas. There are 160 participants; a clear description is provided of the delimiting requirements for the studied population, but no further details are specified regarding their sampling technique. Araneda *et al.* (2019) follow the corpus-based methodology suggested by Figueroa *et al.* (2010) to perform their phonetic evaluation and identify the exact same allophones present in Santiago, i.e., predominance in usage of the canonical allophone [t̠ɹ̝̊] and a few other sibilant variants, but within 'non-standard' conversational environments. This is an unexpected finding, since the consulted literature, including Figueroa *et al* (2010), indicates that the canonical allophone [t̠ɹ̝̊] is the most frequently realized sound in formal settings, and therefore, a higher production of sibilant variants was expected within non-standard contexts. And although these studies apply transcriptions of variants of /tr/ consistently, such transcriptions cannot be assessed easily due to the amount and order of diacritics used, which, instead of clarifying the phoneme sounds, make them rather daunting, even to IPA linguist users.

Controversial Assumptions

As above mentioned, the phonemes that characterize variants of /r/ when following /t/ and preceding vowels represent different degrees of devoicing and "assibilation", but there is no further elaboration on what assibilation means. According to the OED, assibilation is the pronunciation of a sibilant or hissing sound. However, such terminology does not qualify among IPA standards when classifying manners of articulation of speech sounds.

Ladefoged & Johnson (2015) argue that "sibilant" is a term that is sometimes applied to divide fricatives in relation to their auditory features. More specifically, high-pitched fricative phonemes that present greater loudness and a clear hiss are called sibilants, such as [s, z, ʃ, ʒ]. Therefore, in order to accurately describe variants of /r/ in phonetic terms, we need to address them as fricative sounds when the hiss feature is more prominent, or affricate sounds when the preceding /t/ is more prominent. Such a clarification narrows the number of phonemes appropriate to variants of /r/, realized in such a specific context, facilitating the selection of accurate allophonic IPA transcriptions for such a language variation.

Hence, in the present literature review, there are two major gaps that need to be filled. Firstly, accurate phonetic transcriptions for allophonic realizations of /tr/ must be systematically produced, using the worldwide acknowledged IPA standards, so that further research may share equal starting points when analyzing phonetic variation in Chilean Spanish. Secondly, non-linguistic factors, such as social class, should be closely studied in order to understand their implications in allophonic variation. The present research will

provide qualitative and quantitative answers for the former gap, as my aim is to facilitate reliable phonetic transcriptions for variants of /tr/ present in Chilean Spanish, using the IPA conventions.

1.3. Research Questions

A distinctive variation can be heard in the pronunciation of /tr/ among Chilean Spanish speakers. Several studies have described such phenomenon, though no agreement has been yet reached with respect to standard linguistic terminology for such reports. The present research analyzes such language variation from a sociophonetic perspective in order to offer a clearer phonetic insight to the ongoing discussion on social language use in Chilean Spanish.

Hence, the current investigation deals with the sociolinguistic nature of variants of <tr> that occur in semi-formal Chilean Spanish. In order to avoid the existent discrepancies when describing features of /tr/, common linguistic and social features need to be established as reference; high standard Chilean Spanish is thus also analyzed to play such a role. Allophones of /tr/ are compared to one another to define differences that can be better identified by answering the following research questions:

1) What is the sociolinguistic nature of variants of <tr> in semi-formal Chilean Spanish?

2) Are there any linguistic variables, such as stress placement, or social variables, such as degrees of formality in speech style, influential in the usage of allophones of /tr/?

3) To what extent are the realizations of /tr/ in formal Chilean Spanish and in semi-formal style similar to one another?

These questions will be answered in the light of a corpus-based analysis, namely through a detailed assessment of occurrences of /tr/ within formal and semi-formal contexts. Besides providing reliable data on /tr/ and its allophones, this approach establishes systematic steps towards an accurate collection of specific patterns of language usage, which could encourage further sociolinguistic research on other remarkable features of Chilean Spanish.

Chapter 2: Methodology

Speech data was collected in order to generate corpora that provided reliable phonetic features of /tr/ and its allophonic variation in Chilean Spanish. Two different corpora were produced to obtain insight of realizations of /tr/ within two degrees of formality: formal, as well as semi-formal style. Accordingly, two different speech sources were employed. The first source corresponded to speech material from 5 radio news presenters that provided data of /tr/ realized in high formal Chilean Spanish. The second source consisted of speech fragments produced by 5 Chilean politicians during online interviews to evaluate semi-formal Chilean Spanish. Both sources were obtained on the Internet: the speech produced by newsreaders was

accessed through the official website of Radio Cooperativa, while the semi-formal speech data was collected from the video sharing platform YouTube. A final amount of 200 instances of /tr/ were selected. Thus, 100 speech fragments were analyzed per communicative context, namely formal and semi-formal settings. The allophonic variation of /tr/ was evaluated in the light of the dependent linguistic variable phonological context as to whether different preceding phonemes influence the use of a certain variant of /tr/. Also, some non-linguistic independent variables were considered, such as speakers' residence regions, in order to identify plausible social factors that may influence speakers' use of variants. An overview of the assessed factors in both corpora is presented in Table 2.1.

Table 2.1

Social and Linguistics Factors Identified in Formal and Semi-Formal Style Corpora

Variables		Formal Style Corpus	Semi-Formal Style Corpus
Social Factors	Age	26-49	38-39
	Regional origin (%)	Santiago (100%)	North 40% - Center 60 %
	Sex	Male	
	Studies	High	
Linguistic Factors	Phonological contexts	Intervocalic, post-fricative, post-nasal, and post-liquid	
	Syllable type	Stressed 29%	Stressed 23%
		Unstressed 71%	Unstressed 77%

2.1. Formal Chilean Spanish Corpus

This corpus is comprised of the speech produced by radio newscasters whose speech production is considered equivalent to high-standard Chilean Spanish. This consideration is based on my personal judgements as a linguist and as a native speaker of Chilean Spanish. Online audio files of 5 male anchors were collected from news transmissions such as breaking news and sports news. About 15 minutes were used per presenter.

2.1.1. Speakers

In order to select speech material that could provide the description of canonical realizations, speakers who spoke Standard Chilean Spanish to a high level were required. Venegas & Soto-Barba (2017) underscores the high degrees of self-awareness and subsequent self-correction that can be achieved in reading aloud, which also favors more accurate speech production. Therefore, 5 contemporary newscasters were selected as formal speech production sources; their speech data was retrieved from the official website of Radio Cooperativa. Radio Cooperativa is a highly prestigious press referent in Chile; it is acknowledged by its vast journalistic work and several decades of experience in the field.

Thus, their newsreaders were selected on the assumption that such speakers produce the Chilean Spanish language at the highest level.

The first step in the sampling technique consisted of reaching Radio Cooperativa's archives department in order to request general personal information of their news presenters. After submitting the corresponding official solicitation form to Radio Cooperativa, data was received regarding journalists' full names, their ages, their city of residency, programs they contributed to, as well as the journalists' role in such programs.

Then, three main criteria were considered in the selection of speakers: gender, age, and their corresponding radio programs. Firstly, all participants were male, as for the independent variant gender is out of the scope of this research and most of the anchors were male speakers. Secondly, the selected participants were between 26 to 49 years old. The youngest newscasters of the selected programs were favored. Speakers who were above 50 years of age were avoided as speech source since, as mentioned above, older speakers are prompted to produce larger amounts of marked allophonic variants (see e.g., Flores, 2017; Wigdorsky, 1978; Zepeda, 2019). Thirdly, speech retrieval was an option when journalists had a conducting role in specific radio programs. Preferred radio programs for speech retrieval involved press transmissions that are considered highly reliable among the Chilean population by their high formality degrees and their proper language usage (Lasagni *et al*., 1987; Venegas & Soto-Barba, 2017). Consequently, such a consideration indicates that those news presenters qualified as a suitable source of formal speech. Also, all speakers were established in the city of Santiago for longer than ten years. An overview is presented in Table 2.2 that includes general information of the selected speakers.

Table 2.2

General Personal Information of Chilean Radio Anchors

Style	Speakers	Code	Age	Sex	Residence	Radio Broadcast	News Type
High standard language	Francisco Becerra	FB	26	Male	Santiago	El Diario de Cooperativa	hard
	Gonzalo Araya	GA	37			El Diario de Cooperativa	hard
	Jorge Lira	JL	44			Hablando De…	soft
	Sebastian Esnaola	SE	45			Al Aire Libre	soft
	Rafael Pardo	RP	49			El Diario de Cooperativa	hard

Chilean Spanish presents a vast range of intraspeaker variation. These 5 speakers represent the Chilean population that must use a prestigious language style to be considered a trustworthy press service by Chilean people (Flores, 2017; Lasagni *et al.*, 1987).

2.1.2. Speech Data

Speech material was selected with respect to specific qualitative and quantitative features. Qualitatively, the required aspects of the retrieved data involved its speech style, the radio station, its radio program, its sound quality, and format. Quantitatively, the amount of speech material and the quantity of speakers were considered in the selection of speech data.

The preferred speech style for this corpus corresponded to a formal modality since canonical pronunciations are imperative within formal contexts. Accordingly, the target language is more frequently realized under official communicative circumstances, as well as while reading aloud, such as radio news presenters (Flores, 2017; Lasagni *et al.*, 1987; Venegas & Soto-Barba, 2017). Hence, Radio Cooperativa was selected.

Radio Cooperativa started broadcasting news programs, such as *Reporter Esso*, in 1941, making it the first and largest news-based radio station in Chile (Lasagni *et al.*, 1987). Lasagni *et al.* (1987) suggest that one of the essential features of language use among Chilean news broadcasters concern presenters' accurate diction, which correlates with the formal speech style Chilean society expects from official anchors. Consequently, the radio station was selected as speech source for this research on the basis of its large trajectory and recognized prestige in the national journalistic media.

To ensure a broader access to the desired speech data, a decision had to be made regarding broadcast news types that would best serve such purpose. Bell (1991) acknowledged two sorts of news: hard and soft news. Hard news concerns well-structured reports of events that have been disclosed since the prior editing of a program transmission (i.e., criminal acts, calamities, discoveries, etc.), whereas soft news discusses pieces of information more extensively. As a result, soft news allow more stylistic variation that generally contains contextual details as well, such as—to some extent—the presenter's viewpoints of such news (as cited in Smakman, 2006, p. 71). Therefore, radio programs containing hard news were preferred as speech sources, since during such broadcasting, presenters avoid communicating their assessments of the reported events; anchors limit themselves to reading the displayed pieces of news and using less spontaneous speech.

The only radio program classified as a hard news provider was *El Diario de Cooperativa*, which was the official daily news report in the radio's schedule. All other programs imparted soft news, as the most relevant news was further discussed by up to three

journalists. The timeframe for the retrieval of the speech data corresponded to radio broadcasting emitted in March, 2022, and at that time, only three different speakers were presenting that program. Therefore, two additional soft news programs were included, namely *Al Aire libre* and *Hablando De…*, since such news items were reported in a formal setting by only one presenter, which led to less stylistic variety during news discussions.

Furthermore, a high quality of the speech material is imperative in order to accurately analyze its acoustic properties, such as soundwaves. To achieve this, plenty of speech data was collected to allow a margin for non-suitable material; interfering sounds such as background music were reduced, and when such a procedure was not enough to provide clear sound data, the token was discarded. Speech material needed to be further analyzed in software such as Audacity and Praat; audio fragments were downloaded in WAV file format.

Tokens

The total amount of analyzed tokens corresponded to 100 words containing instances of /tr/. Approximately fifteen minutes of speech were collected per newscaster, retrieving from 24 to 28 tokens per speaker. The required number of tokens for this corpus was 20 items per speaker; nevertheless, a few extra ones were also collected in case some tokens presented distorted acoustic features. Also, occurrences of /tr/ were ignored when they were mispronounced and when they contained proper nouns in a foreign language, such as surnames in English (e.g., Trump) in order to gather highly consistent pronunciation patterns. Three realizations of /tr/ were found when preceding a diphthong and when following a hiatus; those tokens were discarded as there were no sufficient instances for reliable data.

Linguistic Features

As previously mentioned, the context in which /r/ was examined concerned a preceding dental /t/ and a following vowel sound. Such an environment belongs to an indivisible onset consonant cluster of Spanish language. The realizations of the digraph <tr> are thus analyzed as one linguistic segment with two phonetic elements, as in the affricate [t͡ʃ] in English and Chilean Spanish, which is the corresponding phoneme to the digraph <ch>. This phonetic context was selected since its realizations can present noticeable degrees of intraspeaker as well as interspeaker allophonic variation.

The Spanish language presents a syllable-timed language rhythm that characterizes syllables by constantly displaying the same features, whether they are stressed or unstressed (Law *et al*., 2018). As there is a stable length across stressed and unstressed syllables in Chilean Spanish, instances of /tr/ in all lexical-stressed contexts were equally evaluated.

Four different phonological contexts were distinguished in the collected speech data: an intervocalic position, post-fricatives, post-nasals, and in post-liquid contexts. Only two instances of /tr/ occurred after a pause and such were discarded as they did not provide enough data for a reliable description of /tr/ in such a context. An overview of the instances of /tr/ analyzed in this corpus is presented in Table 2.3.

Table 2.3

Instances of /tr/ in Formal Chilean Spanish

Description Phonological Context	Syllable Type	Example	Tokens (100)	Speakers (N=5)
Intervocalic	stressed	*atrás*	10	4
	unstressed	*otro*	25	5
Post-fricative	stressed	*las tres*	14	5
	unstressed	*ministro*	12	5
Post-nasal	stressed	*entrar*	13	5
	unstressed	*mientras*	22	5
Post-liquid	stressed	*maltrato*	2	2
	unstressed	*el trabajo*	2	2

2.1.3. Procedure

The measuring technique consisted of a series of systematic auditory and comparative procedures that offer steady features of the articulatory phonetics of /tr/. Thus, the first step to measure instances of /tr/ consisted of downloading audio files in WAV format from the radio's website (Cooperativa, 2022). Such action was required since a WAV format allows further sound analysis through software such as Audacity (Audacity, 2022; version 2.4.2) and Praat (version 6.2.09; Feb 15, 2022). The MiniTool uTube Downloader software (version 3.1) was employed for downloading the speech data, which WAV file sizes varied from 276MB to 654MB, presenting a sampling rate of 44,100 HZ, at 32 bits per file.

Secondly, the audio files of every speaker were open in Audacity for a thorough selection of speech data. In Audacity, acoustic features such as background noise as well as speech rate were adjusted so that the speech segments could be properly prepared for assessment. In such a regulation, additional noise such as background music was reduced three times to 10 decibels (dB); noise could not be reduced all at once to less than 10 (dB) as such could also affect speech sounds. Moreover, the rate of all speech data was decreased by 15%, as the resulting rate offered ample features of the segments of /tr/. Then, labels were made of every instance of /tr/ and its surrounding segments. Once all labels were made, they were played consecutively within their phonological environment, in order to classify the

manner of articulation of /tr/ (i.e., stop, affricate, or fricative). All selected labels were exported into sole WAV files, which were further analyzed in Praat.

In Praat, canonical realizations of /tr/ were evaluated by considering two features: their sound wave pattern and the preceding speech sound. Waveforms were studied to identify the length of the speech segments at play, namely, the interval time (i.e., milliseconds) between the release of the stop /t/ and the start of the voicing, which is its voice onset time (henceforth, VOT), as well as the length of the voicing corresponding to /r/ independently. Some studies argue that canonical realizations of /t/ in Spanish language present a VOT value between 20 and 30 milliseconds (hereafter, ms − for such studies, see e.g., Balukas & Koops, 2015; Piccinini & Arvaniti, 2015), thus identifying the VOT of /t/ and the length of the liquid segment /r, could provide the phonetic features of canonical realizations of /tr/ in Chilean Spanish. Also, recognizing the previous speech segment could establish a correlation between the previous manner and place of articulation and the realization of plausible variants of /tr/.

2.2. Semi-Formal Chilean Spanish Corpus

The speech data selected for his corpus was generated by 5 native speakers of Chilean Spanish, whose speech was classified as semi-formal. This classification is based on the communicative contexts in which such speech data was produced, as well as speakers' roles in the Chilean society at the moment of their speech production. Audio files were retrieved from the video sharing website YouTube, which contained online interviews. Speech material comprised realizations of /tr/ of 5 male speakers who, at that time, were involved in political movements in Chile. Circa 20 minutes of speech data were collected per speaker.

2.2.1. Speakers

To collect speech data that depicted features of allophonic variants of /tr/ produced in semi-formal contexts, native speakers of Chilean Spanish who spoke the language to an academic standard level were required. Rojas (2012) underlines an acknowledged correlation among Chilean people concerning high educational levels and proper diction of Chilean Spanish. Therefore, 5 Chilean speakers who have obtained at least a bachelor's degree were selected as speech sources. The assumption for these speakers' selection is that, due to their educational backgrounds, such participants could produce language at a formal standard level.

In order to gather a homogenous sample of speakers who were also from different regions of Chile, participants with an active role in the constituent assembly of Chile were considered. Archives from the National Congress Library of Chile (Biblioteca del Congreso Nacional de Chile, henceforth, BCN) indicated that since May 2021, 155 people from all over the country were democratically elected as members of the constituent assembly, to revise and

modify the Chilean constitution. Candidates for such an event needed to be recognized by the Chilean population in order to be elected as participants of such an assembly. Consequently, large amounts of personal data regarding those candidates, as well as their political agendas, were provided as public knowledge to Chilean people, in order to facilitate people's trust on such new public figures. Such information was often imparted by means of online interviews[6], which are the speech source of the present corpus.

The sampling technique comprises four main criteria: sex, age, educational background and place of residence. Firstly, a list containing all the participants of the constituent assembly was accessed through the BCN's official website. Such a list provided complete biographies of every assembly member. Secondly, all male participants who were born in 1982 and 1983 were preselected; those years were preferred as they comprise the largest and youngest group of assembly members. Selected participants were thus between 38 and 39 years old when they elicited the data assessed in this corpus. Older age ranges were left aside since, as previously mentioned, older people tend to produce more allophonic variants. Moreover, only male participants were taken into consideration as sample due to two reasons; on the one hand the independent variable gender is not further discussed in this study, and on the other hand, male speakers emit larger amounts of language variation than women, as earlier discussed, offering a broader range of the target language features for this corpus. Thirdly, speakers were selected by considering their achieved university studies, as well as their different locations across the country; when assembly members were located in the same region, the speaker who had completed more academic years was preferred as speech source. Speakers' educational records were strongly considered based on the previously stated effect of fulfilled educational background on proper realizations of Chilean Spanish. An overview of the participants' personal features is presented in Table 2.4.

Table 2.4

General Features of Semi-Formal Chilean Spanish Speakers

Language Style	Speakers	Code	Place of Residence	Profession	Age	Sex
	Alfredo Moreno	AM	Molina	Engineer	40	
	Cesar Uribe	CU	San Nicolás	Architect	39	
Standard	Daniel Bravo	DB	La Serena	Lawyer	40	Male
	Luis Jiménez	LJ	Arica	Lawyer	39	
	Ricardo Moreno	RM	Santiago	Lawyer	39	

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[6] These interviews were developed virtually due to the COVID-19 pandemic outburst.

2.2.2. Speech Data

The speech material for this corpus was selected by taking into consideration a few quantitative and qualitative characteristics. Respecting the quantifiable features, the number of selected speakers and the sum of tokens per speaker were the contemplated factors. The collected data for this corpus was retrieved from 5 different speakers so that language variation of five individuals could be contrasted with previously analyzed canonized realizations of <tr>, in order to better define the phonetic features of the assessed allophones. Therefore, 20 instances of <tr> were collected per speaker, which according to Smakman (2018) is a reliable amount of speech material to evaluate individuals' phonetic variation.

Furthermore, the qualitative features in the collection of speech data comprised the communicative language style, its sound quality, and its format. The language use assessed in this corpus corresponds to a semi-formal style; the speech data was retrieved from unofficial interviews with politicians, who generally used a formal language. Those interviews were classified as unofficial since they were online interviews accomplished by informal local digital press. However, the language usage was classified as semi-formal, since those interviews not only offered information regarding speakers' goals as contributors to the new Chilean constitution, but also discussed some personal information, such as speakers' place of birth, their previous studies, hobbies, etc.; consequently, politicians also used language at a less official level.

Number of Tokens

The tokens assessed in this corpus corresponded to a final sum of 100 instances of /tr/. Between 22 and 25 tokens were collected per speaker, which were retrieved from circa twenty minutes of speech per interview. Following the procedures from the previous corpus, 20 tokens per speaker were required; however, extra speech data was collected to allow posterior removal of unsuitable material. Moreover, instances of /tr/ were immediately disregarded when found in a mispronounced word, when they were part of proper nouns in foreign languages, or when they presented unclear surrounding language segments due to connectivity issue—which was a problem encountered in most of the interviews. These steps ensured a collection of consistent articulatory patterns.

Phonetic and Phonological Contexts

As already stated, the phonological context assessed in this corpus corresponded to productions of /tr/ in onset position; from which /t/ is a dental sound and /r/ is a tap. Such realizations were again examined as one phoneme that presents two manners of articulation, such as the affricate phoneme [t͡ʃ] in <choose> in English.

Three phonological features were considered for the measurement of the tokens: their lexical stress, their VOTs and their preceding language sound. Regarding its lexical stress, stressed and unstressed syllables containing instances of /tr/ were studied alike, as to its constant syllable-timed feature ensures an equal duration of all syllables within stressed and unstressed distributions. Also, VOT was obtained by measuring the interval between the releases of /t/ and the start of the voicing of the next segment, i.e /r/ or the next vowel sound.

Further, the same phonological contexts assessed in the previous corpus were studied in this corpus, namely intervocalic /tr/, post-fricatives, post-nasals, and post-liquids. Four realizations of /tr/ occurred when preceding a diphthong, two tokens were encountered following a hiatus, and three instances of /tr/ were produced after a silence. Such speech fragments were discarded since they presented insufficient data of /tr/ in such environments. In Table 2.5, an overview is shown regarding the instances of /tr/ examined in this corpus.

Table 2.5

Instances of /tr/ in Semi-Formal Chilean Spanish

Description Phonological context	Syllable Type	Example	Tokens (100)	Speakers (N=5)
Intervocalic	stressed	*detrás*	9	4
	unstressed	*nosotros*	25	5
Post-fricative	stressed	*distrito*	14	5
	unstressed	*demuestra*	9	5
Post-nasal	stressed	*central*	12	4
	unstressed	*dentro*	20	5
Post-liquid	stressed	*del tronco*	5	4
	unstressed	*el trabajo*	6	5

2.2.3. Procedure

In order to provide clear articulatory features of variants of /tr/, consistent selective steps towards acoustic measurements were executed, which were quite similar to the procedures performed in the previous corpus. As a first step, WAV audio files were retrieved from interview videos found on YouTube by operating the MiniTool uTube Downloader software; WAV files that fluctuated from 203MB to 412 MB were downloaded, at a sampling rate of 44,100 HZ and 32 bits per audio fragment. The sound features of the collected data were further assessed in Audacity and Praat.

In order to qualitatively improve and then select the specific speech material for assessment, WAV files were accessed through Audacity. Individuals in this corpus did not speak as fast as the news presenters did in the previous corpus, thus their speech rate in their

audio files was lowered by 10% only, in order to evaluate speech sounds more accurately. Also, background noise reduction was not required for these audio files, as these speech sources were online interviews that did not have background music to avoid acoustic interference. Then, instances of /tr/ and their immediate surrounding segments were separated into labels. As variants of /tr/ present a different manner of articulation—by exchanging the canonical voiceless stop for affricate or fricative realizations—perceiving such variants can be achieved when listening attentively. Therefore, all labels were played sequentially in order to classify all audio fragments into their first manner of articulation, namely, stop, affricate or fricative. Finally, all labels were exported as WAV files for their individual analysis in Praat.

Every realization of /tr/ was evaluated in Praat by analyzing three features: each sound wave pattern, their preceding speech sound and their VOTs. Waveforms were considered to detect the length and voicing of the involved speech sounds. Such data was carefully stored for its later statistical analysis in SPSS software. Also, recognizing the previous speech segment could establish a correlation between the previous manner and place of articulation and the realization of specific variants of /tr/. Finally, VOTs were measured in ms to identify plausible features, such as aspiration, thoroughly among allophones of /tr/.

Chapter 3: Results

This investigation intends to provide a detailed sociophonetic description of the allophonic nature of <tr> when realized within semi-formal style in Chilean Spanish. Such description is accomplished by contrasting the realizations of /tr/ generated in semi-formal style to variants produced within formal style. The previous chapter reveals the steps involved in the selection and measurement of the speech data that comprise the two corpora compiled for this study, specifically the formal Chilean Spanish corpus and the semi-formal Chilean Spanish corpus. Accordingly, the present chapter offers qualitative and descriptive statistical analyses of the collected speech data in both corpora. Such outcomes are compared to one another in order to establish conclusive differences in the production of /tr/ within formal and semi-formal settings; the main characteristics of variants of /tr/ are presented in the following chapter of this research.

3.1 /tr/ in Formal Chilean Spanish

The speech material retrieved from five radio anchors, namely 100 speech fragments, provides qualitative and quantitative information on /tr/ within formal style in Chilean Spanish (for further details, see the Appendix A section). The qualitative data collected offers articulatory characteristics and phonological evidence for /tr/, namely the manner of

articulation and voicing of each segment, as well as the phonological nature of /tr/ in relation to its surrounding segments and its lexical stress distribution.

The articulatory phonetics analyzed in this corpus comprises properties such as place and manner of articulation, as well as the larynx setting in which /tr/ is produced (i.e., voicing). An overview of such articulatory features of <tr> produced by radio presenters of hard and soft news in formal style is presented in Table 3.1.

Table 3.1

Articulatory Properties of <tr> Produced by Five Radio Anchors

Articulatory Place	Manner	Voicing	Narrow transcription	Speakers (*N* = 5)	News Type	Tokens (100)
Dento-alveolar	Stop tap	Voiceless-voiced	[t͡ɾ]	FB	Hard	20
				GA		20
				RP		20
				JL	Soft	14
				SE		16
Alveolo-palatal	Affricate	Voiceless	[t͡ɕʰ]	JL	Soft	6
				SE		4

As shown in Table 3.1, the most frequent pronunciation of <tr> present in 90% (*N* = 90) of the speech collected for this corpus corresponds to [t͡ɾ]; a variant consisting of two speech sounds. The manner of articulation and voicing of the first segment concern an unaspirated voiceless stop, transcribed as [t̪], as it takes place in between the alveolar ridge and the upper teeth. The second segment is identified as an alveolar voiced tap [ɾ], which is also realized in 90% of the collected speech data. The production of <tr> among radio news presenters indicates thus a clear preference for [t͡ɾ], which also coincides with the definition of its canonical variant described in the literature review.

Conversely, another realization of <tr> occurs in 10% of the analyzed data, which is identified as an aspirated voiceless alveolo-palatal affricate [t͡ɕʰ]. This affricate phoneme (i.e., a stop followed by a fricative sound) is occasionally produced by only two speakers who are soft news anchors. Further articulatory and phonological features on [t͡ɕʰ] are not further analyzed in this corpus as its amount of occurrences is rather irrelevant; the next section includes a thorough examination of [t͡ɕʰ] due to its significant incidence in such corpus.

Furthermore, the collected speech data also provides qualitative evidence in terms of the sound structure of /tr/ in Chilean Spanish, i.e., phonological properties of /tr/ in relation to its location within words and its interaction with lexical stress—also known as main or primary stress. An outline of such phonological features is presented in Table 3.2.

Table 3.2

Phonological Nature of /tr/ Produced by Five Radio Anchors

Phonological Features			Notation			Tokens
Context	Syllable type	Example	Voicing	Broad	Narrow	(100)
Intervocalic	stressed	*atrás*	voiced	/tr/	[t͡ɾ]	6
			voiceless		[t͡ɕʰ]	1
	unstressed	*otro*	voiced	/tr/	[t͡ɾ]	27
			voiceless		[t͡ɕʰ]	1
Post-fricative	stressed	*mostró*	voiced	/tr/	[t͡ɾ]	8
	unstressed	*nuestro*	voiced	/tr/	[t͡ɾ]	16
Post-nasal	stressed	*control*	voiced	/tr/	[t͡ɾ]	5
			voiceless		[t͡ɕʰ]	5
	unstressed	*dentro*	voiced	/tr/	[t͡ɾ]	22
			voiceless		[t͡ɕʰ]	3
Post-liquid	stressed	*maltrato*	voiced	/tr/	[t͡ɾ]	4
	unstressed	*el trabajo*	voiced	/tr/	[t͡ɾ]	2

As shown in the table above, /tr/ is identified in four phonological distributions: intervocalic, post-fricative, post-nasal, and post-liquid contexts. The most significant variant in this corpus is [t͡ɾ] (90%; $N = 90$), which occurs mostly in intervocalic positions (33%; $N = 33$), followed by post-nasal occurrences (27%; $N = 27$). [t͡ɾ] is less often encountered after liquids (6%; $N = 6$) and in post-fricative position (24%; $N = 24$). Conversely, [t͡ɕʰ] (10%; $N = 10$) is encountered in two phonological distributions only; 8 instances are preceded by nasals and 2 occurrences are encountered in intervocalic contexts.

Additional qualities of /tr/ are as well identified concerning lexical stress, i.e., stressed and unstressed syllables. On the one hand, a relevant number of items of [t͡ɾ] in this corpus corresponds to unstressed syllables (67%; $N = 67$); such majority is consistently observed in all phonological contexts. Only 23 speech fragments (23%) are found in stressed syllables. On the other hand, the variant [t͡ɕʰ] is mostly identified in this corpus as part of stressed syllables; out of 10 items, 6 are encountered in stressed syllables and 4 correspond to unstressed syllables.

Quantitative data, such as the length in ms of every segment of [t͡ɾ] across this corpus, is assessed by means of descriptive statistics. Therefore, segments lengths, their means, their standard error, and standard deviations (henceforth, *SE* and *SD*, respectively) provide data on intraspeaker (i.e., *SE*) and interspeaker (i.e., *SD*) variability. Such information is summarized in Table 3.3.

Table 3.3

Means (ms), SD, and SE of Individual and Sample Realizations of [t͡ɾ] by Radio Anchors

Speakers	News Type	Variant	Length Stop	Length Liquid	Total Length
FB	hard		42.68	31.74	75.31
GA	hard		49.49	30.08	79.82
RP	hard	[t͡ɾ]	39.91	29.23	70.59
JL	soft		40.65	27.29	70.01
SE	soft		36.89	25.98	65.01
Length Means			42.23	29.10	72.15
SE			1.02	0.84	2.51
SD			9.75	7.99	5.63

In general terms, the values of segmental lengths of [t̪] and [ɾ] retrieved for this corpus are stable. The mean duration of [t͡ɾ] corresponds to 71.33 ms. The average length of [t̪] equals 42.23 ms whereas the average duration of [ɾ] reaches 29.10 ms, presenting a slightly inferior duration than the first segment, of about 13 ms; anchors of soft news, i.e., J. L. and S.E., present marginally lower segmental length values. As expected, stressed and unstressed instances of [t͡ɾ] show a steady length difference that did not exceed 4 ms per segment. Moreover, the *SE* and *SD* values of [t̪] equal 1,02 and 9.75, which are marginally higher than in [ɾ] (*SE* = 0.84; *SD* = 7.99). These values coincide with the greater length of /t/ in contrast to the duration of /r/. Further, the descriptive statistics of each segment in relation to their four phonological contexts are presented in Table 3.4.

Table 3.4

Phonological Distribution of [t͡ɾ] in Formal Corpus: Means (ms), SD and SE

Phonological Distribution	Segment /t/	/r/	*N* Items (90)	Length Means		SD		SE	
Intervocalic			33	43.56	29.79	11.27	8.20	1.96	1.43
Post-fricative			24	43.76	27.72	7.53	5.44	1.54	1.11
Post-nasal	[t̪]	[ɾ]	27	40.29	28.31	8.56	9.67	1.65	1.86
Post-liquid			6	37.68	34.36	13.06	5.89	5.33	2.41

According to the table above, [t͡ɾ] is more consistently pronounced in this corpus when following a fricative (*SD* = 7.53/5.44; *SE* = 1.54/1.11), and after a nasal (*SD* = 8.56/9.67; *SE* = 1.65/1.86), as such means present the lowest *SD* and *SE* values. Conversely, the phonological environments that show a greater amount of variability include intervocalic [t͡ɾ] (*SD* = 43.56/29.79; *SE* = 1.96/1.43), as well as post-liquid occurrences (*SD* = 13.06/5.89). *SE* values for /tr/ in post-liquid distribution are not relevant though due to the low number of items

encountered in such environment. A summary of the qualitative and quantitative main trends of [t͡ɾ] described above is presented in Table 3.5.

Table 3.5

Outline of Qualitative and Quantitative Features of [t͡ɾ] in Formal Chilean Spanish

Phonological Context	Example	Notation Voicing	Narrow	Items (90)	Means (ms) [t̪]	Means (ms) [ɾ]	Speakers (N = 5)
Intervocalic	*atrás*			33	43.56	29.79	5
Post-fricative	*instructor*	voiced	[t͡ɾ]	24	43.76	27.72	5
Post-nasal	*controlar*			27	40.29	28.31	5
Post-liquid	*maltrato*			6	37.68	34.36	4
Means					42.23	29.10	
SE					1.02	0.84	
SD					9.75	7.99	

3.2 /tr/ in Semi-Formal Chilean Spanish

The speech fragments collected from 5 Chilean politicians, i.e., 100 items, offer sufficient qualitative and quantitative data on two allophones of /tr/ that are realized in semi-formal speaking style, namely [t͡ɾ] and [t͡ɕʰ], as presented below in Table 3.6 (for further details on the collected speech fragments, see Appendix B). Moreover, the following subsections provide an in-depth examination for both variants in relation to their qualitative and quantitative features.

Table 3.6

Allophones of <tr> Produced by Five Chilean Politicians in Semi-Formal Style

Articulatory Features Place	Manner	Voicing	Narrow transcription	Speakers (N = 5)	Tokens (100)
Dento-alveolar	Stop tap	Voiceless- voiced	[t͡ɾ]	AM	5
				CU	20
				DB	13
				LJ	6
				RM	17
Alveolo-palatal	Affricate	Voiceless	[t͡ɕʰ]	AM	15
				CU	-
				DB	7
				LJ	14
				RM	3

3.2.1 Variant [t͡ɾ]

The variant [t͡ɾ] is exactly the same canonical allophone largely produced in the previous corpus; a voiceless dental stop followed by a voiced tap. Similarly, the most recurrent pronunciation characterized in 61% ($N = 61$) of the collected items in this corpus corresponds to [t͡ɾ]. Thus, the canonical variant of /tr/ is also preferred by speakers of this corpus in semi-formal style of speech.

The analyzed phonological contexts for [t͡ɾ] across this corpus are presented below, in Table 3.7. Most of the collected items (23%; $N = 23$) take place at intervocalic position, whereas the least frequent environment for [t͡ɾ] corresponds to post-liquid speech fragments (4%; $N = 4$). Also, 21 items (21%) are identified in post-fricative distribution while 13 tokens (13%) occur in post-nasal contexts.

Table 3.7

Phonological Nature of [t͡ɾ] Produced by Five Chilean Politicians in Semi-Formal Style

Phonological Features			Notation			VOT	Items	Speakers
Context	L. Stress	Example	Voicing	Broad	Narrow	(ms)	(61)	($N = 5$)
Intervocalic	stressed	*atrás*					5	4
	unstressed	*otro*					18	4
Post-fricative	stressed	*las tres*					5	5
	unstressed	*extraer*	voiced	/tr/	[t͡ɾ]	<20	16	5
Post-nasal	stressed	*entrar*					6	4
	unstressed	*controlar*					7	4
Post-liquid	stressed	*maltrato*					-	3
	unstressed	*el trató*					4	2

Furthermore, the table above provides information on the phonological distributions of [t͡ɾ] and the main stress. Most of the collected data in this corpus corresponds to unstressed items (45%; $N = 45$); only 16 speech fragments (16%) are stressed syllables. Due to its syllable-timed nature (see Chapter 2, page 16), the difference in quality of stressed [t͡ɾ] is categorical rather than continuous.

Quantitative evidence is also obtained from the segmental lengths (i.e., ms) of [t͡ɾ] in this corpus, at the hand of descriptive statistics; values such as means, *SE*, and *SD* are disclosed at individual and sample level in Table 3.8.

Table 3.8

Means (ms), SE, and SD of Realizations of [t͡ɾ] by Five Chilean Politicians

Speakers	Variant	Items (*N* = 61)	Length Stop	Length Liquid	Total Length
AM		5	47.83	29.12	70.90
CU		20	47.46	38.89	87.27
DB	[t͡ɾ]	13	33.90	44.27	78.78
LJ		6	52.13	40.68	92.82
RM		17	44.55	44.96	89.52
Means			44.25	41.10	85.86
SE			1.53	1.37	2,08
SD			11.95	10.77	16,30

The means of the first segment differ in 18.23 ms (*SE* = 11.95); the least stable measurements—the longest (52.13 ms) and the shortest lengths (33.90 ms)—correspond to speakers that produced a low number of [t͡ɾ] variants (*N* = 6;13, correspondingly). The means of the liquid are slightly steadier, as the means difference equals 15.84 ms. The average length of [t͡ɾ] reaches 85.86 ms, of which the longest (92.82 ms) and shortest (70.90 ms) measurements are produced by speakers who realized 6 and 5 items of [t͡ɾ], respectively.

Also, some variability is observed through the segmental lengths of [t͡ɾ] in relation to the four phonological environments such variant is found, which are presented in Table 3.9.

Table 3.9

Phonological Distribution of [t͡ɾ] in Semi-Formal Chilean Spanish: Number of Items, Segments Means (ms), SD and SE

Phonological Distribution	Segment /t/ /r/	Items (*N* = 61)	Means (ms)		*SD*		*SE*	
Intervocalic		23	45.70	43.66	12.82	9.63	2.67	2.00
Post-fricative	[t̪] [ɾ]	21	42.89	38.87	12.76	13.00	2.78	2.83
Post-nasal		13	43.81	40.77	9.75	9.20	2.70	2.55
Post-liquid		4	44.43	39.19	12.44	9.14	6.22	4.57

In general terms, *SE* and *SD* values indicate significant levels of variability in the production of [t͡ɾ] across this corpus, as *SD* always exceeds 9 and *SE*, 2. A more consistent pronunciation of [t͡ɾ] occurs in post-nasal (*SD* = 9.75/ 9.20; *SE* = 2.70/ 2.55) and intervocalic (*SD* = 12.82/9.63; *SE* = 2.67/2.00) distribution. Contrariwise, variability in the production of [t͡ɾ] in this corpus seem to increase when following a liquid sound (*SD* = 12.44/ 9.14; SE = 6.22/4.57) or after a fricative (*SD* = 12.76/13.00; *SE* = 2.78/2.83), however, due to the few instances in post-liquid position, its corresponding *SE* value is irrelevant.

3.2.2 Variant [t͡ɕʰ]

A second allophone of /tr/ is also distinguished in semi-formal setting, namely the voiceless alveolo-palatal affricate [t͡ɕʰ], which occurs in 39% (*N* = 39) of the collected data. It is an allophone proper of languages such as Polish and Chinese (Ladefoged & Johnson, 2015; Żygis *et al*., 2012), which first segment is produced as a stop [t] as the tongue blade reaches the postalveolar area, whereas the second segment is realized as a voiceless alveolo-palatal fricative [ɕ] that holds the apical posture from the previous segment. All realizations are produced with a noisy puff of air, indicating an aspirated manner of articulation that is confirmed by the items' long positive VOT values. This allophone is pronounced by almost all speakers (*N* = 4), who also add different degrees of aspiration to this variant. An outline of the phonological features of [t͡ɕʰ] is exposed in Table 3.10.

Table 3.10

Phonological Nature of [t͡ɕʰ] Produced by Five Chilean Politicians

Phonological Features			Notation			VOT	Items	Speakers
Context	L. Stress	Example	Voicing	Broad	Narrow	(ms)	(39)	(*N* = 5)
Intervocalic	stressed	*atrás*				39	1	4
	unstressed	*otro*				43	13	4
Post-fricative	stressed	*las tres*				-	-	-
	unstressed	*nuestro*	voiceless	/tr/	[t͡ɕʰ]	44	8	4
Post-nasal	stressed	*entrar*				31	6	4
	unstressed	*contra*				36	7	4
Post-liquid	stressed	*maltrato*				-	-	-
	unstressed	*l trabajo*				66	4	2

In the collected data for this corpus, most instances of [t͡ɕʰ] appear in intervocalic (16%; *N* = 16) and in post-nasal contexts (13%; *N* = 13). Conversely, the least number of items occur in post-liquid (4%; *N* = 4) and post-fricative (6%; *N* = 6) environments. Data regarding [t͡ɕʰ] and lexical stress is also included in the table above. Most of the tokens produced as [t͡ɕʰ] collected in this corpus are unstressed (82%; *N* = 32) whereas only 7 items (18%) are stressed. Also, the long positive VOT values show there is a trend in producing strongly aspirated variants when following liquid segments (VOTs= 60ms) and after fricatives (VOTs= 44ms), whereas the variants that are produced with the least amount of aspiration occur after nasals (VOTs= 34ms) and in intervocalic positions (VOTs= 42ms).

The duration of [t͡ɕʰ] and its constituents provide quantitative information regarding the variability of its realization in semi-formal contexts; an outline of the descriptive statistics of measures of [t͡ɕʰ] is presented in Table 3.11.

Table 3.11

Segments Means, SE, and SD of Individual and Sample Realizations of [t͡ɕʰ] by Politicians

Speakers	Variant	Items (N = 39)	Length Stop	Length Liquid	Total Length
AM		15	40.12	42.92	84.66
CU		-	-	-	-
DB	[t͡ɕʰ]	7	32.81	35.91	68.72
LJ		14	32.83	34.70	68.61
RM		3	18.84	30.48	49.32
Means			34.55	37.75	73.32
SE			1.93	1.86	3.34
SD			12.08	11.64	20.89

As shown above, the differences in ms of elements in [t͡ɕʰ] across this corpus seem constant; both segments show either quite similar lengths or the first segment is marginally shorter than the second one—i.e., their average difference equals 3.20 ms. The production of /r/ (*SE* = 1.86; *SD* = 11.64) among speakers is slightly steadier than their realizations of /t/ (*SE* = 1.93; *SD* = 12.08). Besides, the one speaker that differs the most in his pronunciation of [t͡ɕʰ], presenting the lowest segmental duration ([t] = 18.84; [ɕ] = 30.48), is also the speaker that produces the fewest number of instances of [t͡ɕʰ].

The phonological environments in which [t͡ɕʰ] is produced also reveal diverse degrees of variability, as exposed in Table 3.12.

Table 3.12

Phonological Distribution of [t͡ɕʰ] in Semi-Formal Chilean Spanish: Segments Means (ms), SD and SE

Phonological Distribution	Segment /t/ /r/	Items (N = 39)	Means (ms)		SD		SE	
Intervocalic		14	36.34	37.90	11.56	12.38	2.89	3.09
Post-fricative	[t] [ɕ]	8	41.01	46.14	8.75	10.85	3.57	4.42
Post-nasal		13	30.81	34.25	14.57	11.43	4.04	3.17
Post-liquid		4	29.88	35.97	3.53	5.65	1.76	2.82

Some variability is identified in the production of [t͡ɕʰ] in post-nasal (*SD* = 14.57/11.43; *SE* = 4.04/3.17) as well as in intervocalic contexts (*SD* = 11.56/15.38; *SE* = 2.89/3.09). On the contrary, less variability is present in post-fricative (*SD* = 8.75/10.85; *SE* = 3.57/4.42) and post-liquid environments (*SD* = 3.53/5.65; *SE* = 1.76/2.82). Such reduced *SD* and *SE* values correlate with the few number of items encountered in those phonological distributions, namely 8 and 4 fragments of speech, correspondingly.

3.2.3 Interspeaker Variation: [t̠ɾ] vs. [t͡ɕʰ]

The allophones of /tr/ encountered in semi-formal Chilean Spanish consist of the variants [t̠ɾ] and [t͡ɕʰ]. Figure 3.1 presents an overview of the number of instances of such allophones in relation to each speaker's production.

Figure 3.1

Individual Realizations of [t̠ɾ] and [t͡ɕʰ] Produced by Politicians in Semi-Formal Style
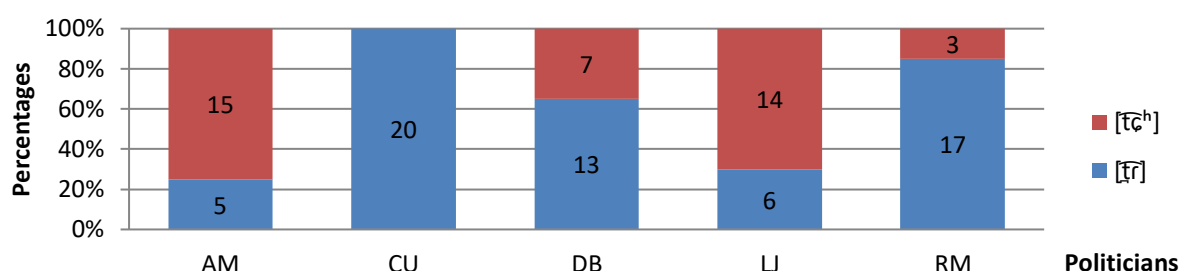
Only one speaker, CU, realizes the canonical variant [t̠ɾ] consistently across the corpus (*N* = 20; 100%). Two politicians use the non-canonical variant [t͡ɕʰ] irregularly (RM = 15%, and DB = 35%) whereas the other two sample subjects show a rather frequent use of [t͡ɕʰ] (AM = 75%; LJ = 70%).

Furthermore, the production of variants of /tr/ seems slightly affected by their phonological environment, namely intervocalic, post-fricative, post-nasal, and post-liquid contexts, as illustrated below in Figure 3.2 and Figure 3.3.

Figure 3.2

Phonological Contexts of [t̠ɾ] Produced by Politicians in Semi-Formal Style
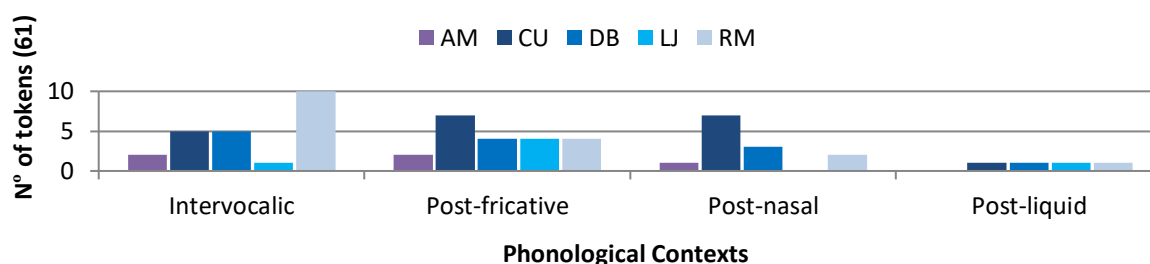
Figure 3.3

Phonological Contexts of [t͡ɕʰ] Produced by Politicians in Semi-Formal Style
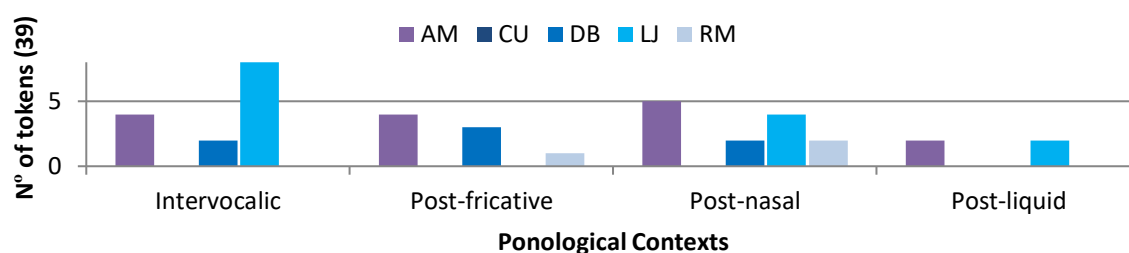
On the one hand, the graph in Figure 3.2 indicates that the distributions in which [t͡ɽ] is consistently and most frequently produced includes post-fricative (*N* = 21) and intervocalic (*N* = 23) positions. Conversely, phonological contexts such as post-liquid (*N* = 4) and post-nasal (*N* = 13) contain the least number of instances of such canonical variant. On the other hand, the graph in Figure 3.3 shows that the allophone [t͡ɕʰ] is consistently realized in every phonological distribution by two politicians (i.e., AM and LJ). Moreover, other two speakers (i.e., DB and RM) produce such variant only in two phonological contexts, namely after a nasal and after a fricative sound. The peak of realizations of [t͡ɕʰ] are encountered in post-nasal (*N* = 13) and intervocalic (*N* = 14) environments. Post-liquid (*N* = 4) and post-fricative (*N* = 8) contexts seem to be the least compatible distributions for the allophone [t͡ɕʰ].

Chapter 4: Discussion

In this thesis, I analyzed the allophonic variation of <tr> produced in semi-formal style of speech in Chilean Spanish, unfolding some linguistic and social factors that influence such variability. In the previous chapter, instances of /tr/ elicited in formal and semi-formal contexts were qualitatively and quantitatively assessed by analyzing their articulatory phonetics and their phonological features. Consequently, the present chapter displays the most relevant findings that answer my research questions. Finally, aspects such as the implications, limitations of this study and further research alternatives are discussed to conclude this study.

4.1 Outline of the Results

The results discussed in this section outline the most relevant qualitative and quantitative evidence collected in this seminar that serve to answer the three research questions initially posed, namely:

1) What is the sociolinguistic nature of variants of <tr> in semi-formal Chilean Spanish?

2) Are there any linguistic variables, such as stress placement, or social variables, such as degrees of formality in speech style, influential in the usage of allophones of /tr/?

3) To what extent are the realizations of /tr/ in formal Chilean Spanish and in semi-formal style similar to one another?

4.1.1 The Sociolinguistic Nature of <tr> in Semi-Formal Chilean Spanish

The main outcomes revealing the sociolinguistic nature of /tr/ reveal two allophones produced in the semi-formal Chilean Spanish corpus, namely [t͡ɽ] and [t͡ɕʰ] (for an overview, see Figure 3.1). Both variants provide evidence on some linguistic features, such as their phonetic and phonological properties, as well as on the sociolinguistic aspects *language style (formal/semi-formal)*, *regional dialectology*, and *intraspeaker-interspeaker variation* that affect their allophonic usage.

Linguistic Description of Allophones of /tr/

The linguistic characterization of allophones of /tr/ refers to their articulatory phonetics, their phonological distributions, as well as their interaction with lexical stress. Firstly, the articulatory phonetics of variants of /tr/ in the semi-formal Chilean Spanish corpus describes the allophones [t͡ɽ] and [t͡ɕʰ]. Figure 3.1 displays a trend in usage of the variant [t͡ɽ] in semi-formal style, as it shows that such canonic allophone is the most frequently produced in this corpus, as it occurs in 61% of the speech fragments, whereas [t͡ɕʰ] corresponds to the least pronounced variant (i.e., 39%).

On the one hand, the standard default variant [t͡ɽ] is produced in the dento-alveolar area as a stop tap. The glottis is initially closed during the production of the first segment (i.e., voiceless) and opens up to produce the second segment (i.e., voiced). Such articulatory criteria are in agreement with the description reviewed in the literature that defines the canonical pronunciation of /tr/ (see Soto-Barba, 2008; Figueroa *et al*., 2010; Sadowsky & Salamanca, 2011).

On the other hand, the vernacular allophone [t͡ɕʰ] (see Table 3.6) is produced in the post-alveolar area as an aspirated voiceless affricate, starting with a brief stop and being immediately followed by a palatal fricative, as described by Żygis *et al.* (2012). The sibilant characteristic of [t͡ɕʰ] relates to its affricate manner of articulation, as well as to degrees of aspiration involved in such production. Previous studies (see Section 1.2), such as Araneda *et al*., 2019; Cepeda, 1991; Dixon, 2010; Figueroa *et al*., 2010; Flores, 2017; Lenz, 1940; Silva–Fuenzalida, 1952; Oroz, 1966; Wagner, 1967; Bobadilla y Bobadilla, 1980; Contreras, 1993; Soto–Barba, 2007, attribute a post-alveolar place to [t͡ɕʰ] as well as an 'assibilated' manner of articulation to stress its sibilant (i.e., fricative) property. However, non-standard variants of /tr/ are unclear and inconsistently transcribed, e.g., [tɹ̝̊, tɹ̝, ɹ̝̊], as such studies mostly focus on social acceptability judgements on strident speech sounds and neglect an accurate speech labeling for IPA standards.

Secondly, the phonological distributions of [t͡ɽ] and [t͡ɕʰ] identified in semi-formal style regard intervocalic, post-fricative, post-nasal and post-liquid contexts (for further details, see Table 3.7 and Table 3.10). The most frequent phonological environment for both variants is intervocalic ([t͡ɽ] = 23; [t͡ɕʰ] = 16) whereas the least recurrent context is post-liquid ([t͡ɽ] = 4; [t͡ɕʰ] = 4). Similarly, speakers present the greater degree of individual steadiness when producing intervocalic [t͡ɽ] and [t͡ɕʰ], as those contexts expose the lowest *SE* values and similar VOTs (see Table 3.9, Table 3.10, and Table 3.12). Also, a comparison between the *SD* values of both allophones portrays that [t͡ɽ] is more consistently pronounced when encountered in

post-nasal positions, while [t͡ɕʰ] is more steadily pronounced after liquids, as such *SD*s comprise the lowest values. Correspondingly, [t͡ɕʰ] is more strongly aspirated when following a liquid (VOT circa 66) whereas post-nasal variants are realized with the least amount of aspiration (VOTs circa 34). On this matter, previous studies have evaluated allophonic variation within the same phonological contexts (e.g., Araneda *et al*., 2019; Figueroa *et al*., 2010; Flores, 2017). However, identifying variants of prominence within such environments in those studies is rather confusing due to the ongoing inconsistencies when addressing and transcribing sibilant variants of /tr/.

Thirdly, linguistic evidence on variants of /tr/ in the semi-formal style corpus regarding lexical stress identifies <tr> as a grapheme that tends to occur in unstressed syllables. Also, the distribution of stress is constant for both allophones; most instances of [t͡ɾ] and [t͡ɕʰ] are unstressed (77%), 45 and 32 tokens, respectively (see Table 3.7 and Table 3.10). In this regard, the reviewed literature (e.g., Figueroa *et al*., 2010; Flores, 2017) suggests that [t͡ɾ] is mostly produced in stressed syllables whereas strident variants occur in unstressed syllables; such claim is thus challenged by the outcomes of this research.

Sociolinguistic Characterization of Allophones of /tr/

Three sociolinguistic variables were taken into consideration to assess the allophonic variation of /tr/ in this corpus, namely regional dialectology, intraspeaker-interspeaker variation, and a semi-formal style of speech. Regarding regional dialectology, the sample subjects' places of residence, shown in Table 2.4 and Figure 3.1, indicate that the interspeaker style shifting verified in the usage of [t͡ɾ] and [t͡ɕʰ] does not correspond to regional dialectology in semi-formal Chilean Spanish. Thereby, the only speaker that realizes the canonical variant [t͡ɾ] consistently across all tokens—i.e., no intraspeaker variation—is CU, an activist architect from San Nicolás town. CU went to Chillán city to complete his high school and university studies; however, he has spent most of his life in rural areas (**BCN**). Then, the two politicians that occasionally produce the variant [t͡ɕʰ], i.e., DB (35%) and RM (15%), are two lawyers from La Serena and Santiago city respectively. Both speakers have always lived in large urban areas. Also, the last two speakers that realize the allophone [t͡ɕʰ] more regularly, i.e., AM (75%) and LJ (70%), are an engineer and a lawyer respectively. Both politicians were born in the central and northern cities of Santiago and Arica correspondingly, staying in such urban areas for most of their lives; however, both individuals have spent several years working in the countryside areas of Molina and Chiapa respectively. Therefore, the allophonic variation of /tr/ encountered in the semi-formal corpus cannot be the result of variation within specific geographic boundaries. Previous research, such as Araneda *et al*. (2019), argue that

the northern and central regions of Chile tend to produce the canonical variant [t͡ɾ] in significantly larger proportions than speakers in the south, where the production of sibilant variants is greater; such a claim is at variance with the evidence of the semi-formal corpus discussed above. Conversely, such findings agree with most of the studies that claim sibilant variants of /tr/ are not part of regional dialectology, as they occur in different places of Chile, Mexico, and Spain (e.g., Bobadilla & Bobadilla, 1980; Hualde, 2013; Quilis, 1993).

Moreover, the significant amount of intraspeaker variation in the pronunciation of /tr/ in this corpus (see Figure 3.1) indicates there are certain social constrains in such allophonic usage. In this matter, Meyerhoff (2011) states that stylistic (i.e., individual) variation derives from degrees of attention a speaker pays to their language usage in order to adapt their speech to their interlocutor's. Most of previous studies suggest that such attention to speech correlates with Chilean people's stigmatized judgements towards the realization of fricative variants of /tr/ (e.g., Dixon, 2010; Figueroa *et al*., 2010; Figueroa *et al*., 2013). Meanwhile, Flores (2017) claims such social judgements towards sibilant variants seem to be gaining overt prestige among Chilean people.

Finally, this section answers my first and second research questions as regards the sociolinguistic nature of /tr/ in semi-formal Chilean Spanish, by assessing the linguistic and social factors that affect the use of its variants. Therefore, the sociolinguistic nature of /tr/ involves two variants: the canonical allophone [t͡ɾ] and its covert variant [t͡ɕʰ]. Regarding their linguistic characterizations, the former allophone depicts articulatory movements that are accurately described in the revised literature whereas the latter provides first-hand characteristics to allophones of /tr/ regarding its aspirated, sibilant manner of articulation. Also, both variants show a tendency to be constrained to intervocalic phonological structures, as part of unstressed syllables; post-nasal contexts favor the stable production of [t͡ɾ] while post-liquid environments grant larger amounts of aspiration to [t͡ɕʰ]. Concerning the above mentioned social aspects, speakers' places of residence confirm that intraspeaker variation is not a result of regional dialectology, as well as contradict studies that claim strident variants are more frequently used in southern areas of Chile. Finally, the large quantities of intraspeaker variation evidence social acceptability judgements towards sibilant variants of /tr/ in less formal speech style contexts.

4.1.2 Variation and Style: Evidence from Formal and Semi-Formal Speech

Regarding the allophonic variation in formal and semi-formal Chilean Spanish, a major finding indicates that the variant [t͡ɾ] significantly correlates with the variable speech formality, as its production increases considerably in more formal contexts (see Table 3.1 and

Table 3.6). Regarding the linguistic characterization of [t͡ɾ], consistent features are observed in the speech data of the formal corpus and the semi-formal corpus. Such features include a dento-alveolar segment that is produced as a stop-tap in a voiceless-voiced larynx setting (see Tables 3.1). Similarly, such allophone is identified in four phonological contexts across both corpora: intervocalic, post-fricative, post-nasal, and post-liquid environments (see Table 3.2). Moreover, the interaction between [t͡ɾ] and lexical stress is steady in both corpora, since most items are unstressed. These findings are in agreement with previous research (e.g., Araneda *et al.,* 2019; Figueroa *et al.*, 2010) that describe the canonical variant [t͡ɾ].

Yet, some minor differences are identified in the manner of articulation of [t͡ɾ] in semi-formal style (see Table 3.3 and Table 3.8). Such variation is evidenced by the corresponding *SE* and *SD* values of every phonetic element and the entire segment, which depict a marginally greater degree of intraspeaker and interspeaker differences in the production of [t͡ɾ] in the semi-formal style corpus (*SE* = 1.53/1.37; *SD* = 11.95/10.77) than in the formal corpus (*SE* = 1.02/0.84; *SD* = 9.75/7.99), since the *SE* and *SD* achieved by radio anchors are slightly inferior. In this regard, the reviewed literature approaches degrees of intraspeaker and interspeaker variation within semi-formal style in Chilean Spanish concerning allophonic variation only, leaving *SE* and *SD* values of the production of [t͡ɾ] unattended.

Conversely, a correlation between a decrease in the realization of [t͡ɕʰ] and more formal style of speech is evidenced by the first and second corpora. This allophone is rather insignificantly produced in the formal corpus—i.e., 10% and all instances occurred during the broadcasting of less formal *soft* news—and more considerably produced in the semi-formal corpus (i.e., 39%). Concerning the linguistic features of [t͡ɕʰ], similar articulatory settings (i.e., place, manner, and voicing) are produced in both corpora; however, differences are noticed in relation to its phonological contexts, and its interaction with stress. Its acoustic properties include a palato-alveolar segment that is realized as an aspirated voiceless affricate (see Table 3.1 and Table 3.6). On this regard, even though previous studies (see e.g., Araneda *et al.,* 2019; Figueroa *et al.*, 2010) mostly agree with the place (i.e., palato-alveolar) and manner (i.e., voiceless affricate) of articulation of [t͡ɕʰ], other transcriptions, such as [tʃ̝, tʂ̝], are employed for its depiction, which attempt to emphasize different degrees of friction in the production of strident variants of /tr/ that are not in agreement with the conventions of the IPA. Moreover, the aspirated feature of [t͡ɕʰ] has no precedent in any of the revised studies; such aspirated noise is rather recognized as part of its sibilant or 'assibilated' manner of articulation.

In addition, two phonological environments seem to favor the production of [t͡ɕʰ] in both corpora, namely post-nasal and intervocalic contexts. However, items produced in semi-formal speech style are also present across other phonological positions, such as post-fricative and post-liquid (see Table 3.2 and Table 3.10), which suggests that [t͡ɕʰ] is not strictly constrained to post-nasal and intervocalic distributions. This finding is in agreement with previous studies (e.g., Figueroa *et al.*, 2010) that sustain that phonological environments do not correlate with the production of non-canonical variants of /tr/.

Furthermore, the interaction between [t͡ɕʰ] and lexical stress in the formal corpus, evidenced in Table 3.2, seems to deviate from such results in the semi-formal corpus. As stated above, <tr> generally occurs in unstressed syllables across the formal and the semi-formal corpora. Similarly, compelling results are presented in the semi-formal corpus, as 32 out of 39 instances of [t͡ɕʰ] are unstressed items. Nevertheless, the relation between [t͡ɕʰ] and lexical stress in the formal speech style suggests the incidence of [t͡ɕʰ] as a sociolinguistic marker, since 6 out of 10 items are stressed as a result of two speakers' style-shifting; soft news anchors realizing [t͡ɕʰ] in stressed items suggest some level of speakers' awareness when producing intraspeaker allophonic variation for /tr/. On this regard, Meyerhoff (2011) sustains that when a variant is more consistently produced in a certain style, i.e., formal speech, than in the other, there is some level of speakers' awareness in their language use; such description categorizes the variant [t͡ɕʰ] as a sociolinguistic marker.

4.2 Conclusions

In conclusion, the allophonic variation of /tr/ produced in the semi-formal Chilean Spanish corpus regards two variants; the overt allophone [t͡ɻ], which is also vastly produced in formal style, and its covert variant [t͡ɕʰ]. Nevertheless, the latter variant is considerably more pronounced in slightly less formal contexts, such as soft news radio presenters and online formal interviews. Such minor difference could signify subtle changes in the covert prestige of [t͡ɕʰ], as claimed by Flores (2017). Therefore, further research could evaluate the production of /tr/ within semi-formal speech style produced by a larger sample, considering as well different age ranks, to identify whether production and perception of variants of /tr/ vary in (c)overt prestige. In the meantime, the present study contributes to the ongoing sociolinguistic discussion by introducing the articulatory features of [t͡ɕʰ] as well as its corresponding narrow transcription, in agreement with the IPA standards; such conventional transcription will facilitate the classification and assessments of affricate variants of /tr/ in future studies on Chilean Spanish language variation.

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Appendix A

Formal Chilean Spanish Corpus:

Tokens	Speaker	Variant	Phonological Context	VOT (ms)	/tr/ (ms)	/t/ (ms)	/r/ (ms)
1. de trabajo	FB	[t͡ɼ]	Intervocalic	<25	105,12	66,19	38,93
2. a través	FB				95,09	48,84	46,25
3. entregó	FB				66,64	26,36	40,28
4. cuatro	FB				66,64	57,19	42,02
5. otro	FB				99,21	24,94	23,81
6. otros	FB				87,39	50,17	37,22
7. nosotros	FB				56,22	36,10	20,12
8. metropolitana	GA				69,69	44,37	25,32
9. compatriotas	GA				84,74	50,38	34,36
10. y Tres	GA				81,36	54,11	27.25
11. y treinta	GA				81,36	55,85	33,72
12. otro	GA				89,57	51,02	25,55
13. cuatro	GA				85,37	57,24	28,13
14. nosotros	GA				84,72	56,99	27,73
15. atraves	JL				64,19	35,49	28,70
16. se trata	JL				86,33	53,23	33,10
17. cuatro	JL				86,33	51,89	34,95
18. otro	JL				86,84	30,88	26,58
19. nosotros	JL				49,57	34,68	14,89
20. teatro	JL				83,81	46,50	37,31
21. limítrofe	JL				60,92	39,43	21,49
22. metropolitana	RP				64,19	35,49	28,70
23. a tramitación	RP				92,38	49,18	43,20
24. o tras	RP				86,33	53,23	33,10
25. otro	RP				86,33	51,89	34,95
26. árbitro	RP				86,84	30,88	26,58
27. cuatro	RP				49,57	34,68	14,89
28. se trabaja	SE				70,04	50,57	19,47
29. a trabajarse	SE				47,60	25,01	22,59
30. ese trabajo	SE				55,78	28,28	27,50
31. que tres	SE				105,32	34,20	36,93
32. nosotros	SE				56,63	41,03	15,60
33. otro	SE				63,01	31,11	31,90
34. ante tribunales	JL	[t͡ɕʰ]		59	92,38	49,18	43,20
35. atrevo	SE			51	105,3	52,99	52,33
36. transmisión	FB	[t͡ɼ]	Post-fricative	<25	52,20	23,08	29,12
37. mostró	FB				58,28	38,96	19,32
38. las tres	FB				76,47	45,43	31,04
39. nuestros	FB				55,32	33,77	21,55
40. ministro	FB				79,33	50,63	28,70
41. administración	GA				68,99	40,30	28,69
42. dos Tras	GA				81,70	46,34	35,36

Tokens	Speaker	Variant	Phonological Context	VOT (ms)	/tr/ (ms)	/t/ (ms)	/r/ (ms)
43. Extremas	GA	[t͡ɾ]	Post-fricative	<25	64,87	43,08	21,79
44. nuestro	GA				64,89	40,74	24,15
45. nuestra	GA				78,81	52,89	25,92
46. ministro	GA				88,23	54,27	33,96
47. demostración	JL				84,10	48,76	35,34
48. Estrena	JL				77,85	49,76	28,09
49. las tres	JL				67,88	44,71	23,17
50. ministro	JL				61,04	36,42	24,62
51. nuestro	JL				54,29	31,51	22,78
52. restrictivas	RP				46,50	37,31	83,81
53. los tribunales	RP				39,43	21,49	60,92
54. estructura	RP				48,76	35,34	84,1
55. extracto	RP				49,76	28,09	77,85
56. ministro	RP				44,71	23,17	67,88
57. tranquilizador	SE				62,74	41,12	21,62
58. estreno	SE				75,24	44,63	30,61
59. nuestro	SE				88,73	54,65	34,08
60. entregó	FB	[t͡ɾ]	Post-nasal	<25	73,45	35,09	38,36
61. entrevistas	FB				59,96	40,10	19,86
62. entrevista	FB				63,15	44,65	18,50
63. Control	FB				100,11	45,50	54,61
64. Entre	FB				78,05	39,64	38,41
65. centrales	FB				61,26	42,35	18,91
66. mientras	FB				98,27	57,81	40,46
67. contra	FB				74,23	46,80	27,43
68. Controlar	GA				84,12	48,03	36,09
69. Entrar	GA				91,74	52,73	39,01
70. entre	GA				67,42	46,13	21,29
71. Centro	GA				81,92	46,38	35,54
72. contra	GA				66,07	43,52	22,55
73. mientras	GA				80,28	49,85	30,43
74. entrevistado	JL				49,82	32,03	17,79
75. encontrarás	RP				61,04	36,42	24,62
76. contradictorio	RP				54,29	31,51	22,78
77. entrantes	RP				49,82	32,03	17,79
78. mientras	RP				71,49	36,35	35,14
79. entre	RP				54,91	29,48	25,43
80. centro	RP				88,32	48,08	40,24
81. contra	RP				45,76	23,41	22,35
82. entrada	SE				57,33	25,24	32,09
83. contra	SE				62,06	45,58	16,48
84. encuentro	SE				70,80	41,57	29,23
85. entran	SE				51,08	29,12	21,96
86. mientras	SE				55,45	38,39	17,06
87. n trabaja	JL	[t͡ɕʰ]		33	71,49	36,35	35,14

Tokens	Speaker	Variant	Phonological Context	VOT (ms)	/tr/ (ms)	/t/ (ms)	/r/ (ms)
88. encontrar	JL	[t͡ɕʰ]		32	54,91	29,48	25,43
89. entró	JL			50	88,32	48,08	40,24
90. adentro	JL			25	45,76	23,41	22,35
91. entre	JL			41	78,77	42,63	36,14
92. encontrar	SE			36	37,38	18,94	18,44
93. contrátala	SE			18	42,90	21,53	21,37
94. encontrarlos	SE			31	60,99	31,68	29,31
95. el-tránsito	GA	[t͡ɾ]	Post-liquid	<25	100,55	55,74	44,81
96. el-trabajó	JL				67,24	33,92	33,32
97. maltrato	RP				78,77	42,63	36,14
98. el-tratato	RP				67,24	33,92	33,32
99. al-tratamiento	SE				43,93	16,63	27,30
100. el-trabajo	SE				74,52	43,25	31,27

Appendix B

Semi-Formal Chilean Spanish Corpus:

Tokens	Speaker	Variant	Phonological Context	VOT (ms)	/tr/ (ms)	/t/ (ms)	/r/ (ms)
1. a-transar	AM	[t͡r̥]	Intervocalic	<25	91,20	45,64	45,56
2. otras	AM				69,42	49,95	14,69
3. a-tratar	CU				106,51	54,45	52,06
4. e-tranquilidad	CU				87,42	45,11	42,31
5. cuatro	CU				99,65	46,60	53,05
6. nosotros	CU				99,65	46,11	48,15
7. otros	CU				94,26	44,02	37,16
8. a transmisión	DB				82,28	35,40	46,88
9. y-trata	DB				75,41	43,47	31,94
10. letras	DB				75,41	31,11	50,19
11. nosotros	DB				81,30	21,33	46,12
12. otras	DB				88,48	54,02	34,46
13. nosotros	LJ				125,57	66,55	59,02
14. A-través	RM				97,47	54,10	43,37
15. la-transversal	RM				93,13	49,34	43,79
16. se-traduce	RM				56,87	25,07	31,80
17. nosotros	RM				90,52	47,57	42,95
18. otras	RM				51,36	18,15	33,21
19. otros	RM				121,85	70,66	51,19
20. detrás	RM				89,55	42,03	47,52
21. atrás	RM				99,91	51,19	48,72
22. o-trato	RM				108,48	54,46	54,02
23. patricio	RM				100,88	54,83	46,05
24. a-través	AM	[t͡ʂ]		58	89,14	32,53	56,61
25. patrimonio	AM			43	93,71	49,98	43,73
26. o-tres	AM			39	93,71	32,17	37,25
27. otros	AM			33	121,85	70,66	51,19
28. A-través	DB			41	74,79	40,27	34,52
29. otro	DB			28	50,98	24,40	26,58
30. transversal	LJ			38	91,71	44,97	46,74
31. retribución	LJ			55	93,14	36,01	57,13
32. ahí-trabajé	LJ			36	61,37	24,13	37,24
33. que-tratamos	LJ			34	61,37	49,40	33,78
34. se-trataba	LJ			46	83,18	26,68	19,60
35. toco-trabajar	LJ			37	90,11	57,59	32,52
36. otras	LJ			58	39,06	19,07	19,99
37. otros	LJ			50	111,85	50,93	60,92
38. s-tradiciones	AM	[t͡r̥]	Post-fricative	<25	76,10	51,67	24,43
39. extraña	AM				73,84	45,17	28,67
40. os-trabajando	CU				77,48	45,33	32,15
41. estructura	CU				68,92	42,80	26,12
42. redistribuyen	CU				70,54	46,69	23,85

Tokens	Speaker	Variant	Phonological Context	VOT (ms)	/tr/ (ms)	/t/ (ms)	/r/ (ms)
43. frustrado	CU	[t͡ɾ]	Post-fricative	<25	86,08	42,72	43,36
44. administra	CU				94,03	65,20	28,83
45. Nuestras	CU				96,37	40,81	55,56
46. nuestro	CU				88,76	39,57	49,19
47. es-transitar	DB				112,12	61,45	50,67
48. distribución	DB				93,35	23,96	69,39
49. mostrando	DB				68,32	22,14	46,18
50. construcción	DB				49,86	23,44	26,42
51. Administrativo	LJ				110,34	64,68	45,66
52. s-Tradiciones	LJ				72,70	47,14	25,56
53. redistribución	LJ				58,39	39,32	19,07
54. Distrito	LJ				87,00	44,98	42,02
55. estructurales	RM				76,62	32,04	44,58
56. mostró	RM				62,43	25,15	37,28
57. ministro	RM				88,12	40,13	47,99
58. nuestra	RM				105,79	56,42	49,37
59. administración	AM	[t͡ʂ]		52	60,08	23,43	36,65
60. s-trabajando	AM			59	71,81	37,33	34,48
61. muestras	AM			40	100,44	48,14	52,30
62. ministro	AM			41	100,82	45,23	55,59
63. instrumentos	DB			55	93,75	36,09	57,66
64. Nuestra	DB			43	90,59	46,59	44,00
65. nuestros	DB			31	80,89	44,71	36,18
66. nuestros	RM			33	56,49	25,35	31,14
67. entro	AM	[t͡ɾ]	Post-nasal	<25	78,97	46,70	32,27
68. controversias	CU				92,19	53,51	38,68
69. centralización	CU				79,49	46,25	33,24
70. en-transporte	CU				77,87	46,30	31,57
71. entregado	CU				82,36	45,64	36,72
72. contrato	CU				92,07	51,88	40,19
73. encontrarnos	CU				78,15	50,69	27,46
74. entregan	CU				85,71	40,40	45,31
75. control	DB				67,42	30,03	37,39
76. dentro	DB				89,35	33,73	55,62
77. entre	DB				78,14	33,99	44,15
78. contrato	RM				116,43	61,17	55,26
79. entrar	RM				81,56	29,31	52,25
80. en-tratar	AM	[t͡ʂ]		45	103,7	53,50	50,20
81. introducción	AM			43	70,64	39,71	30,93
82. contrario	AM			31	84,66	54,35	30,31
83. entrando	AM			37	95,75	41,32	54,43
84. entre	AM			43	101,63	48,35	53,28
85. contrario	DB			30	52,66	19,19	33,47
86. encontramos	DB			22	37,43	18,44	18,99

Tokens	Speaker	Variant	Phonological Context	VOT (ms)	/tr/ (ms)	/t/ (ms)	/r/ (ms)
87. encontró	LJ	[t͡ʂ]	Post-nasal	38	58,77	24,07	34,70
88. reencontré	LJ			30	52,10	25,13	26,97
89. Contra	LJ			29	53,49	24,24	29,25
90. centro	LJ			25	43,52	21,06	22,46
91. encuentro	RM			32	38,80	12,82	25,98
92. entre	RM			34	52,69	18,37	34,32
93. al-traspasar	CU	[t͡ɽ]	Post-liquid	<25	87,98	55,11	32,87
94. el-trabajo	DB				62,75	26,66	36,09
95. del-troncó	LJ				102,91	50,14	52,77
96. el-trabajo	RM				80,88	45,82	35,06
97. él-trabajó	AM			67	66,94	31,32	35,62
98. trabajado	AM			76	75,54	31,85	43,69
99. el-trabajó	LJ	[t͡ʂ]		55	54,73	24,59	30,14
100. el-tribunal	LJ			66	66,22	31,77	34,45