

The Rhotic Consonant(s) in Contemporary Modern Irish

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1. Introduction

The subject of this major research paper (MRP) is the status of rhotic consonant(s) in the phonemic inventory of Modern Irish (*Gaeilge*, *Nua-Ghaeilge*). Traditional studies of the phonologies of dialects of Irish have described the rhotic in Irish as consisting of the alveolar tap (/ɾ/) with contrastive palatalized and velarized secondary articulations (/ɾʲ/ and /ɾˠ/) (Ó Cuív 1944; de Bhaldraithe 1966; Hamilton 1974; Sutton 1993; Ó Baoill 1996; Ó Raghallaigh 2014). The alveolar approximate ([ɹ]) as an allophone of /ɾ/ has also recently been attested in some studies (Ó Sé 2000: 19; Hickey 2014; Kukhto & Nikolaev 2016). However, the emergence of this allophone, and the precise circumstances under which it occurs, have largely been unexplored. This is not to say that previous scholars have ignored the occurrence of /ɹ/ broadly, but potentially that this is a new and ongoing phenomenon. As an example, previous work of the rhotic of Montréal French has shown that changes like this can occur rapidly (Sankoff & Blondeau 2007). Most previous studies of Irish phonetics and phonology have focused on speakers living in a Gaeltacht, the rural traditionally Irish speaking geographic regions primarily located on the Atlantic fringe of the island. However, the expansion of private Irish-medium schooling in the form of *Gaelscoileanna* since the 1970's, as well as substantial sustained capital and political investment from successive Irish governments have produced a great number of high-level L2 users, as well as native speakers from non-Gaeltacht backgrounds. A part of the impetus to this research is to include these “new” speakers in the conversations around language change and variation in Irish as well, particularly as the *Gaeltachtaí* continue to be threatened and as “urban Irish” speakers begin to form a larger and larger portion of the language's user base. There is also evidence uncovered in scholarly work that Irish phonology and phonetics are changing in other, broader ways, even amongst Gaeltacht speakers (Welby et al. 2017; Müller et al. 2019).

The intent of this MRP is multifaceted. Firstly, I mean to investigate an under-researched shift in the phonetic inventory of the Irish language. While the appearance of [ɹ] has indeed been reported, the scope of the language change has not been adequately determined. More than just whether or not /ɹ/ is replacing /r/, this paper will look into whether changes are occurring to the system of contrasting secondary articulations (palatalized and velarized) present in Irish, and which is highly marked in the language. Secondly, if these changes are indeed occurring as I suspect them to be, then their significance cannot be understated and merits exploration. Such a change in Irish would almost certainly have been brought on through contact with English, given the nature of the target rhotic and its prevalence in English dialects spoken in Ireland, the United Kingdom, and North America. Although English is by far the dominant language in both the Republic and Northern Ireland, its origin and association with eight-hundred years of colonization has profound implications on its relationship with Irish, the indigenous language of the island.

To determine the prevalence of [ɹ] among speakers of Irish, I preformed an experiment using native and non-native advanced users of the language. This experiment saw each participant read a list of words and a short passage which contained a large number of differing environments in which /r^j/ and /r/ occur. I found that [ɹ] was by-far the most common realization of both rhotics in Irish among native and high-level L2 users. The tap in Irish as elicited in this experiment was relegated to canonically palatalized positions, but even then it is inconsistent and among some speakers is not attested at all.

This paper initiates an inquiry into the evolving phonetic nature of the rhotic in Irish. The structure of this inquiry consists firstly of an introduction of the sociolinguistic composition of the speakers and speech communities of Irish, which will include a brief overview of the history

of the language and the current status of the language in the Republic of Ireland and Northern Ireland. I follow this with an enumeration of the contemporary phonetics and phonology of Irish, with a focus on the rhotics. I will also touch on the relationship between the traditional *Gaeltacht* dialects of Irish with *an Caighdeán Oifigiúil*, the standardized written register, and “urban” Irish varieties, which may be coalescing into distinct dialects. Despite there being no formally proscribed spoken register of the language, the written form and the potential emergence of non-*Gaeltacht* dialect(s) has broad implications on the phonetic and phonological makeup of the language. After establishing a sufficient background on the language, I then move into describing the experiment I conducted to elicit tokens of the Irish rhotic in a variety of settings and in two modes of speech. I then conclude on a discussion of my results, their implications, and future avenues of research in this area.

2. Introduction to the Irish language

Modern Irish is a Celtic language that is the national and first official language of the Republic of Ireland, as well as an official language of the European Union since 2007 and a recognized minority language in the United Kingdom. Despite the status afforded to it, and robust if uneven promotion in the post-independence Republic of Ireland, it is used daily outside the education system by only a small percentage of the population of the island of Ireland (*Éire*), and most of those live in rural enclaves known as *Gaeltachtaí*¹ (singular form *Gaeltacht*.) The following image shows the island of Ireland with *Gaeltachtaí* in forest green, with the names of the three major dialects of Irish capitalized and in the largest font size.

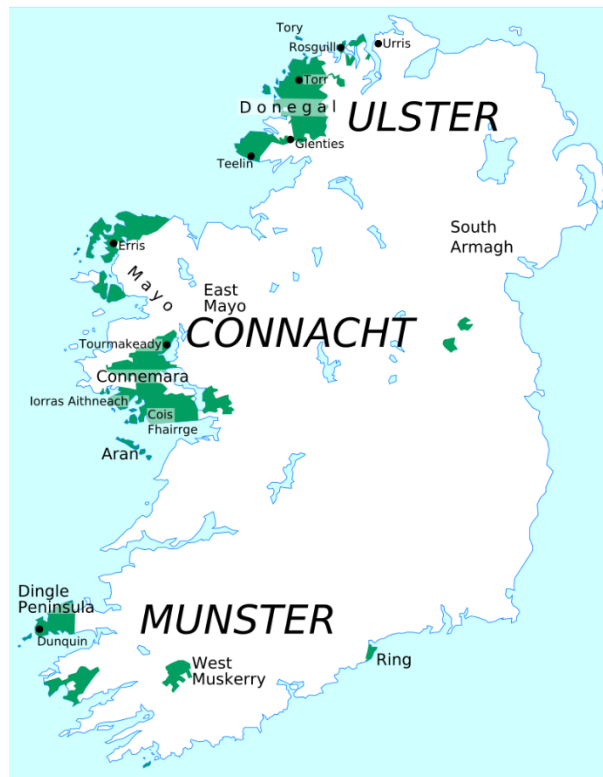


Image sourced from https://commons.wikimedia.org/wiki/File:Gaeltachtaí_le_hainmneacha2.svg

¹ The term *Gaeltacht* or *Gaeltachtaí* is a legal and political designation, which were delineated in the middle of the last century based on the perceived strength of the language in a given area, with only a handful of changes since then.

A distinctly “Irish” language has been identified to have emerged on *Éire* sometime in the 4th century CE, diverging and converging from Celtic languages brought to the island in the 1st millennium BCE, and has been variably influenced over the ages by Brythonic, Latin, Norse, and Norman languages in concert with the waves of migration, invasion, trade, and proselytization which have crashed and broken against its cliffs (Mac Giolla Chríost 2005: 64-67). Without a doubt, Irish has been most affected by its contact with the English language over the past millennium. Beyond the linguistic changes wrought by this exposure, the relationship between these languages over the centuries has had a profound, indelible, and ongoing sociocultural affect on the inhabitants of the island as well as its diasporas. As the indigenous language of Ireland, its relationship with English, the language of the colonizing force, can be paralleled in broad strokes with the relationship between other colonized-colonizer languages in settler colonial societies (Connolly 2017).

Modern Irish nationalism as such emerged in the late colonial period, explicitly provoked by the increasingly evident loss of the Irish language as a one spoken in daily life by virtue of the mortal wounds inflicted upon it by colonization. The Gaelic League (*Conradh na Gaeilge*), founded in the late 19th century, which became one of the most influential sociocultural organizations for Irish nationalists, was explicitly founded to stop the proverbial bleeding, revitalize Irish as the dominant spoken language on the island, and de-Anglicize *Éire* (Beatty 2019). The original motto of the league, “*Sinn féin, sinn féin amháin*” (“Ourselves, ourselves alone”) would also be reflected in the name of the dominant Irish-nationalist political organization in the pre-independence south of Ireland, and the now-largest Irish-nationalist party in both political entities spanning the island, Sinn Féin (Murphy 2005: 51-53).

With the success of the independence struggle, at least in the southern 26 counties, this early marriage with the language revival movement translated into an immediate political effort to promote Irish (Ó Riagáin 1997: 12-14). This is particularly evident in the realm of education. The new Irish state sought to immediately overhaul the school system and rapidly Gaelicize the anglophone population, beginning with the establishment of Irish-medium *Modhscoileanna* (Model Schools) in some urban areas and de-Anglicizing existing schools (Ó Luain 2022: 70). The program was ambitious, particularly when there was such a dearth of Irish-speaking educators, and yet paid early dividends. By the late 1930's, around a quarter of secondary schools and an eighth of primary schools in the Republic were teaching all subjects through the medium of Irish (Ó Riagáin 1997: 15-17). But following stagnation around the middle of the century and decline over subsequent decades, these numbers decreased as Irish-medium schooling became relegated to *Gaeltachtaí*, and even there English-medium schooling was on the rise.

A new movement began in the 1970's and has notably shifted the dynamic in the education system and acutely changed the trajectory of the language revitalization movement. Parental dissatisfaction with the teaching of Irish in English-medium schools, combined with a renewed activist focus on reviving Irish in otherwise Anglophone areas of Ireland, brought about the creation of privately funded, Irish-medium schools called *Gaeilscoileanna* (singular *Gaeilscoil*) (Ó Riagáin 1997; Nic Fhlannchadha & Hickey 2017: 478-479; Ó Luain 2022). Much of this dissatisfaction and renewed focus was explicitly brought on by perceived state indifference to the revival program, that the Irish government had abandoned the language in order to focus on neo-liberal economic policies (Ó Luain 2022:70-72). The rise of *Gaeilscoileanna* has also been connected to an acute awareness of Ireland's colonial past, and

the importance of the Irish language's continued survival and success as a means of rejecting the English and anglophone efforts to eradicate a uniquely Irish culture and identity (Griffin 2006; Ó Luain 2022). This is perhaps more acutely experienced in Northern Ireland, where there are no remaining *Gaeltachtaí*, yet the Irish language is still highly valued and viewed as an important marking of ethno-national and political identity (Mac Ionnrachtaigh 2013; Ó hÍr & Strange 2021).

Beyond the sociocultural and political ramifications of the *Gaeilscoil* movement, there are some salient linguistic implications. Firstly, there is the sheer explosion of language users, with 185 primary and 49 secondary Irish-medium schools currently established in non-*Gaeltacht* areas of the Republic of Ireland and Northern Ireland (Gaeloideachas 2022). While not all *Gaeilscoil* students leave school using Irish as the primary language in daily life, they nonetheless have proven results of producing competent, fluent speakers at least some of whom participate in the speech community (Griffin 2006; Nic Fhlannchadha and Hickey 2017). This increase in speakers has also raised new questions and concerns about the “type” of speakers they are, particularly as it relates to dialect and *an Caighdeán Oifigiúil*. Irish dialects have traditionally been divided on geographic lines, corresponding to the historical province (Ulster, Connacht, and Munster) broadly and then more specifically on *Gaeltacht* origin (Gaith Dobhair, Conemara, Corca Dhuine, among others). In an effort at modernization, the Irish government constructed a written standard for the language, *an Caighdeán Oifigiúil*, which codified a spelling and grammar meant to be inclusive of the most commonly occurring forms across dialect (Ó Siadhail 1980). Notably, *an Caighdeán* is explicitly a written standard, with no proscriptive phonology, though the orthography has nonetheless spawned certain norms in regard to pronunciation. However, *an Caighdeán* has been criticized by some as an overly artificial form

of the language, particularly compared to traditional dialects (Nic Fhlannchadha & Hickey 2016). The successes of the revival movement, particularly connected to the increase of speakers from *Gaelscoil* backgrounds, have spawned new speakers. As these new speakers are likely to have limited contact with traditional Gaeltacht speakers, and more intra-group relationships, a so-called “urban” dialect of Irish which patterns most closely to the standard, and yet incorporates novel forms (Mac Mathúna 2008; Ó hIfearnáin & Ó Murchadha 2011). The sounds, structures, and future of contemporary Modern Irish are increasingly defined in terms of this cleavage between new and traditional speakers.

2.1. Phonetics and Phonology of Irish

The following chart provides a reference of the consonantal inventory present in most Irish dialects. In following with the findings in Bennett *et al.* (2018) non-palatalized phonemes are categorized as plain, rather than velarized.

	Labial	Dental	Alveolar	Palatal	Velar	Glottal
Nasal	m m ^j	ɲ	n ^j	ɲ	ŋ	
Stop	b b ^j	t̪ d̪	t ^j d ^j	c ɟ	k g	
Fricative/ Approximant	f f ^j w v		s ʃ	j ç	x ɣ	h
Tap			r r ^j			
Liquid			l l			

Table adapted from Ní Chasaide 1994, Ó Raghailigh 2014, and others.

Irish phonetics and phonology have been subject to substantial scholarly interest over the past century. Of particular interest, has been the contrastive secondary articulation which distinguishes consonants. In Irish terminology, consonants are described as being “broad” (*leathan*) or velarized, and “slender” (*caol*) or palatalized (Sutton 1993). It should be noted here humorously and ironically that *leathan* begins with a slender consonant (/tʲ/) while *caol* starts

with a broad one (/k^y/). While this traditional distinction has been described in terms of a velarized/palatalized one, there are indications that this is not a cut and dry scenario. In conducting an ultrasound study of Irish consonants using Connemara dialect speakers, Bennett *et al.* (2018) did indeed find that there is a distinction in tongue body position between palatalized and non-palatalized consonants. Palatalized consonants were realized as canonically expected. However, when it came to non-palatalized consonants, there was a wider range of movements that would make the moniker of “velarization” imprecise at best. Based on place and manner of articulation, some consonants were indeed velarized, while others were plain or differently articulated. In an acoustic and perceptual study, Ní Chiosáin & Padgett (2012) found that Irish speakers, like Russian speakers whose language also has a palatalized/nonpalatalized distinction, are generally quite good at distinguishing palatal from non-palatal in all forms. However, they found that they were less good at making the distinction in coda position, also mirroring Russian speakers. This is noteworthy, given that final consonant palatalization can carry a morphological load. For example, the phonological difference between *leabhar* ['lʲa.ʊr] “a book” and *leabhair* ['lʲa.ʊrʲ] “books” is merely that the final rhotic is palatalized. Palatalization in Irish has also been shown to be independent of surrounding vowel types (Ní Chiosáin 1994). Therefore, Irish palatalized consonants can occur before front or back vowels regardless.

As the palatalized/unpalatalized distinction is so central to the arguments of this paper, it's worth noting three key acoustic cues for palatalization in Irish, and in other languages with this contrast. Ní Chiosáin & Padgett (2012) found that an increase in the F3 value, along with a decrease in F1, was as a key feature of palatalization in Irish specifically. Another acoustic cue is duration. In languages like Russian and Estonian, which make a similar distinction to Irish,

palatalized consonants are notably shorter than unpalatalized ones (Kochetov 2006; Ordin 2010; Malmi et al. 2022).

Among other marked features of Irish phonology are initial consonant mutations (ICM), epenthesis, and dynamic stress. ICM are where the quality of certain initial phonemes of a word change depending on their morphosyntactic position. An example of this would be the word *Gaillimh* “Galway,” which in its independent form starts with [g], but when preceded by the particle *i*, changes to [ŋ] and the word is orthographically represented as *i nGaillimh* “in Gallway.” Although ICM is traditionally thought of in terms of purely phonological process, there are some who have argued that morphology plays a bigger role (Green 2006.) Epenthetic processes in Irish are numerous and varied. Ó Baoill (1980) theorized that this originates not in any Scandinavian connection, as has been previously hypothesized, but instead from geminate consonants in Old Irish, supporting this with data from the Gaoth Dobhair (Ulster) dialect which maintain the geminates in some cases. Finally, dynamic stress is a marked feature which are dialect-specific, unique to Munster. Unlike other Irish dialects where stress falls on the first syllable without much deviation from this, the patterning in Munster is varied. Gussmann (2002) theorizes that there are still a series of rules governing stress assignment, wherein complex nuclei (generally long vowels/certain diphthongs) draw stress.

Irish phonology and phonetics are changing. This has been particularly evident in the realization of initial consonant mutations, which are a marked feature of Celtic languages. Welby *et al.* (2017) found that although eclipsis, one of the two forms of ICM, is consistently realized when reading aloud text, it is frequently dropped by native speakers in natural speech. The decline in usage was also found regarding lenition, the other form of ICM in Irish, but to a less

extreme extent. This finding was supported by Müller *et al.* (2019,) noting that the change is even more pronounced among younger speakers.

2.2. The Rhotic in Irish

In an effort to investigate how Irish phonology is changing, this paper focuses on the realization of one particular consonant: the rhotic. In older scholarly inquiries into particular dialects of Irish, Irish is described as possessing two contrastive rhotics, the velarized alveolar tap /rʲ/ and the palatalized alveolar tap /rʲ/ (Ó Cuív 1944; de Bhaldraithe 1966; Hamilton 1974). Ní Chasaide (1995) confirms this using data from a contemporary speaker from Gaoth Dobhair, although she notes [ɹ] as a possible word initial allophone of both /rʲ/ and /rʲ/ in some speakers. Even in a more modern, comprehensive inquiry into the phonetic inventory of Irish across three major dialects, Ó Raghailigh (2014) finds only the two taps as rhotics, including voiced and voiceless variants. Interestingly though, he does include [ɹ] as an allophone of /x/ in one particular environment in the Gaoth Dobhair dialect. However, there have been other recent scholars who have described the emergence of [ɹ] as an allophone of /r/ outside of Gaoth Dobhair. Ó Sé (2000) found the palatalized alveolar fricative [ɹʲ] as the primary allophone of /rʲ/ in the Corca Dhuibhne dialect. This was then confirmed by Kukhto & Nikolaev (2016) when they looked at the same dialect, with additional evidence that [ɹ] was an allophone of /r/ in word initial positions. In some varieties of Irish, it has additionally been seen attested that some forms of /rʲ/ have the apico-postalveolar fricative allophone [ɹ] or [z] (Ní Chasaide 1995; Hickley 2014; Kukhto & Nikolaev 2016.) Welby *et al.* (2017), on the other hand, universally renders /r/ as [ɹ] in all word final positions for Connemara speakers, and also makes a note that rhotics generally are inconsistently palatalized in contemporary Irish.

However, it has been my anecdotal experience in Irish-language environments has been that there is a far more variable movement between /ɹ/ and /r/ across speakers and dialects. Indeed, there is only one scholarly paper that I have been able to identify where the subject is exclusively the rhotic in Modern Irish phonetics and phonology (Anderson & Jaworski 2015). The paper gives a general overview of the rhotic in Irish as well as the other two Goidelic languages and describes an experiment. The experiment was conducted using two native speakers from the Connemara dialect and was a reading-list type experiment not too dissimilar from what I conducted. The authors discuss how in their experiment, the speakers produced a mixture of approximants, taps, and trills even though “rhotics are often assumed to be trills, trilled variants are rather rare in the data” with no further examination into what they have stumbled across (Anderson & Jaworski 2015, 1999.) This seems to be the general theme of this sound change, it is noted, and then quickly ignored. It is the intent of this paper to pay attention, and ask the questions “why” and “how”?

3. Experimental Design and Methodology

For this experiment, I recruited a combination of native L1 Irish speakers, and high-level L2 speakers of the language. My inclusion criteria for a high-level L2 user included those speakers who did not have at least one Irish-speaking parent (with whom they spoke Irish at home,) learned Irish either independently or through formal schooling, uses Irish regularly in their day-to-day activities, and has near-native command of the language. For native speakers, I included those who acquired the Irish language before the age of five through having at least one Irish-speaking parent at home. If they had no Irish speaker parents, but the participant completed their primary schooling in Irish and have continued to use Irish regularly in their day-to-day activities, then they were also considered native speakers. Participants were solicited primarily

through a direct email inquiring as to their interest in participating in the experiment. Most of the high-level L2 users reached out to me directly, volunteering to participate, after I made contact with the Permanent North American Gaeltacht in Erinsville, Ontario, and I explained my inclusion criteria to the leadership of the organization. The leadership then contacted members who would meet these criteria, referring them to me. For all high-level L2 users, I used a combination of self-reporting and personal judgment to ensure they met the criteria for inclusion. In total, eight participants were recruited for this study, of whom two were native speakers and six were high-level L2 speakers. Four of the participants learned Irish as an L2 throughout the primary and secondary schooling in non-*Gaeltacht* areas of Ireland, one participant had their primary schooling conducted through the medium of Irish while their secondary schooling was conducted in English, with Irish taught as an L2 subject, and the final two participants learned Irish exclusively through self-study. The ages of the participants ranged from 25 to 69. This information is summarized in the table below:

Participant	Age	L1	Education
MN1	40	Irish	All Irish L1
FN1	41	Irish	Some Irish L1
ML1	29	English	Irish L2
ML2	58	English	Irish L2
ML3	25	English	Self-Study
FL1	29	English	Irish L2
FL2	69	English	Irish L2
FL4	54	English	Self-Study

After agreeing to participate, and after completing an informed consent form as required under the ethics approval sought and acquired for this experiment, each participant met with the researcher for approximately 30 minutes over the video telephony platform Zoom where the conversation was recorded. Before the experiment began, the participants were asked a series of questions, completing a sociolinguistic background questionnaire.

The experiment conducted for this MRP is modeled on previous phonological inquiries into Irish, where the intent is to elicit a particular phoneme or phonemes (Ní Chiosáin *et al.* 2012; McCullough 2017). In this case, the phonemes were /R/ and /R^j/, which I use as a shorthand to denote the non-palatalized and palatalized rhotic consonants, whatever their particular manner and place of articulation may be. To elicit the phonemes in a wide variety of contexts, the experiment consisted of two sections: the first was the reading of a word list and the second was the reading of a short passage. In the first section, the participant was presented with a single Irish word (for example *túr* “tower”) on the screen in front of them, in black Calibri 60 point font. The participant was then asked to read the word three times as naturally as possible. This was repeated for each of the fifty-one words in the presentation. Of the fifty-one words, thirty-five/thirty-six² were from the word list created to elicit tokens of /R/ or /R^j/ in a number of different phonological and phonetic environments while sixteen were random fillers, inserted to misdirect the participant from detecting the pattern. The table below illustrates these environments with sample words. Please refer to Appendix A for the full list.

Table 1: Word list environments

Environment	Sample Word with Phonetic Transcription	English Translation
RV_	<i>Raidió</i> ['Radjo:]	“Radio”
R ^j V_	<i>Reilig</i> ['R ^j elɲ]	“Graveyard”
_VR	<i>Túr</i> [t̪u:R]	“Tower”
_VR ^j	<i>Béir</i> [bje:R ^j]	“Bears”

² Depending on the speaker, the word *mná* may be variably pronounced with a rhotic ['mRa:] or without ['mna:]

VRV	<i>Mórán</i> ['mo:.Ran]	“Many/much”
VR ^j V	<i>Fireannach</i> ['fɪ.R ^j a.ɲəx]	“Male”
CRV_	<i>Sráid</i> [sRa:d ^j] or [ʃRa:d ^j]	“Street”
CR ^j V_	<i>Prionsa</i> [pR ^j insə]	“Prince”
_VRC	<i>Corp</i> [koRp]	“Body”
_VR ^j C	<i>Páirc</i> [paR ^j c]	“Park”
VCRV	<i>Nua-Eabhrac</i> ['nu.ə 'jaw.Rək]	“New York”
VCR ^j V	<i>Oibrí</i> ['ai.bR ^j i:]	“Worker”
VRCV	<i>Gorta</i> ['goR ^j tə]	“Hunger”
VR ^j CV	<i>Léirmheas</i> ['lʲe:R ^j .vas]	“Review”

The second section of the experiment, involved the reading of a short passage by the participant. The passage chosen was an excerpt from an Irish-language translation of Antoine de Saint-Exupéry’s *Le Petit Prince* (1946.) While the word list produced a large number of tokens in isolation, the reading section expanded upon the context of tokens by providing environment where canonically word-initial /R/ or /R^j/ would be produced medially in the phrasal utterance. There are an additional 39 tokens which were expected to be produced during the reading of the passage. However, the precise context is speaker dependent. Each speaker read at their own pace, and in some cases may have paused between words or ran words together differently than each other. For the complete word list and the excerpt of *Le Petit Prince/An Prionsa Beag*, please refer to the appendices of this work.

The following table illustrates the contexts in the reading sections, with an example word or words, including the number of expected tokens per speaker. The environments were categorized

by three variables, whether the rhotic is canonically palatalized or not, the syllable position of the rhotic, and whether the rhotic is in a complex cluster of consonants in said syllable position or not (ie. simple.)

Table 2: Token contexts

Palatalized or Unpalatalized	Syllable Position	Simple or Complex	Example	Expected Tokens
Unpalatalized	Onset	Simple	<i>Rúnaí</i> ['Ru:.ɲi:] “secretary”	24
Unpalatalized	Onset	Complex	<i>Gráin</i> [gRaɲ ^j] “hatred”	6 (9 with <i>mná</i>)
Palatalized	Onset	Simple	<i>Ribín</i> ['Rʲibʲi:nʲ] “ribbon”	24
Palatalized	Onset	Complex	<i>Cré</i> [cRʲe:] “graveyard”	9
Unpalatalized	Coda	Simple	<i>Leabhar</i> ['lʲa.wəR] “book”	18
Unpalatalized	Coda	Complex	<i>Bord</i> [boRɟ] “table”	6
Palatalized	Coda	Simple	<i>Leabhair</i> ['lʲa.wəRʲ] “books”	18
Palatalized	Coda	Complex	<i>Cuairt</i> [ku:Rʲtʲ] “visit”	6

My primary hypothesis relating to native speakers of Irish is that /ɾ/ is the dominant realization of the rhotics in the language, with /ɹ/ occurring predominantly in word-final position, as was reported in Welby *et al.* (2017). I would expect the native speakers to be more conservative in their speech, and less likely to exhibit influence from English. Additionally, I

hypothesize that high-level L2 users will make use of /ɹ/ in all or almost all environments, as their speech is likely to be heavily influenced by dialects of English where /ɹ/ is dominant. As a secondary hypothesis, I suspect that older speakers of both categories will adhere to the more conservative pronunciation standard, that is maintaining /ɾ/ as well as the palatalized/non-palatalized distinction. This is connected to the idea that the /ɹ/ pronunciation originated in or gained traction alongside the rise of Irish-medium education in non-*Gaeltacht* areas as a recent phenomenon.

Praat (Boersma & Weeknik 2021) was the primary means by which I analyzed the tokens produced by the participants, in conjunction with my own perceptual judgment. Although there was variation between and across speakers as to the precise articulation of the rhotics in this experiment, they could be reasonably categorized into four distinct forms: approximant, tap, trill, or fricative. Approximants were those highly resonant phonemes which were continuant in nature and perceptually rhotic in quality. Taps were those where a single, rapid, identifiable stop was made. Trills were those where more than one stop was made. Fricatives were those where strong turbulent noise was produced and were not perceptually rhotic. Examples of each, drawn from the data, can be seen below:

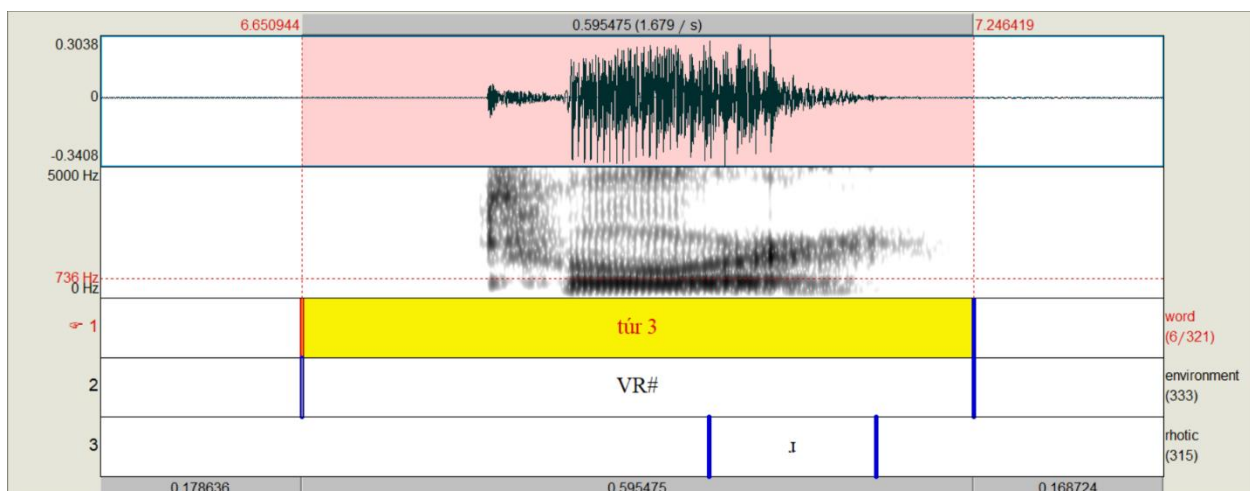


Figure 1: approximant example from FL1

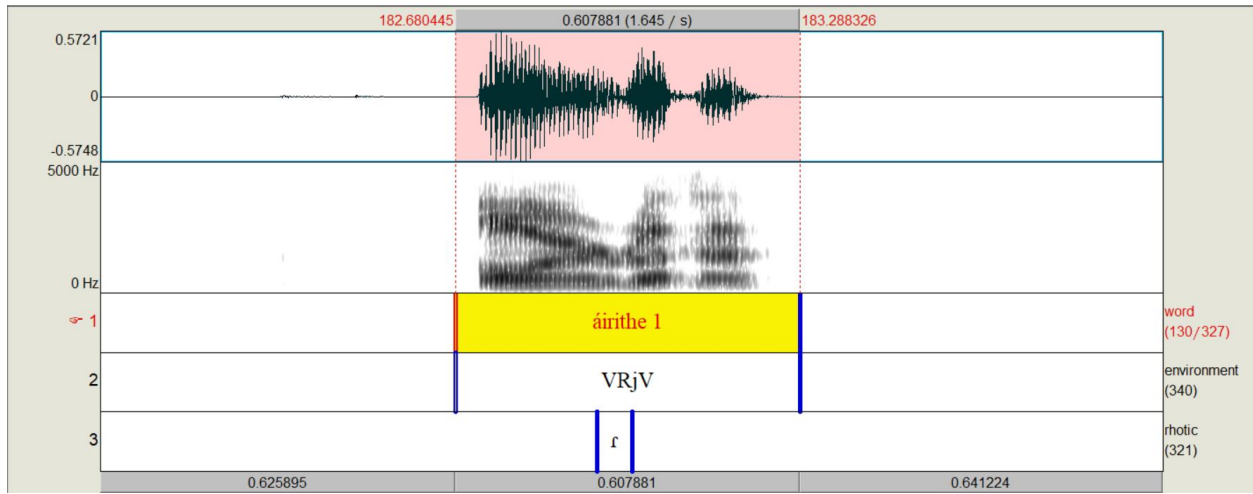


Figure 2: tap example from ML2

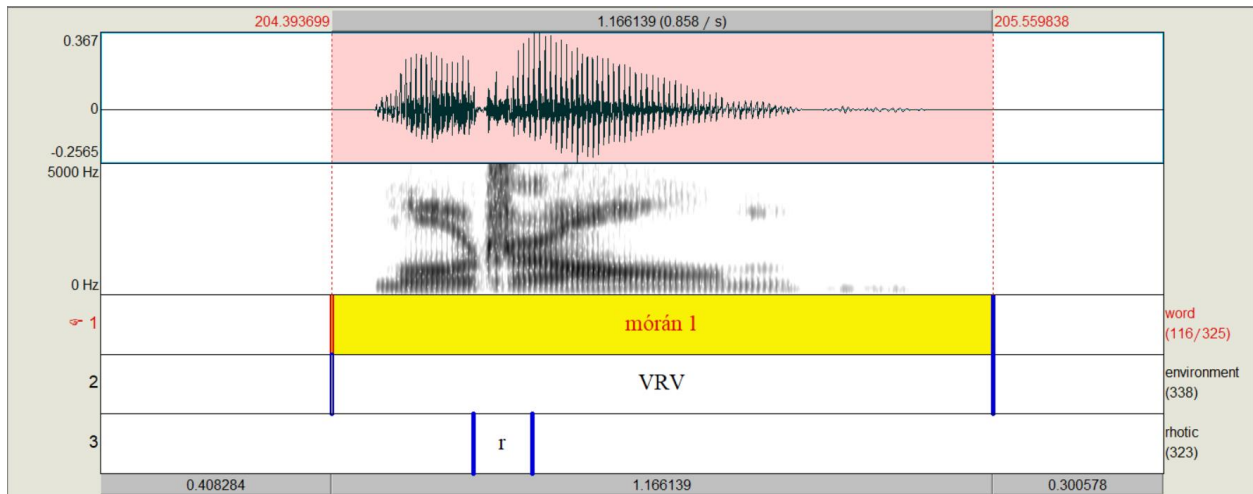


Figure 3: trill example from ML3

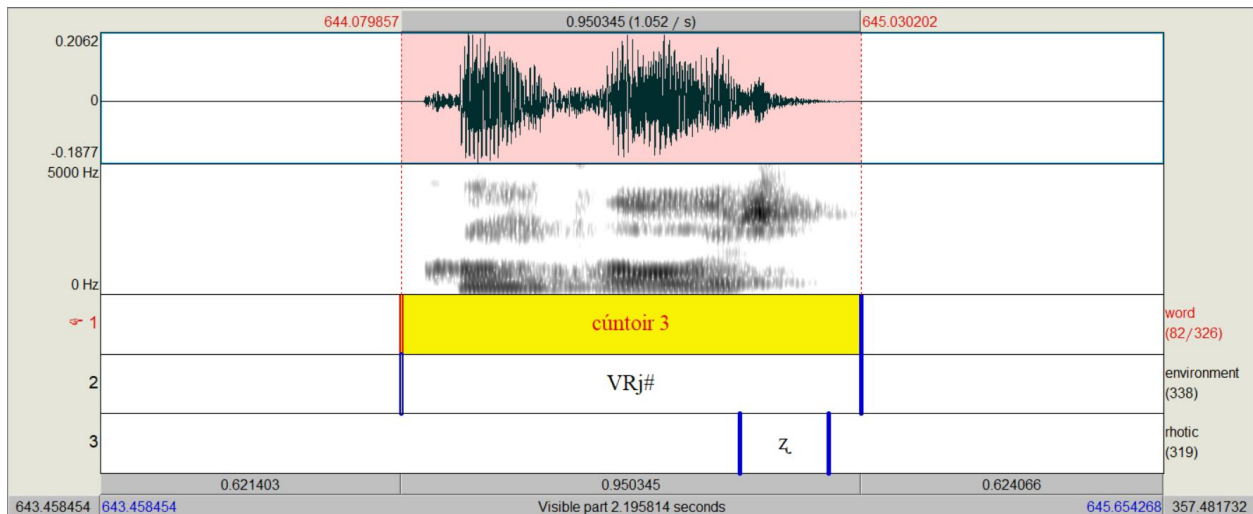
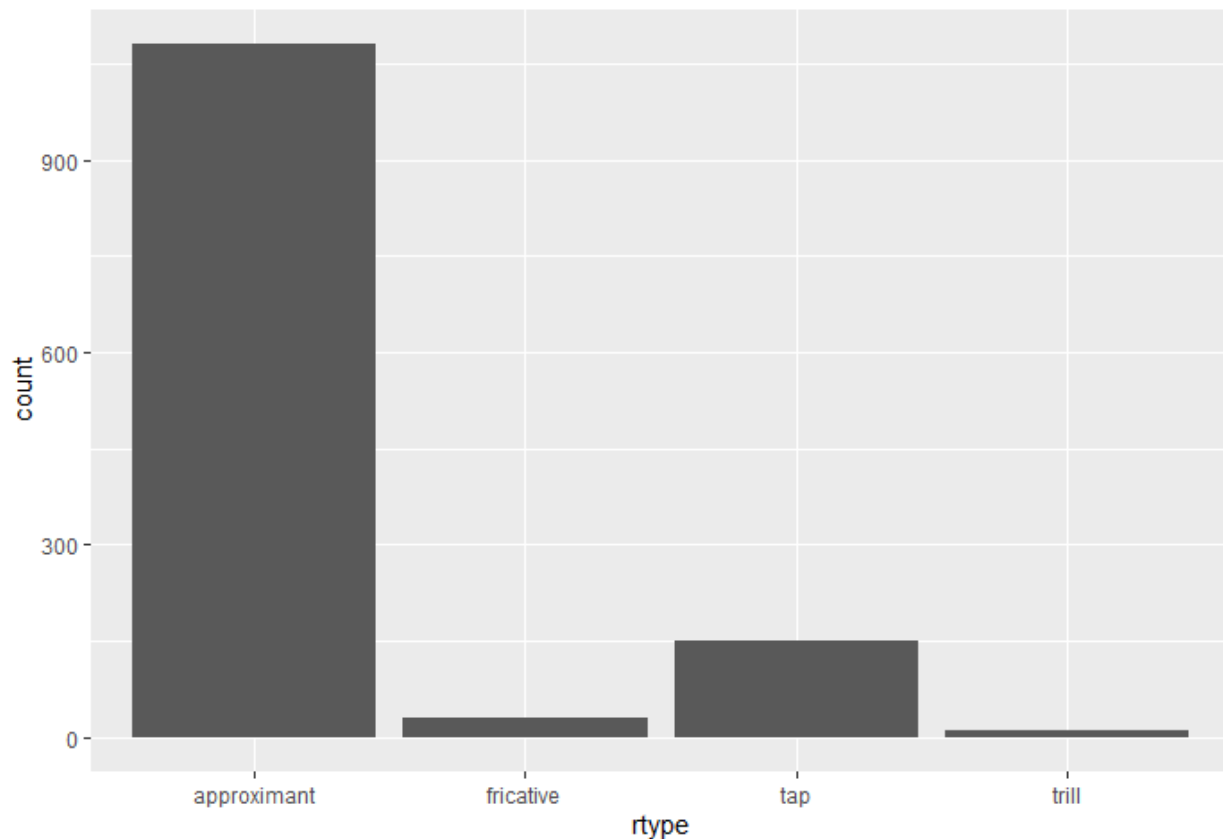


Figure 4: fricative example from MNI

4. Results

4.1. Rhotic Type

This subsection outlines the results of the experiment pertaining to rhotic type used by all participants, firstly by total count, secondly proportionally by each participant, and thirdly proportionally by each participant group. The following graph displays the number of all rhotics token produced in both the word list and passage reading sections of the experiment categorized by whether the token was identified as an approximant, fricative, tap or trill according to the criteria established in the previous section.

*Figure 5: count of each type of rhotic produced by all participants in both sections*

The approximant was, by an overwhelming margin, the most commonly utilized rhotic across all participants. The tap was the second-most articulated rhotic, while the fricative and trill were the third and fourth-most used rhotics. However, the tap was the only of the non-approximant realizations to be used in any significant amount. The fricative and trill were clearly marginal outliers.

The following graph shows the proportion (count 1.00=100%) of rhotic type used by each participant in both sections of the experiment.

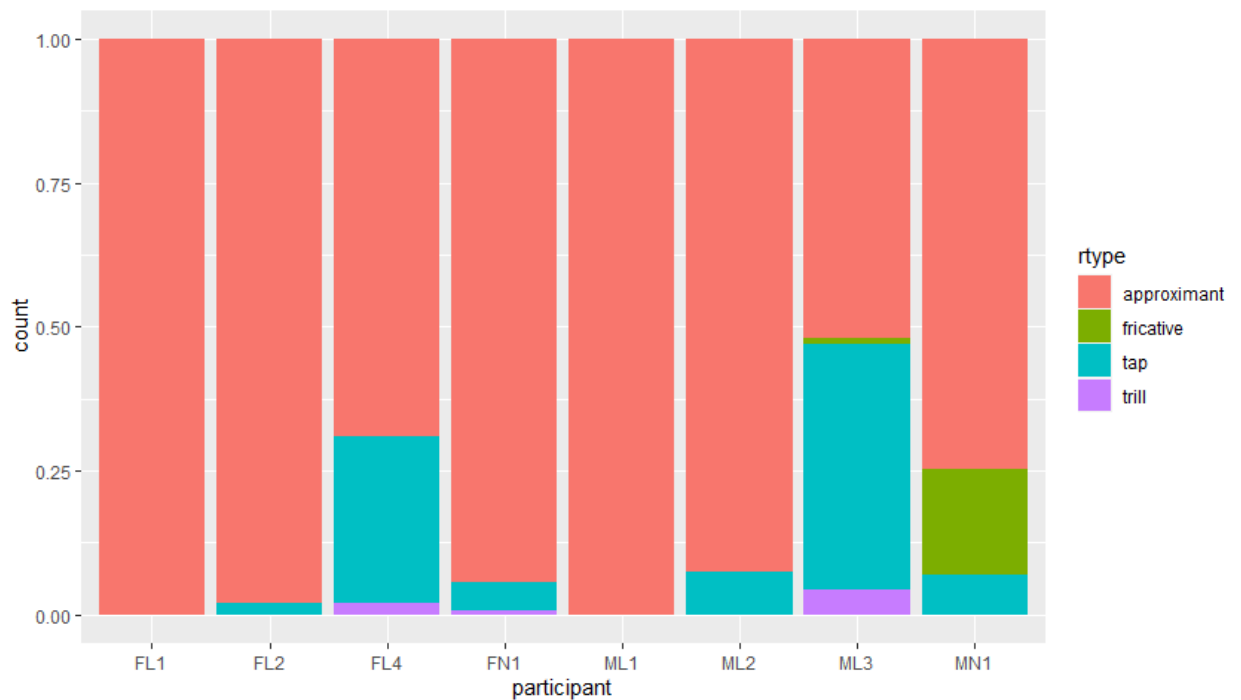


Figure 6: proportion of rhotic type utilized by each participant

All eight participants made use of the approximant in more than 50% of tokens elicited during the experiment. There was a range to this, with two participants using the approximant 100% of the time (FL1 & ML1), and one participant producing this form only slightly more than half of the time. The tap was produced by six of the participants, with four participants making use of the tap to a marginal extent, while two (FL4 & ML3) articulated the tap in greater than a

quarter of all tokens. Trills were produced by only three participants (FL4, FN1 and ML3) with only ML3 making use of the trill more than rarely. Finally, the fricative was elicited only in tokens produced by two speakers (MN1 & ML3) with the native speaker articulating them in around an eighth of cases, while the learner only occasionally produced the fricative. Learners were somewhat more likely to make use of the tap than native speakers, however, this appears to be due to the overrepresentation of taps in the speech of two participants (FL4 & ML3).

The following graph shows the proportion of rhotic type used by participants, divided into native speakers (L1 Irish) and high-level L2 users (L1 English) in both sections of the experiment.

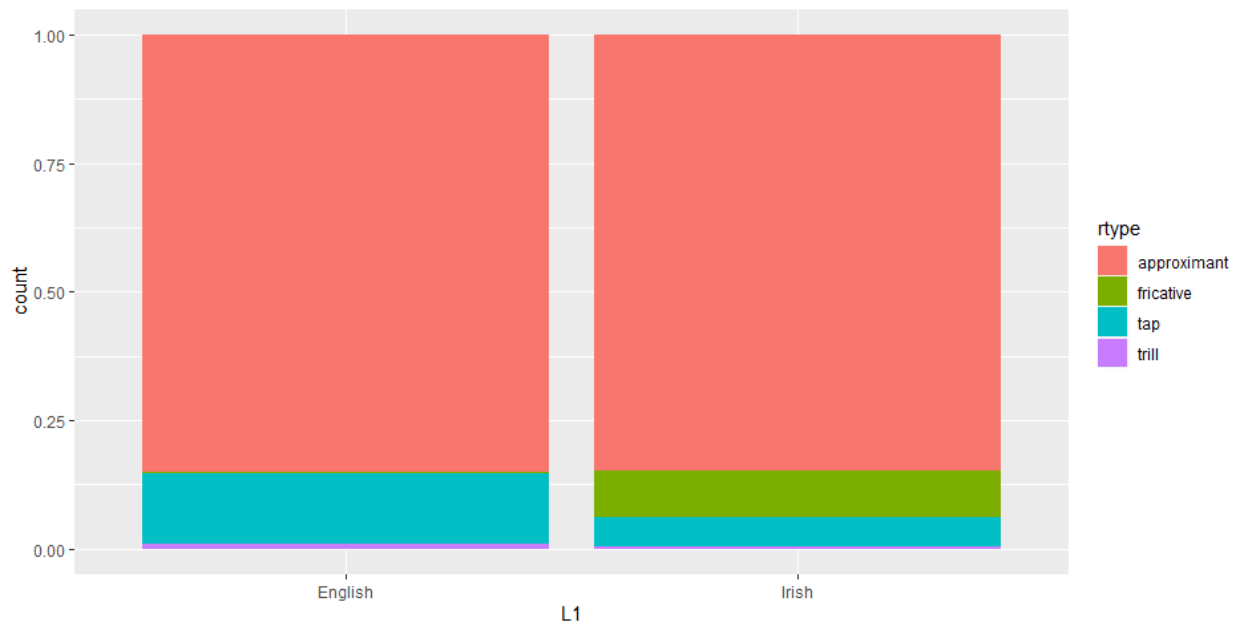


Figure 7: proportion of rhotic type used by participant L1

For both groups of participants, the approximant was the dominant realization of the rhotic, occurring for approximately eighty-five percent of all tokens. The remaining fifteen percent were then divided between the other three rhotic types. The native speakers utilized the fricative slightly more than the tap, with trills occurring very rarely. The high-level L2 users

overwhelmingly used taps when bit using the approximant, with trills rare and fricatives even more uncommon.

4.2 Palatalization

This subsection outlines the results of the experiment relating to rhotic type used the participants by the metric of palatalization. The following graph shows the proportion of rhotic type used by each type of participant controlled for the consonant being canonically palatalized or unpalatalized.

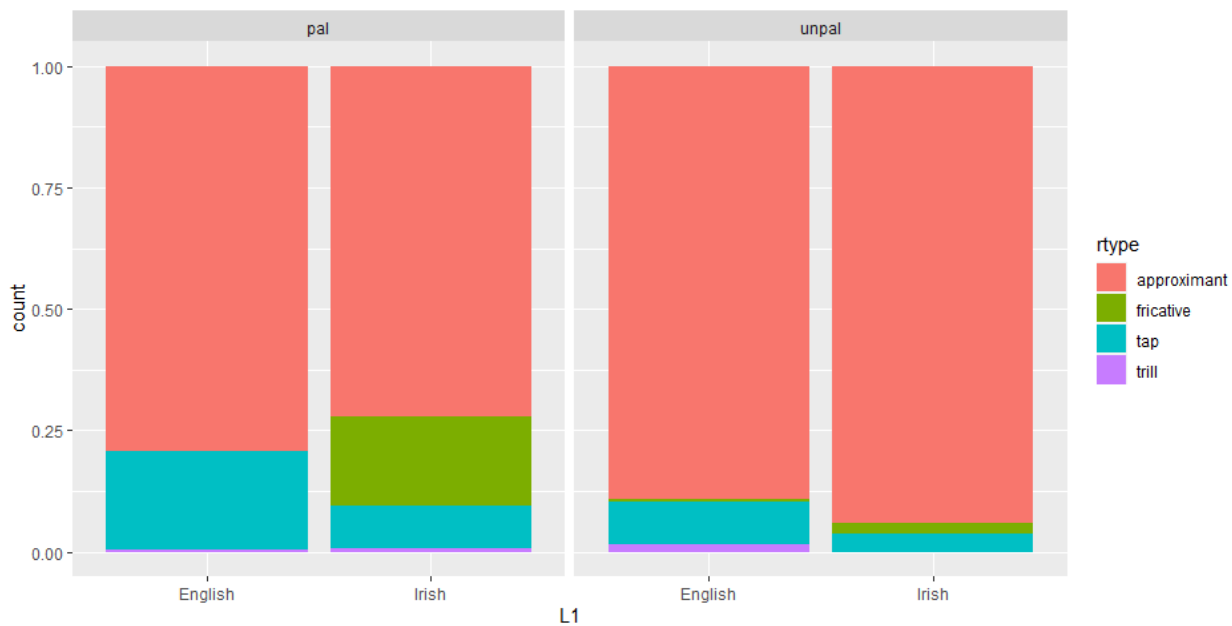


Figure 8: proportion of rhotic type used in canonically palatalized and unpalatalized positions by participant type

Among both participant groupings, and in canonically palatalized and unpalatalized positions, the approximant was the primary realization of the rhotic in Irish. For unpalatalized tokens, the approximant was used by the native speakers in more than 95% of cases, with taps and fricatives making up the remaining 10% in similar proportions. The high-level L2 users produced the approximant in around 87% of cases, with taps making up most of the other cases.

For palatalized tokens, native speakers used the approximant in about 70% of cases, the fricative in around 15%, and the tap in most of the remaining cases. The high-level L2 users produced the approximant in just less than 80% of cases, with the tap occurring for almost all remaining tokens.

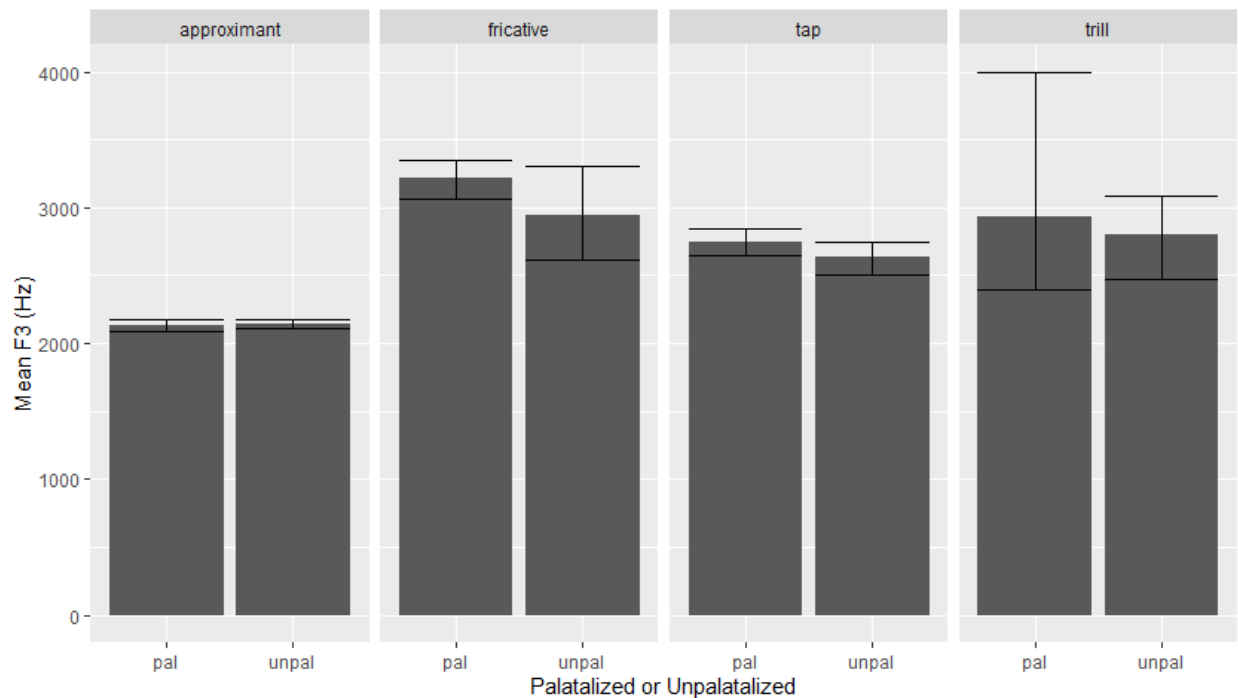


Figure 9: the mean F3 (Hz) value of palatalized and unpalatalized consonants by category of rhotic articulated

The mean F3 (Hz) of palatalized and unpalatalized consonants varied by category of rhotic articulated. The mean F3 for approximants were roughly identical for both palatalized and unpalatalized variants, and significantly lower than the mean F3 for all three other rhotics. In all three cases, the mean F3 of the canonically palatalized rhotic was higher than that of the canonically unpalatalized rhotic. However, in no case was it that this was statistically significant. The widest variation in F3 was in the trill category, while the least variation was present in the

tap category. Fricatives had the highest mean F3 values, with palatalized somewhat higher than unpalatalized and with a narrower range.

The following graphs show the mean F1 (Hz) of the rhotics articulated as approximants in palatalized and unpalatalized forms by the two participant groups.

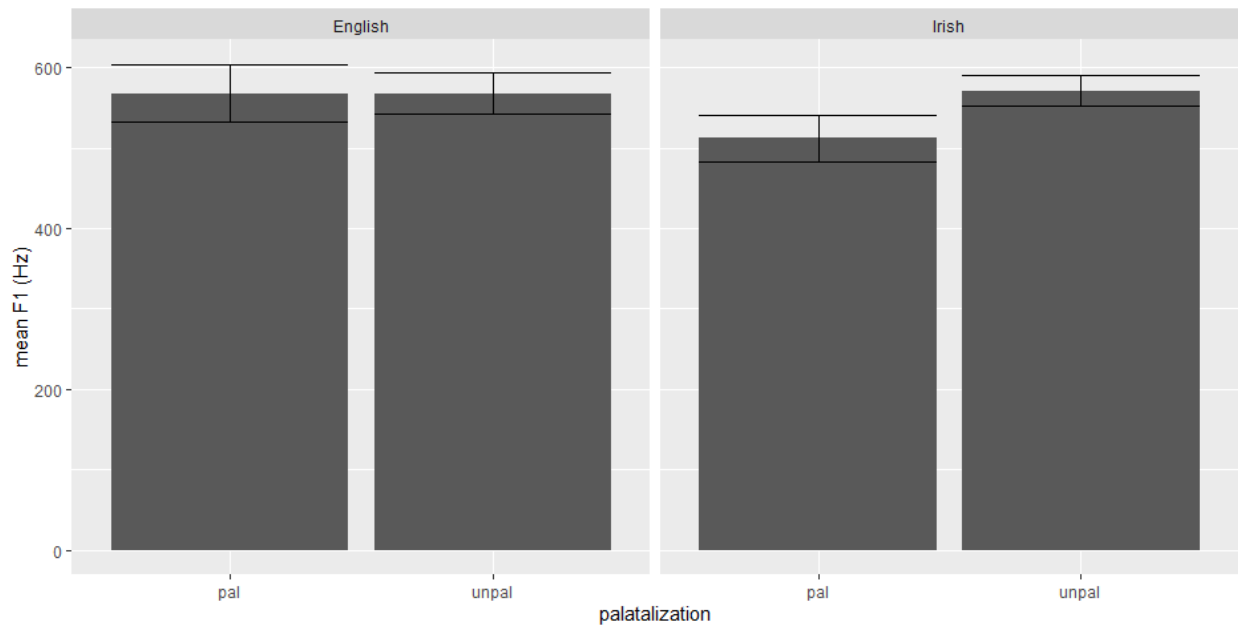


Figure 10: mean F1 (Hz) of rhotics articulated as approximants by all participants in canonically palatalized and unpalatalized positions

The following graphs show the mean duration (s) of the rhotics articulated as approximants in palatalized and unpalatalized forms by the two participant groups.

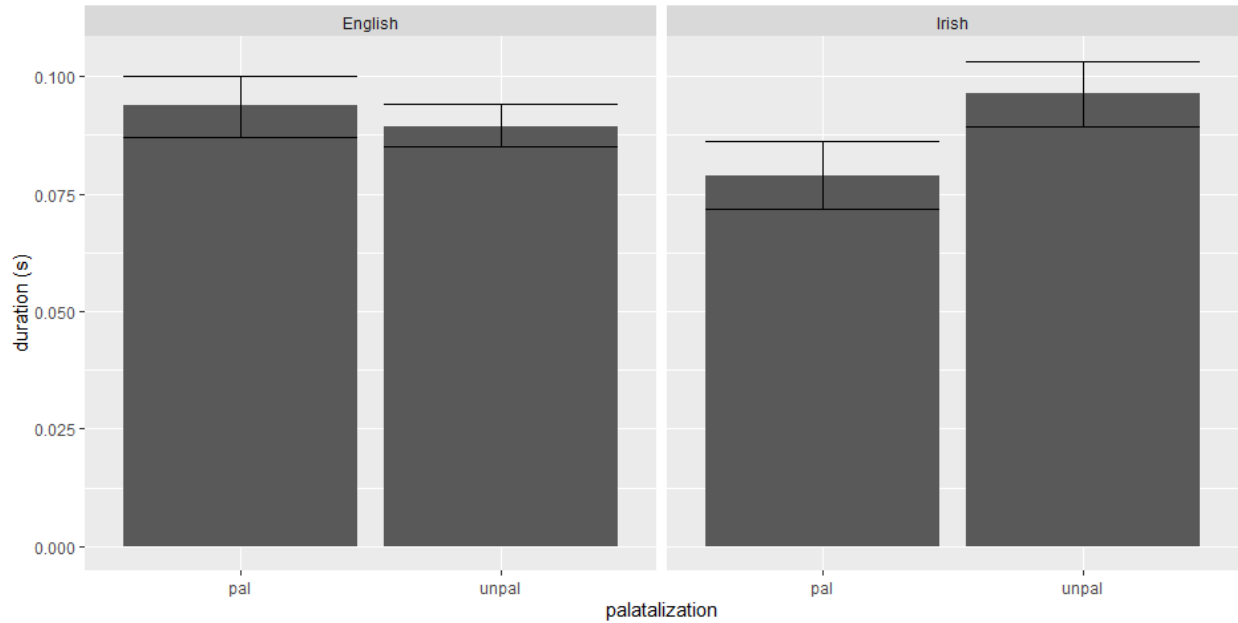


Figure 11: mean duration (s) of rhotics articulated as approximants by all participants in canonically palatalized and unpalatalized positions

The mean F1 and durations of palatalized and unpalatalized approximants were distinct for the two groups of participants. For the native speakers, the mean F1 for palatalized approximants was lower than for unpalatalized ones, and the duration of palatalized approximants was significantly shorter than unpalatalized ones. For the high-level L2 users, the mean F1 for palatalized and unpalatalized approximants were nearly identical and unpalatalized approximants were slightly shorter than palatalized ones. This suggests that L1 distinguish palatalization in terms of lower F1 and shorter duration, and that palatalized approximants are distinct for L1 speakers but neutralized for L2 speakers.

4.2.1 Native Speakers

This subsection illustrates the difference in rhotics produced by the two native speakers, participants MN1 and FN1 in this experiment, on account of their being canonically palatalized or unpalatalized.

The following graph displays the proportion of each rhotic type articulated for each kind of consonant by a single native speaker: MN1.

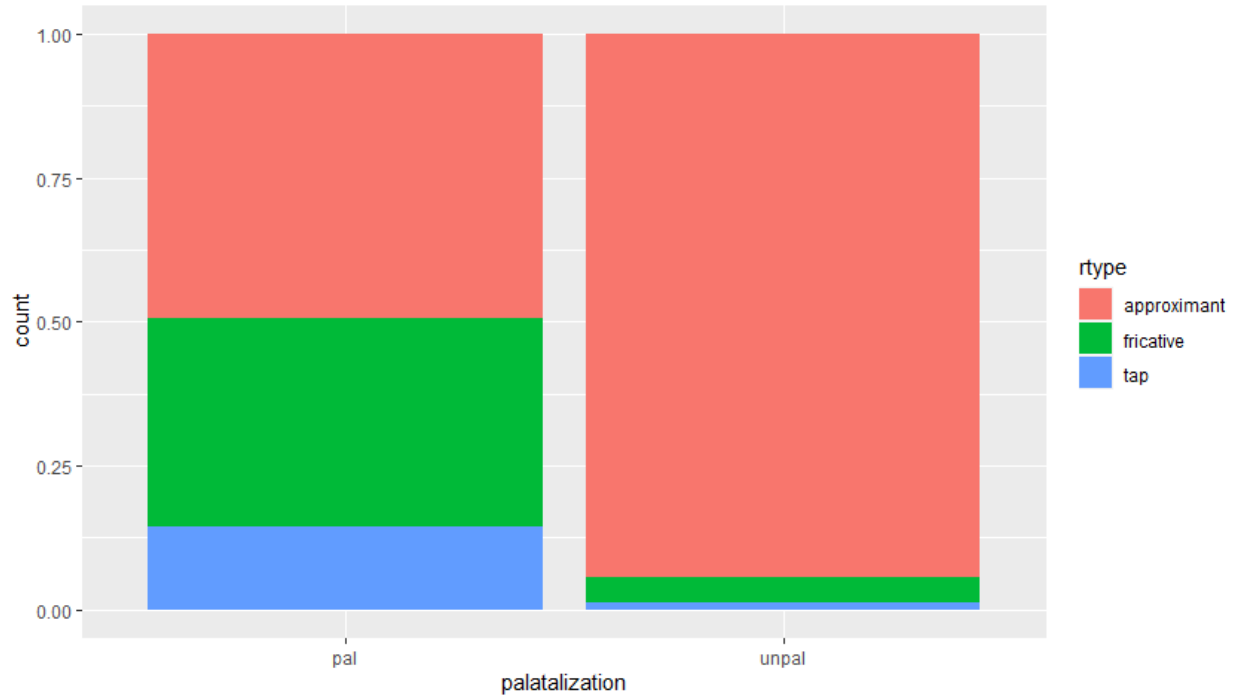


Figure 12: the percentage of rhotic realization type by participant MN1 for canonically palatalized and unpalatalized tokens

The following graph shows the mean duration of rhotics articulated as approximants by MN1, which are categorized as being palatalized or unpalatalized.

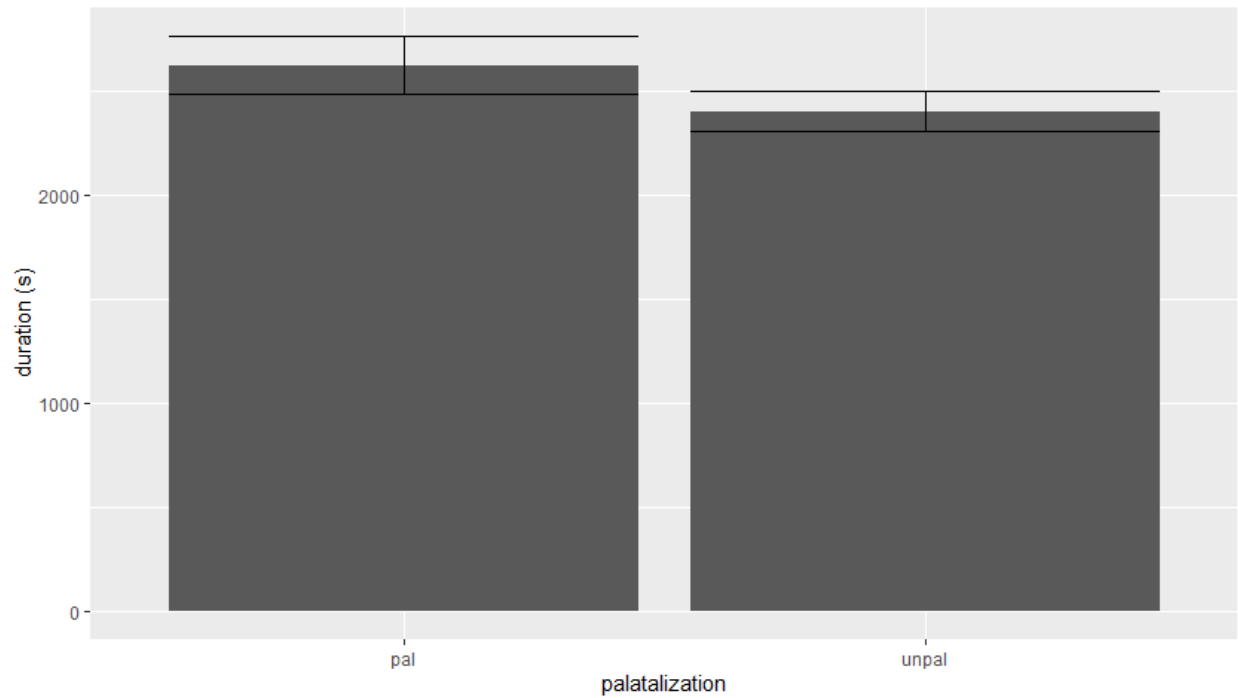


Figure 13: the duration (s) of rhotics articulated as approximants by participant MN1 for canonically palatalized and unpalatalized tokens

The following graph illustrates the mean F3 value of rhotics articulated as approximants by MN1 as categorized by their being palatalized or unpalatalized.

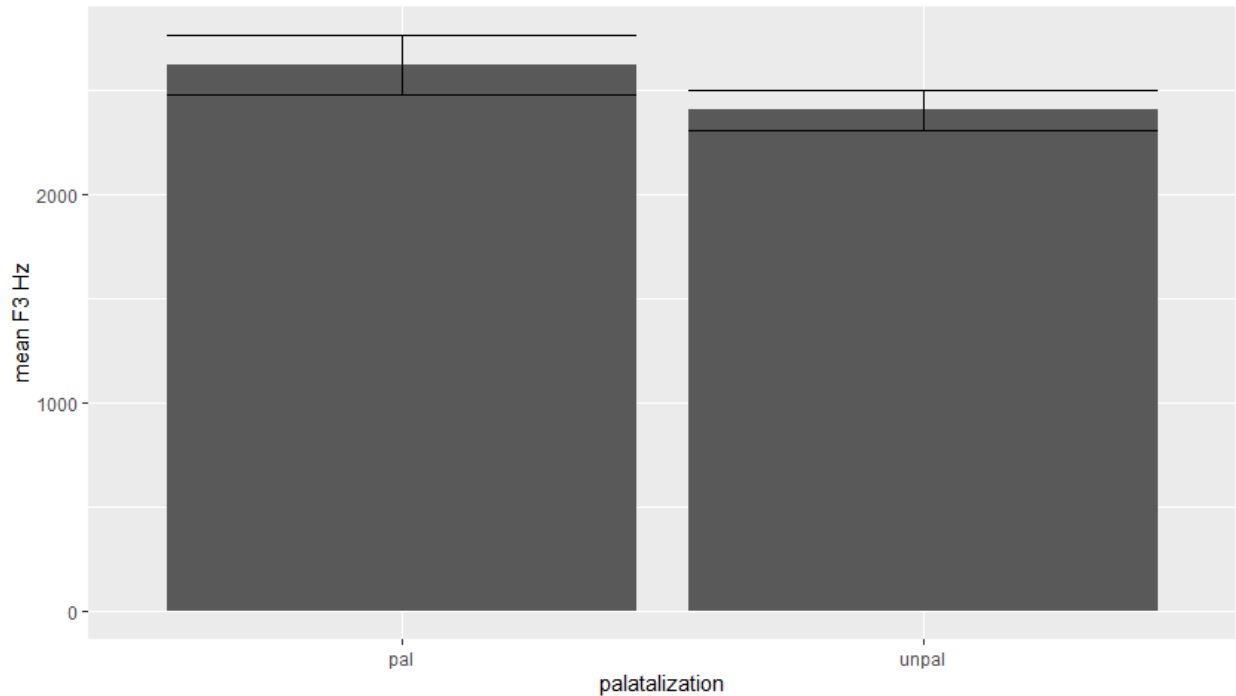


Figure 14: the mean F3 (Hz) of rhotics articulated as approximants by participant MN1 for canonically palatalized and unpalatalized tokens

Speaker MN1 produced three of the four categories of rhotics: approximants, fricatives, and taps, and in differing proportions depending on whether the consonant was canonically palatalized or unpalatalized. For unpalatalized consonants, MN1 produced approximants in around 95% of tokens, with mostly fricatives and rarely taps accounting for the rest of tokens. For palatalized consonants, MN1 produced approximants in just under half of all tokens. The participant then articulated fricatives in around a third of cases, with taps accounting for the remaining tokens. Of the rhotics that MN1 produced as approximants, there was a significant difference in both the duration and the mean F3 value depending on whether the consonant was canonically palatalized or unpalatalized. Palatalized rhotics were longer and had higher F3 values, while unpalatalized ones were shorter and had lower F3 values.

The following graph displays the proportion of each rhotic type articulated for each kind of consonant by a single native speaker: FN1.

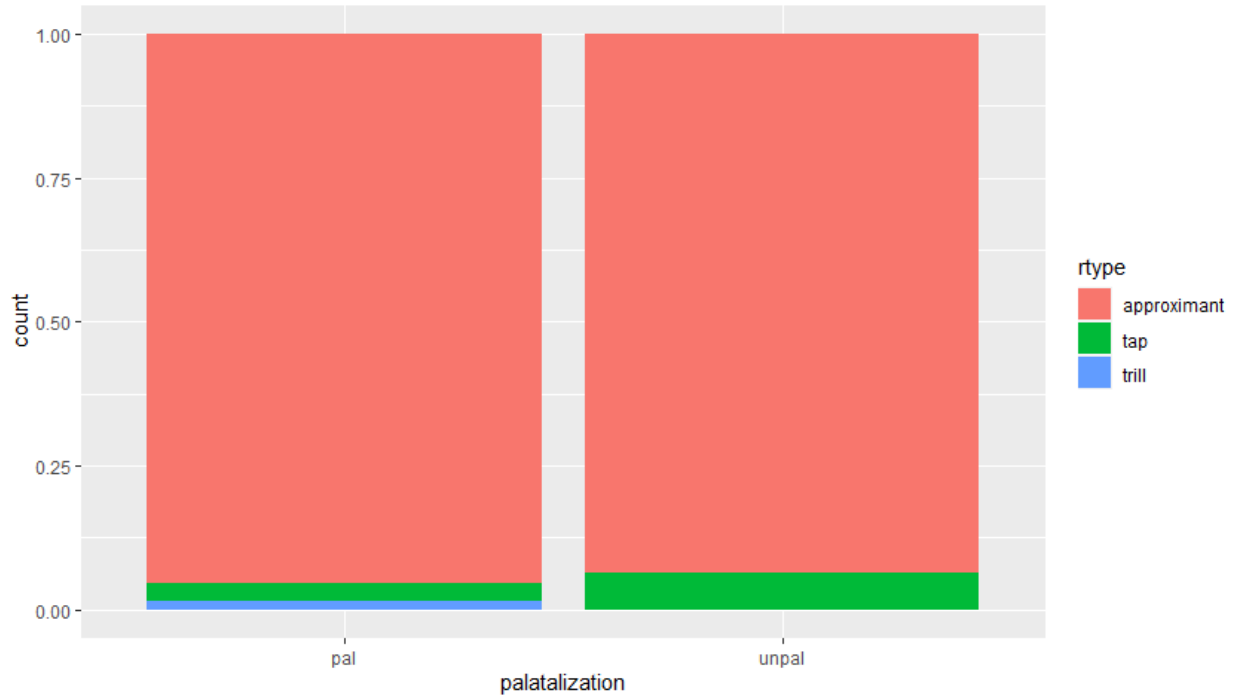


Figure 15: the percentage of rhotic realization type by participant FN1 for canonically palatalized and unpalatalized tokens

The following graph shows the mean duration of rhotics articulated as approximants by FN1, which are categorized as being palatalized or unpalatalized.

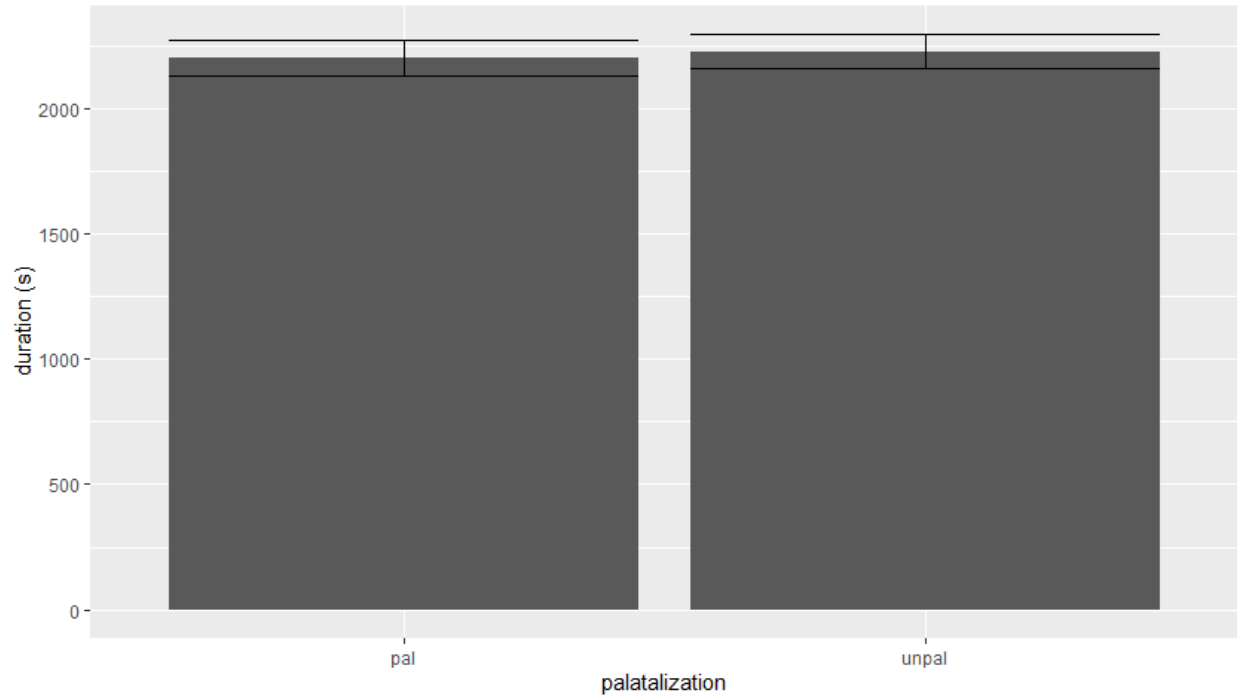


Figure 16: the duration (s) of rhotics articulated as approximants by participant FN1 for canonically palatalized and unpalatalized tokens

The following graph illustrates the mean F3 value of rhotics articulated as approximants by FN1 as categorized by their being palatalized or unpalatalized.

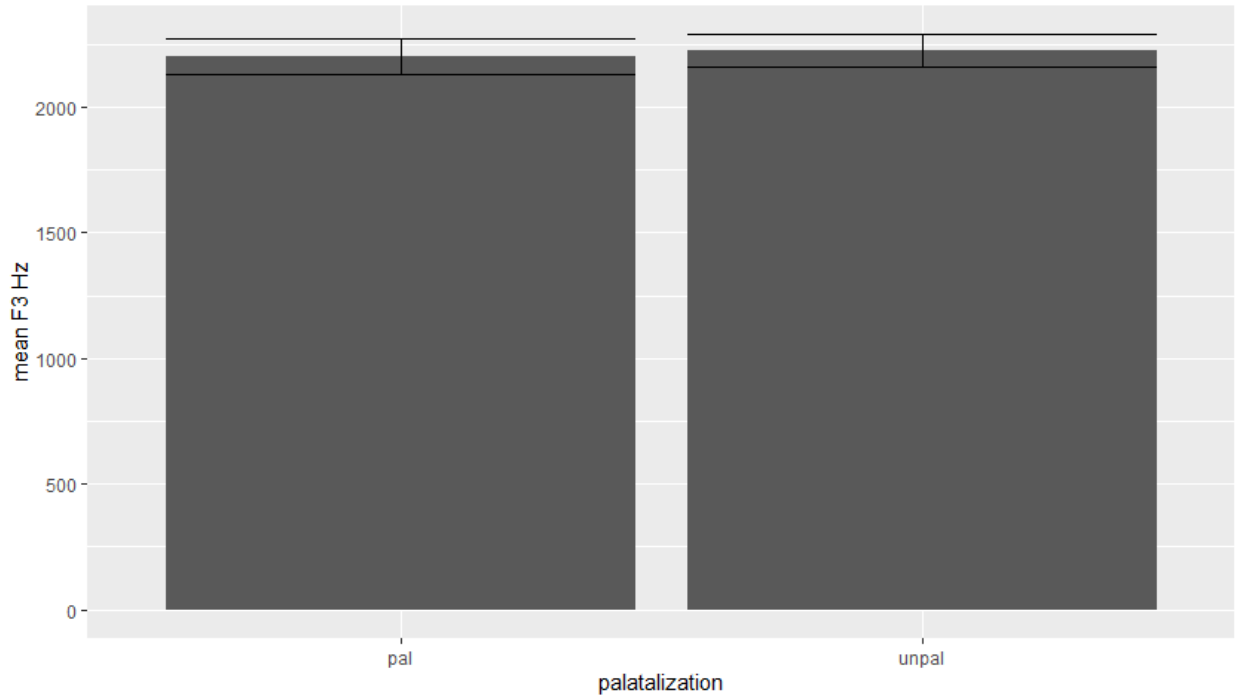


Figure 17: the mean F3 (Hz) of rhotics articulated as approximants by participant FN1 for canonically palatalized and unpalatalized tokens

Speaker FN1 produced three of the four categories of rhotics: approximants, taps, and trills, and in differing proportions depending on whether the consonant was canonically palatalized or unpalatalized. For both unpalatalized and palatalized consonants, FN1 produced approximants in around 90% of tokens. However, for palatalized consonants, FN1 produced exclusively taps in the remaining tokens, whereas the participant then articulated both taps and trills in those remaining tokens. Of the rhotics which FN1 articulated as approximants, there was no significant difference in mean F3 nor duration between canonically palatalized and unpalatalized consonants. There was effectively no difference in duration of rhotics articulated, as well as the mean F3, for rhotics of canonical palatalization or unpalatalization.

4.2.2. High-Level L2 Users

This subsection illustrates the difference in rhotics produced by six high-level L2 speakers on account of their being canonically palatalized or unpalatalized.

The following graph displays the proportion of each rhotic type articulated for each kind of consonant by a single high-level L2 speaker: ML1.

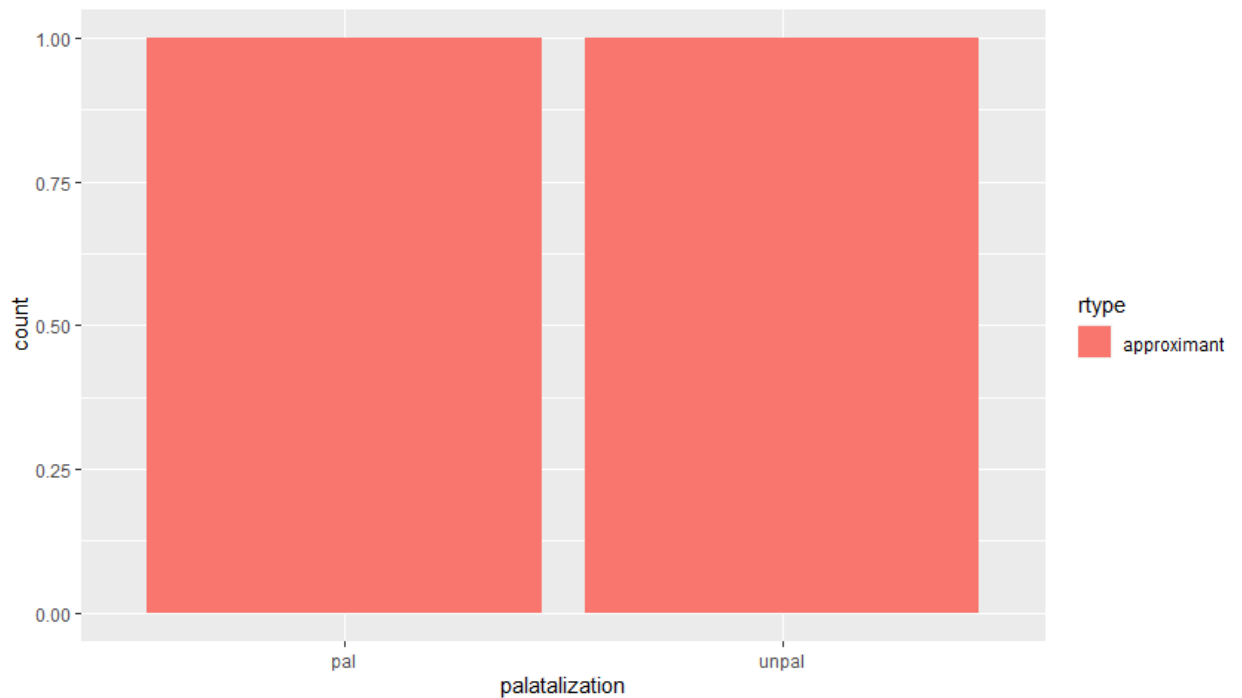


Figure 18: the percentage of rhotic realization type by participant ML1 for canonically palatalized and unpalatalized tokens

The following graph shows the mean duration of rhotics articulated as approximants by ML1, which are categorized as being palatalized or unpalatalized.

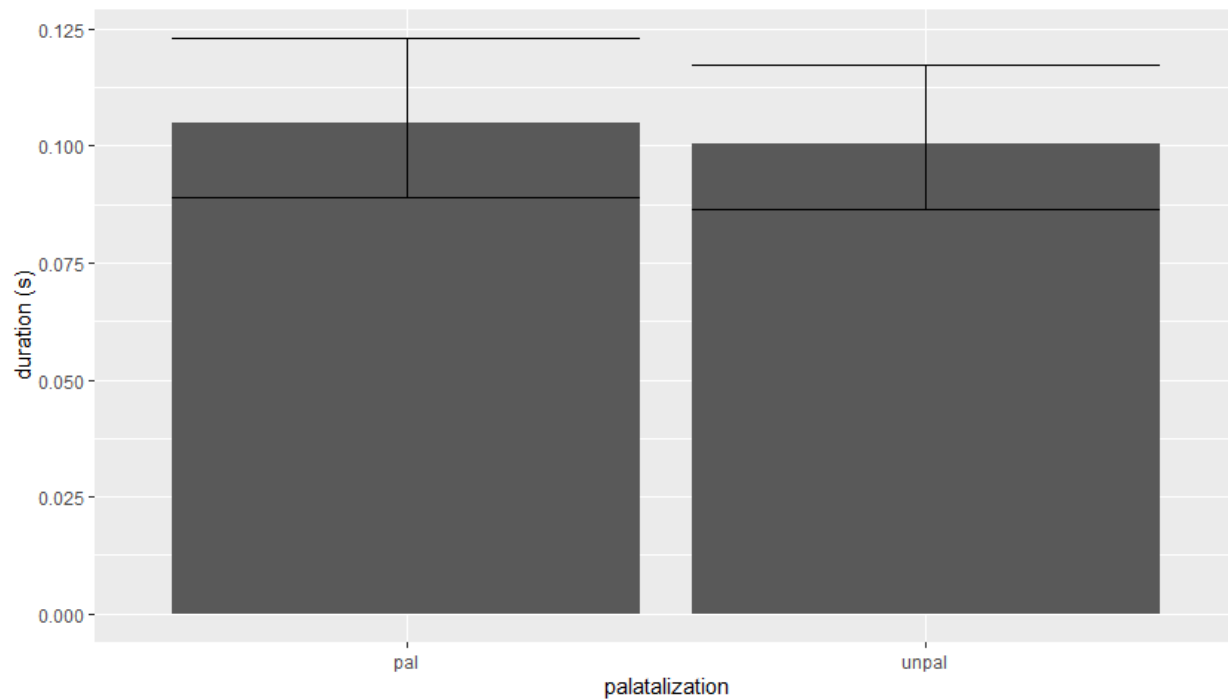


Figure 19: the duration (s) of rhotics articulated by participant ML1 for canonically palatalized and unpalatalized tokens

The following graph illustrates the mean F3 value of rhotics articulated as approximants by ML1 as categorized by their being palatalized or unpalatalized.

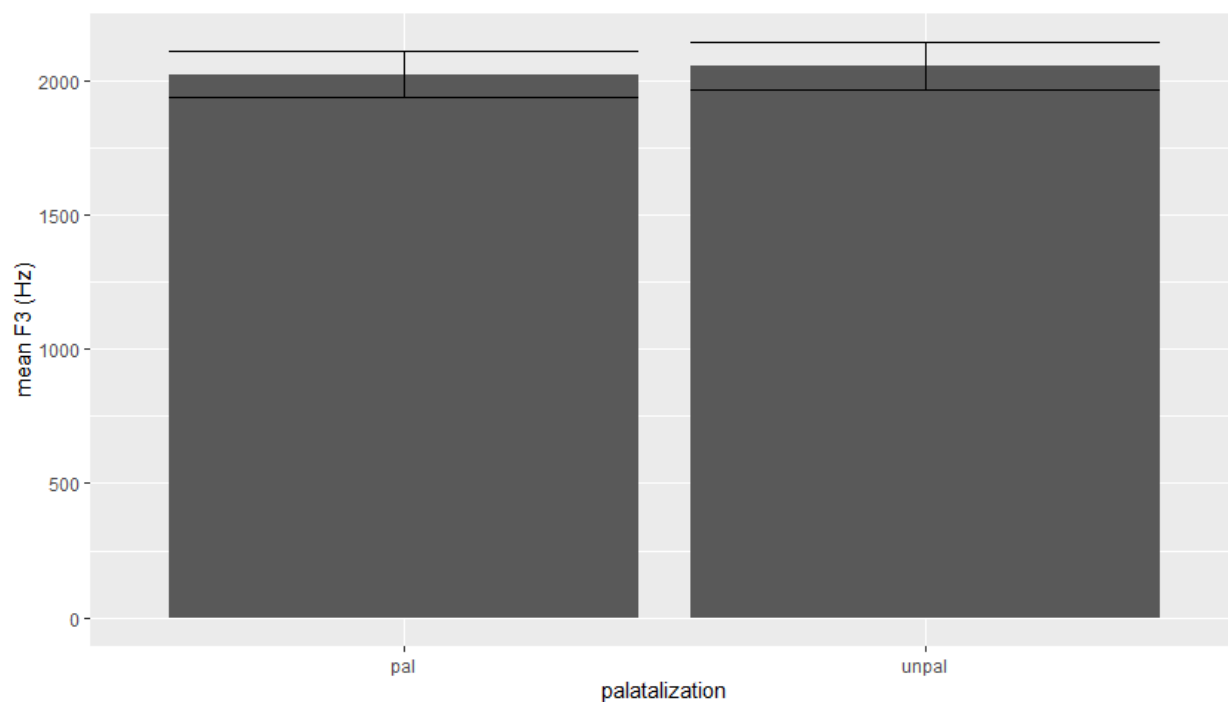


Figure 20: the mean F3 (Hz) value of rhotics articulated by participant ML1 for canonically palatalized and unpalatalized tokens.

Speaker ML1 produced exclusively one type of rhotic: the approximant. He articulated the approximant in all cases and in all environments, regardless of whether they were palatalized or unpalatalized. There was essentially no difference in the mean F3 of rhotics. Palatalized rhotics were slightly longer in duration than unpalatalized ones.

The following graph displays the proportion of each rhotic type articulated for each kind of consonant by a single high-level L2 speaker: ML2.

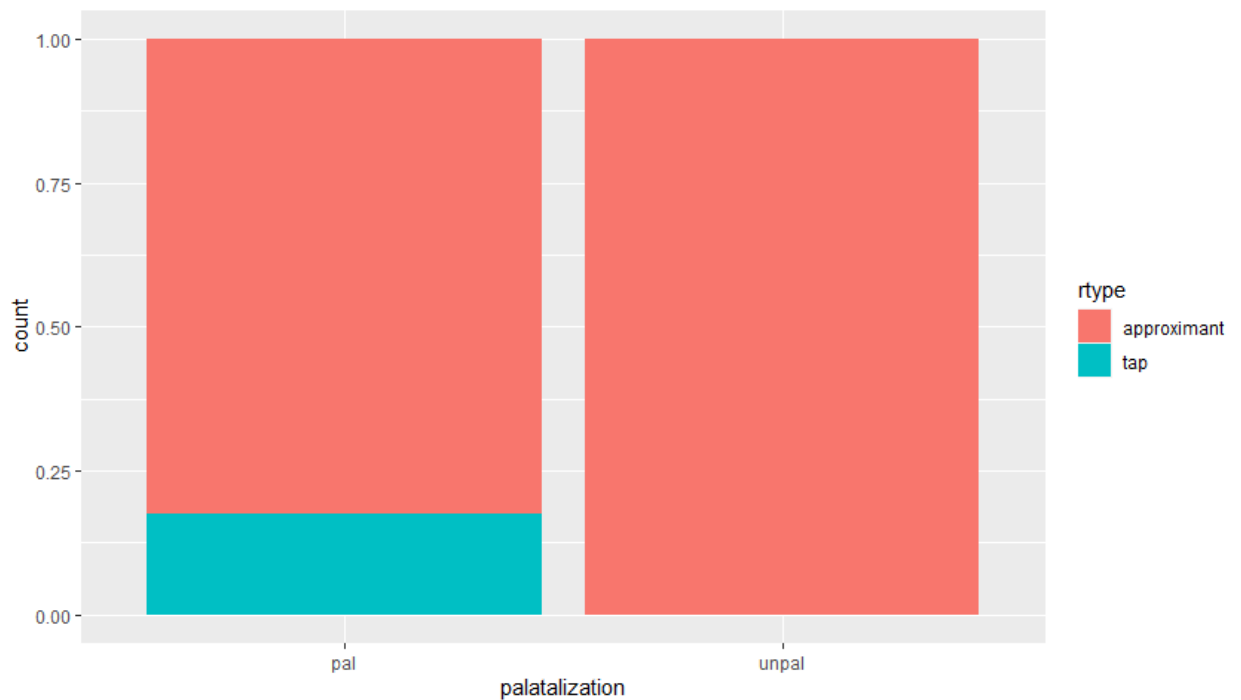


Figure 21: the percentage of rhotic realization type by participant ML2 for canonically palatalized and unpalatalized tokens

The following graph shows the mean duration of rhotics articulated as approximants by ML2, which are categorized as being palatalized or unpalatalized.

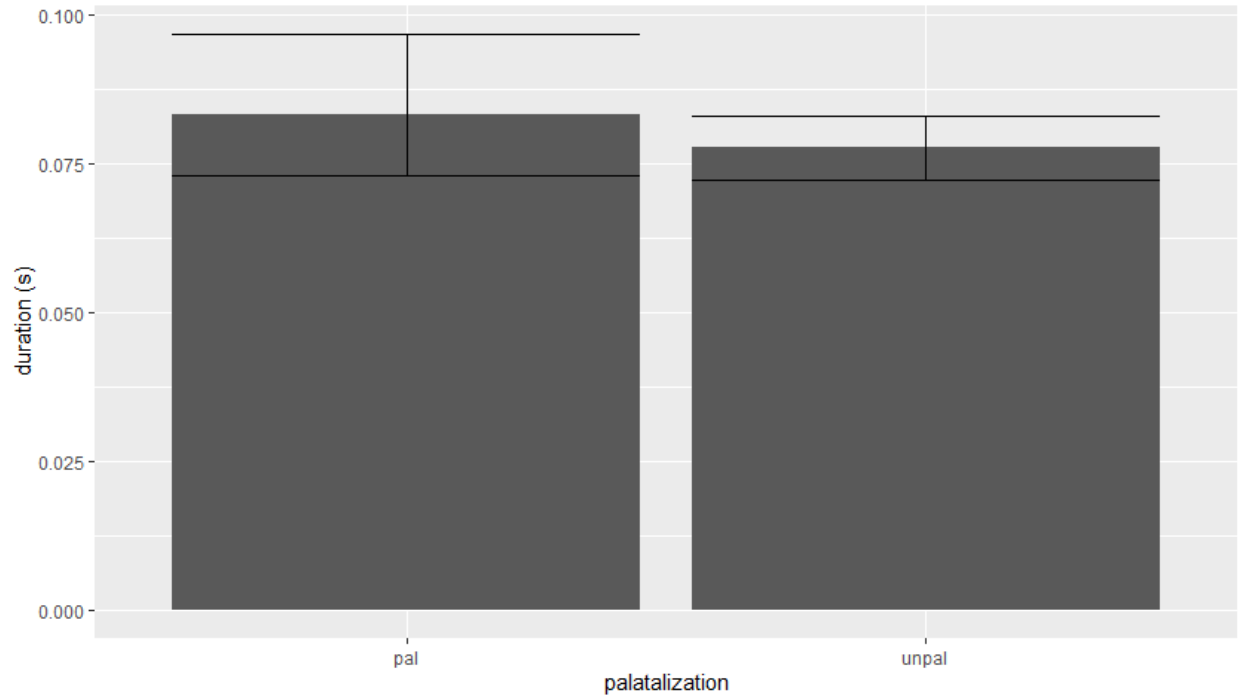


Figure 22: the duration (s) of rhotics articulated as approximants by participant ML2 for canonically palatalized and unpalatalized tokens

The following graph illustrates the mean F3 value of rhotics articulated as approximants by ML2 as categorized by their being palatalized or unpalatalized.

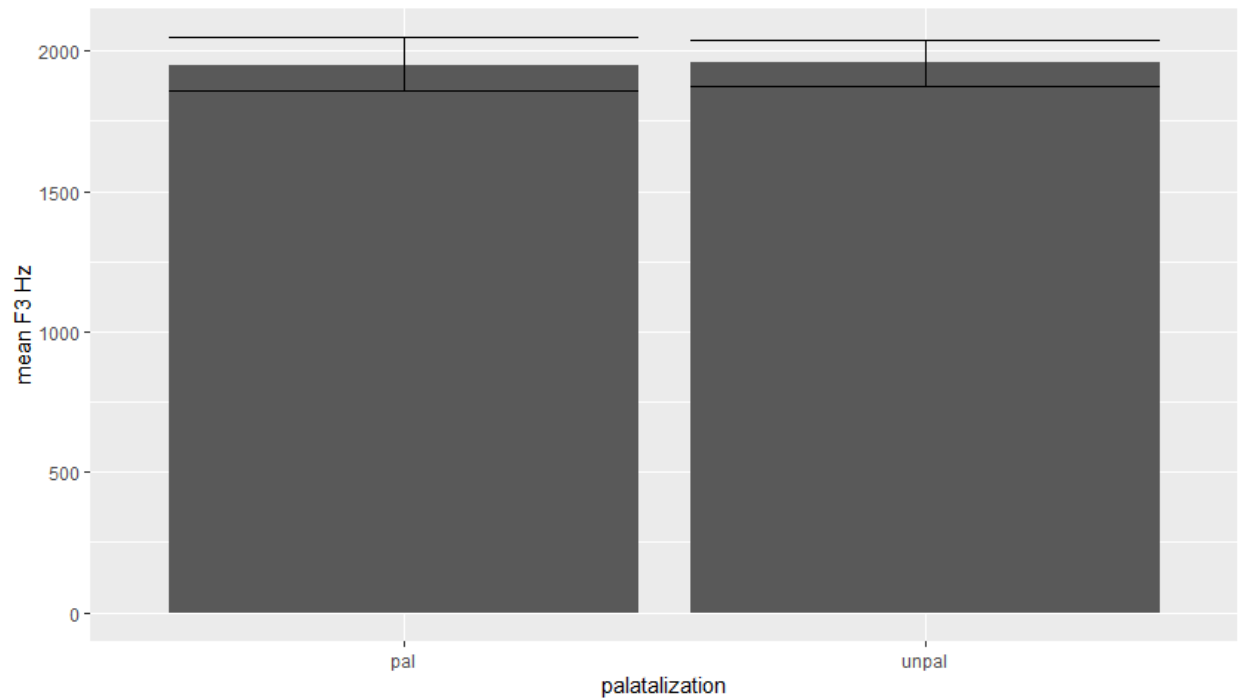


Figure 23: the mean F3 (Hz) of rhotics articulated as approximants by participant ML2 for canonically palatalized and unpalatalized tokens

Speaker ML2 produced two of the four categories of rhotics: approximants and taps, and in differing proportions depending on whether the consonant was canonically palatalized or unpalatalized. For both unpalatalized and palatalized consonants, the dominant manner of articulation of the rhotic was as an approximant. ML2 produced exclusively approximants for unpalatalized tokens. However, for palatalized consonants, FL2 produced mostly approximants with taps articulated in around 15% of tokens. Of the rhotics which ML2 articulated as approximants, there was no significant difference in mean F3 or duration between canonically palatalized and unpalatalized consonants. The duration of palatalized approximants was longer than those which were unpalatalized, while the mean F3 values were effectively identical.

The following graph displays the proportion of each rhotic type articulated for each kind of consonant by a single high-level L2 speaker: ML3.

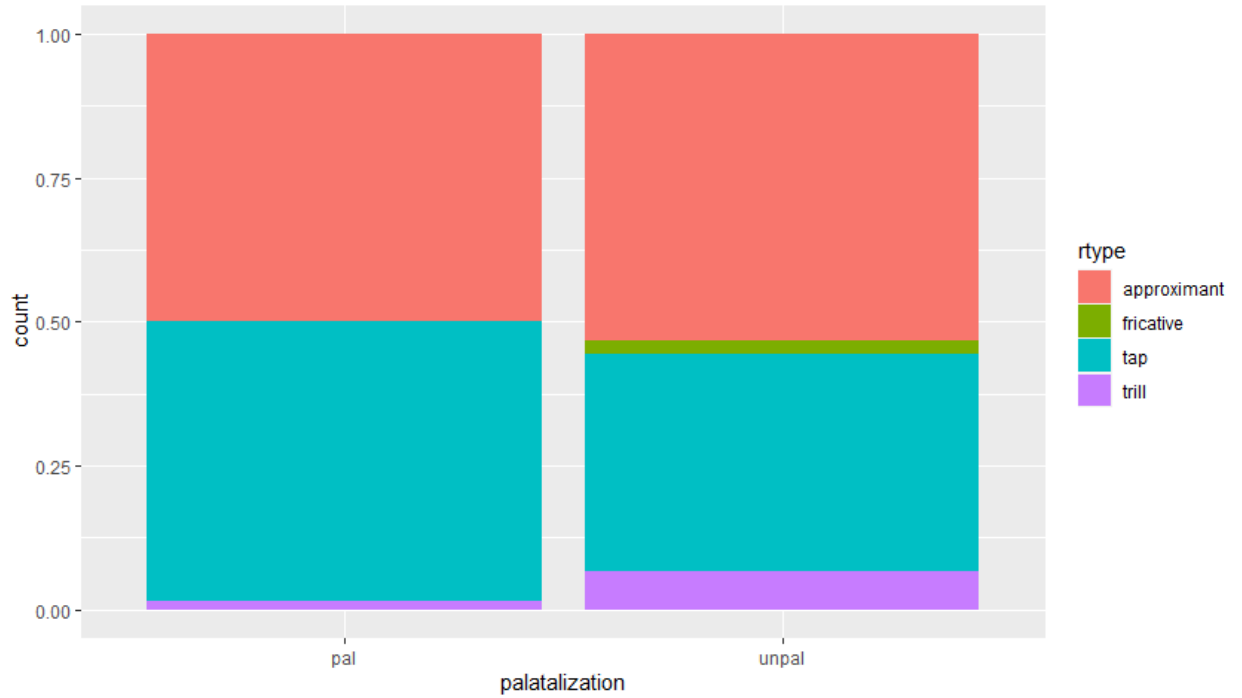


Figure 24: the percentage of rhotic realization type by participant ML3 for canonically palatalized and unpalatalized tokens

The following graph shows the mean duration of rhotics articulated as approximants by ML3, which are categorized as being palatalized or unpalatalized.

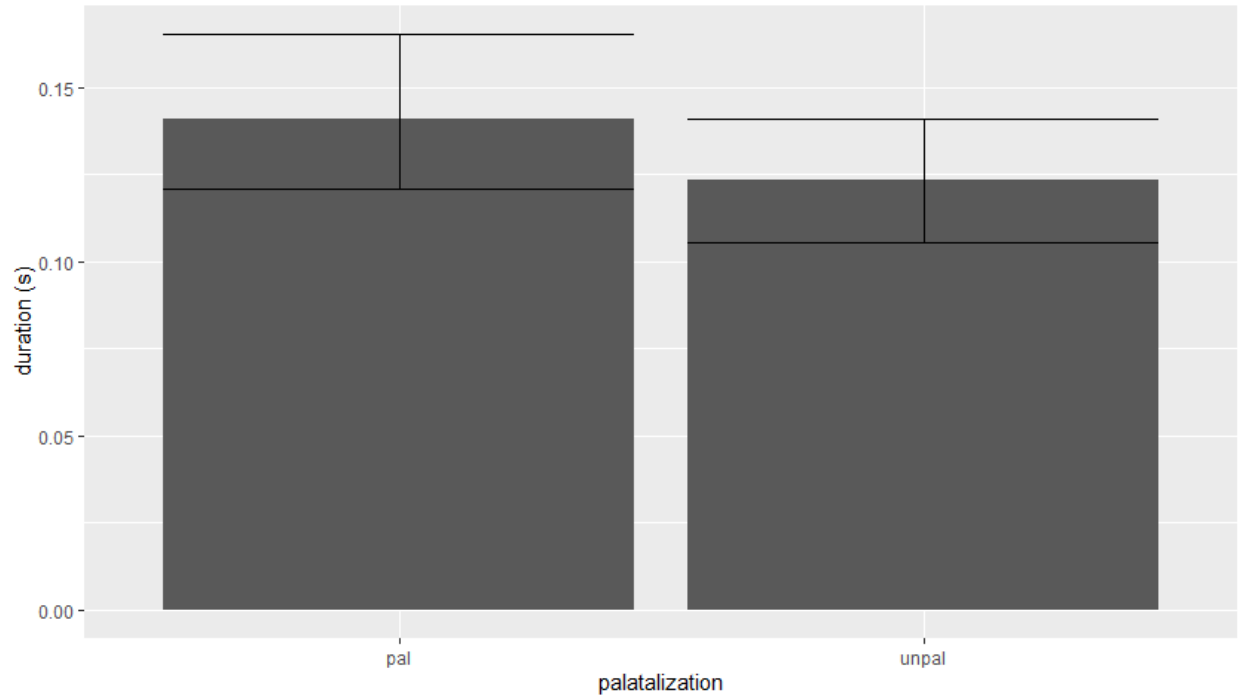


Figure 25: the duration (s) of rhotics articulated as approximants by participant ML3 for canonically palatalized and unpalatalized tokens

The following graph illustrates the mean F3 value of rhotics articulated as approximants by ML3 as categorized by their being palatalized or unpalatalized.

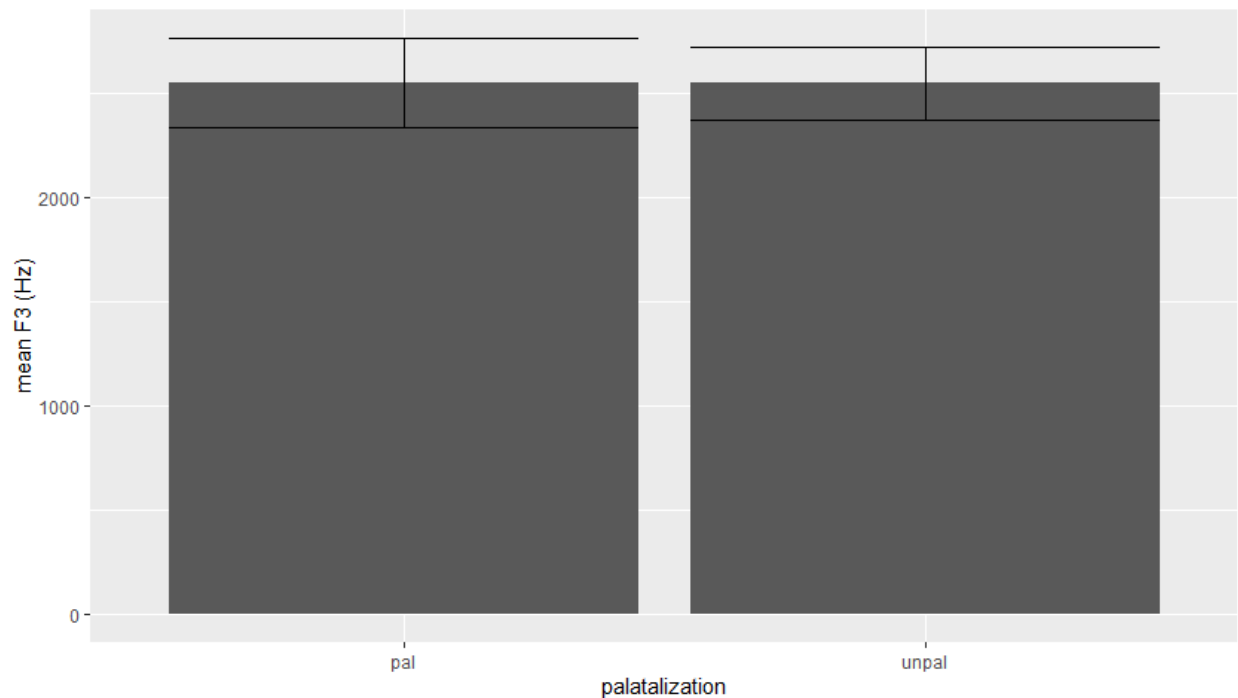


Figure 26: the mean F3 (Hz) of rhotics articulated as approximants by participant ML3 for canonically palatalized and unpalatalized tokens

Speaker ML3 was the only participant that produced all four of the categories of rhotics: approximants, taps, trills, and fricatives, albeit in differing proportions depending on whether the consonant was canonically palatalized or unpalatalized. For both unpalatalized and palatalized consonants, ML3 produced approximants in around 50% of tokens. For palatalized rhotics, ML3 articulated taps in almost all the other tokens, with trills occurring exceptionally rarely. There was more variation in unpalatalized rhotics, where ML3 still produced taps in the plurality of remaining tokens, albeit with trills making up a greater proportion, in addition to some fricatives. Of the rhotics which ML3 articulated as approximants, there was no significant difference in mean F3 or duration between canonically palatalized and unpalatalized consonants. Palatalized approximants were somewhat longer than those which were unpalatalized, while the mean F3 values were roughly identical.

The following graph displays the proportion of each rhotic type articulated for each kind of consonant by a single high-level L2 speaker: FL1.

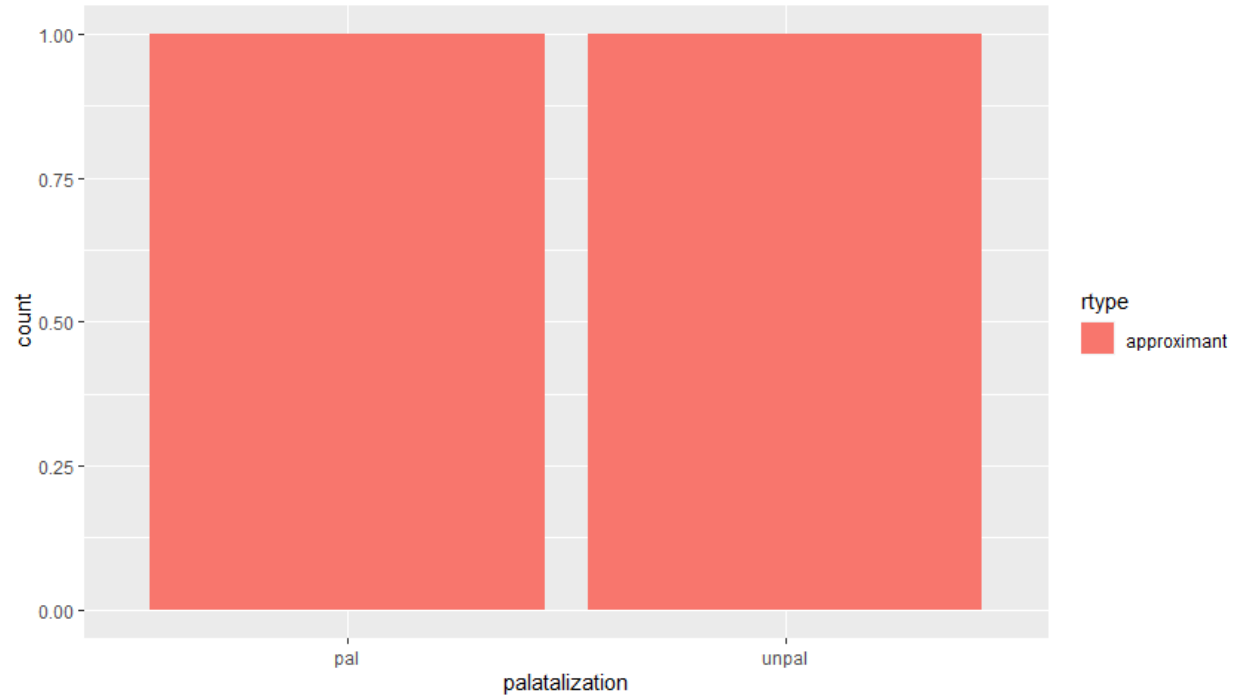


Figure 27: the percentage of rhotic realization type by participant FL1 for canonically palatalized and unpalatalized tokens

The following graph shows the mean duration of rhotics articulated as approximants by FL1, which are categorized as being palatalized or unpalatalized.

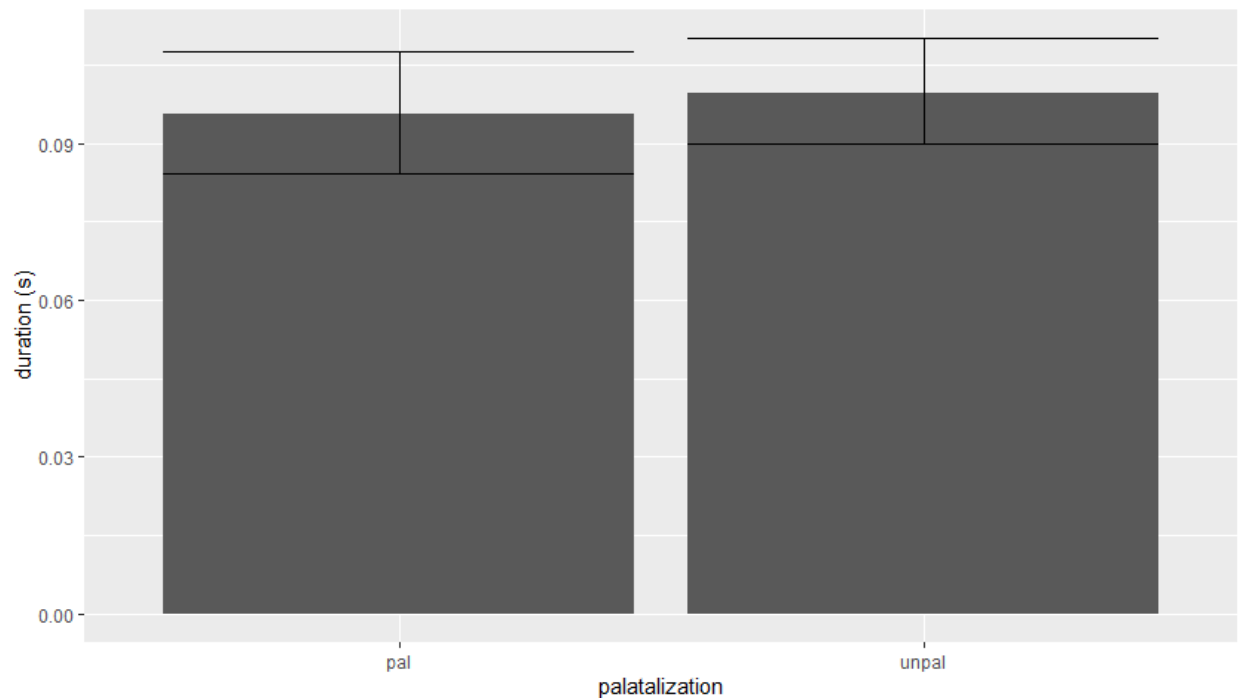


Figure 28: the duration (s) of rhotics articulated by participant FL1 for canonically palatalized and unpalatalized tokens

The following graph illustrates the mean F3 value of rhotics articulated as approximants by FL1 as categorized by their being palatalized or unpalatalized.

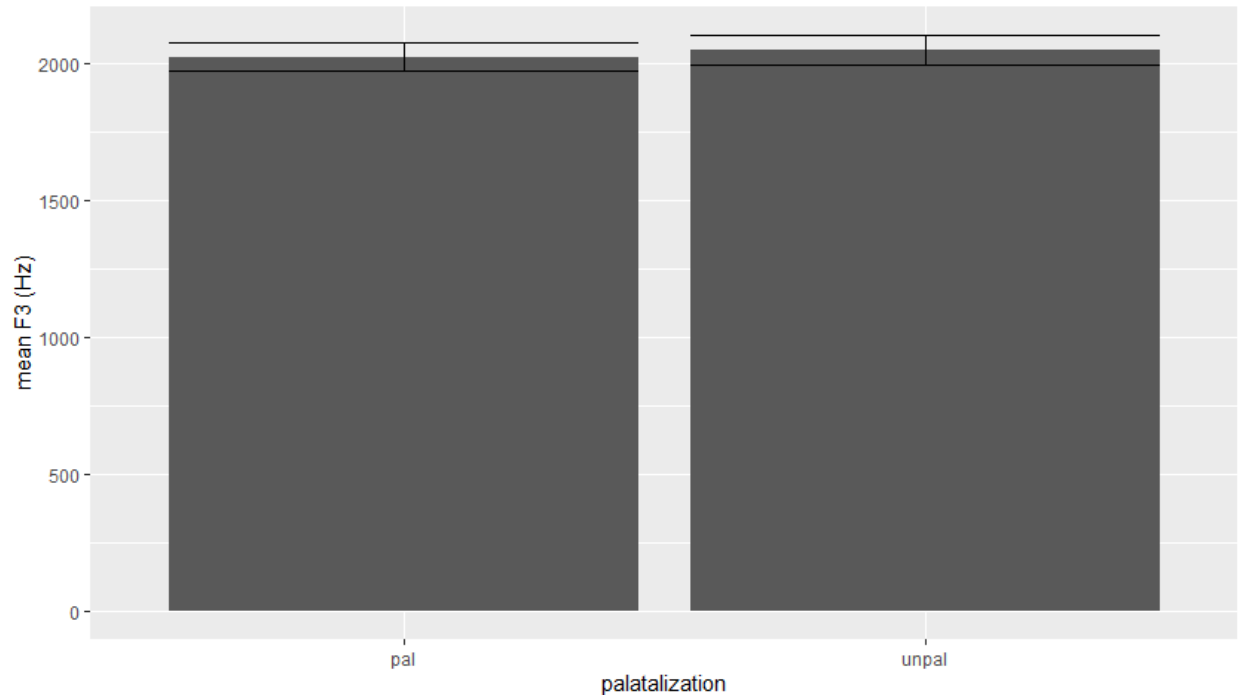


Figure 27: the mean F3 (Hz) value of rhotics articulated by participant FL1 for canonically palatalized and unpalatalized tokens

Speaker FL1 produced exclusively one type of rhotic: the approximant. She articulated the approximant in all cases and in all environments, regardless of whether they were palatalized or unpalatalized. There was no significant difference in duration of the rhotics articulated, as well as the mean F3 in palatalized or unpalatalized environments.

The following graph displays the proportion of each rhotic type articulated for each kind of consonant by a single high-level L2 speaker: FL2.

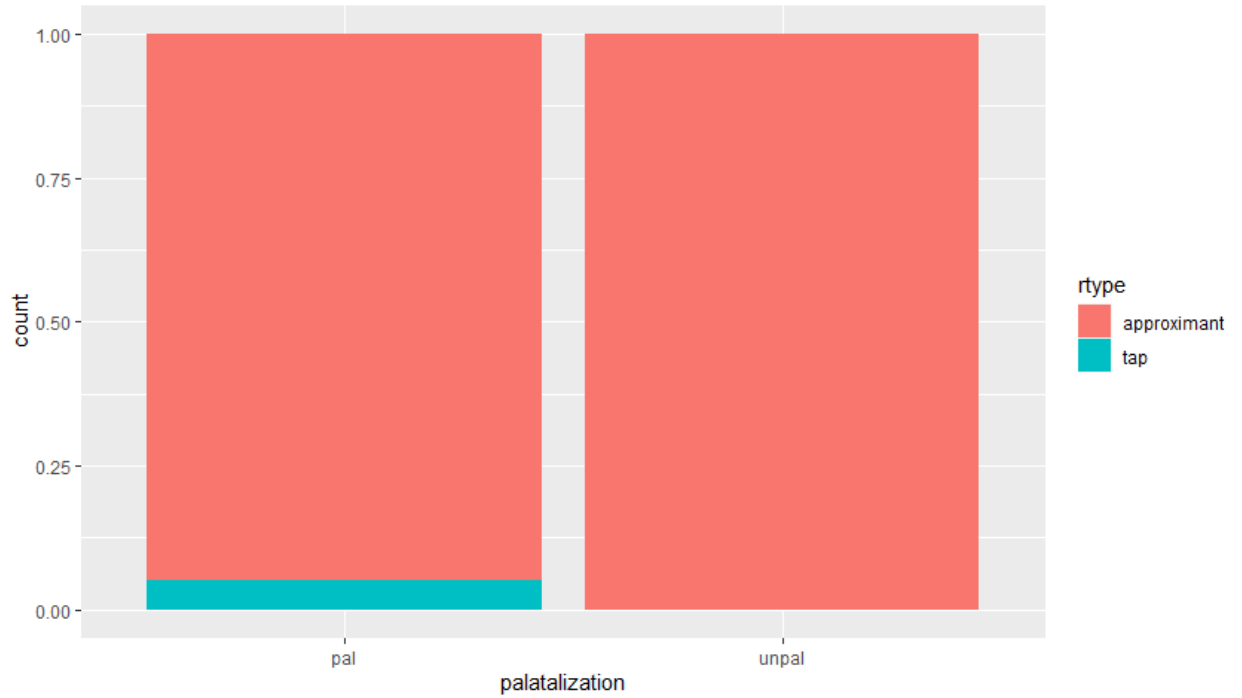


Figure 28: the percentage of rhotic realization type by participant FL2 for canonically palatalized and unpalatalized tokens

The following graph shows the mean duration of rhotics articulated as approximants by FL2, which are categorized as being palatalized or unpalatalized.

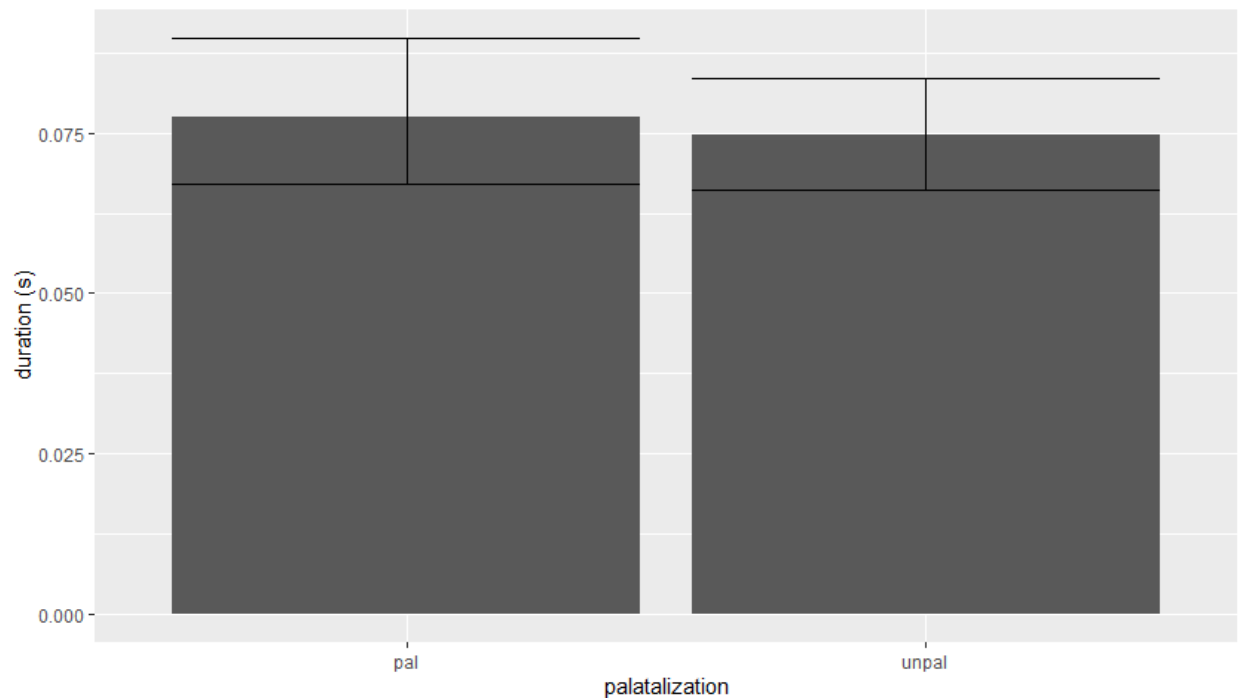


Figure 29: the duration (s) of rhotics articulated as approximants by participant FL2 for canonically palatalized and unpalatalized tokens

The following graph illustrates the mean F3 value of rhotics articulated as approximants by FL2 as categorized by their being palatalized or unpalatalized.

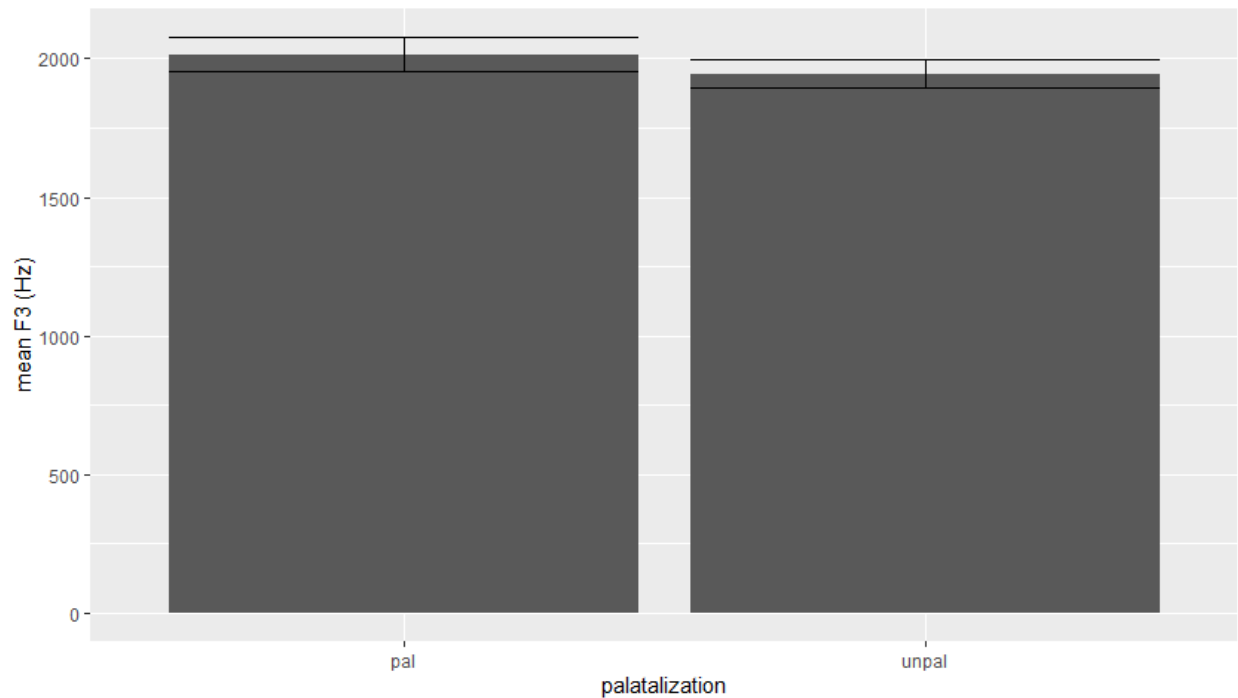


Figure 30: the mean F3 (Hz) of rhotics articulated as approximants by participant FL2 for canonically palatalized and unpalatalized tokens

Speaker FL2 produced two of the four categories of rhotics: approximants and taps, and in differing proportions depending on whether the consonant was canonically palatalized or unpalatalized. For both unpalatalized and palatalized consonants, the dominant manner of articulation of the rhotic was as an approximant. FL2 produced exclusively approximants for unpalatalized tokens. However, for palatalized consonants, FL2 produced almost entirely approximants with taps articulated in around 5% of cases. Of the rhotics where FL2 articulated as approximants, there was no significant difference in mean F3 or duration between canonically

palatalized and unpalatalized consonants. Palatalized approximants were slightly longer and the mean F3 value was at a slightly higher frequency than those which were unpalatalized.

The following graph displays the proportion of each rhotic type articulated for each kind of consonant by a single high-level L2 speaker: FL4.

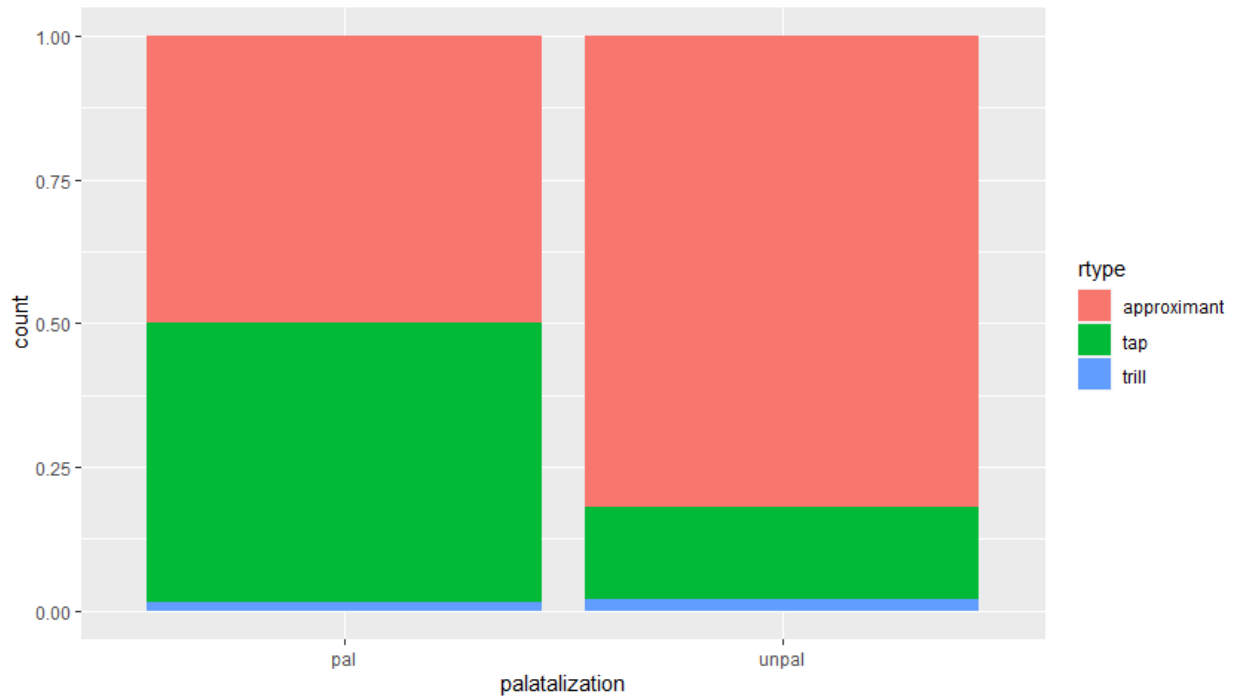


Figure 31: the percentage of rhotic realization type by participant FL4 for canonically palatalized and unpalatalized tokens

The following graph shows the mean duration of rhotics articulated as approximants by FL4, which are categorized as being palatalized or unpalatalized.

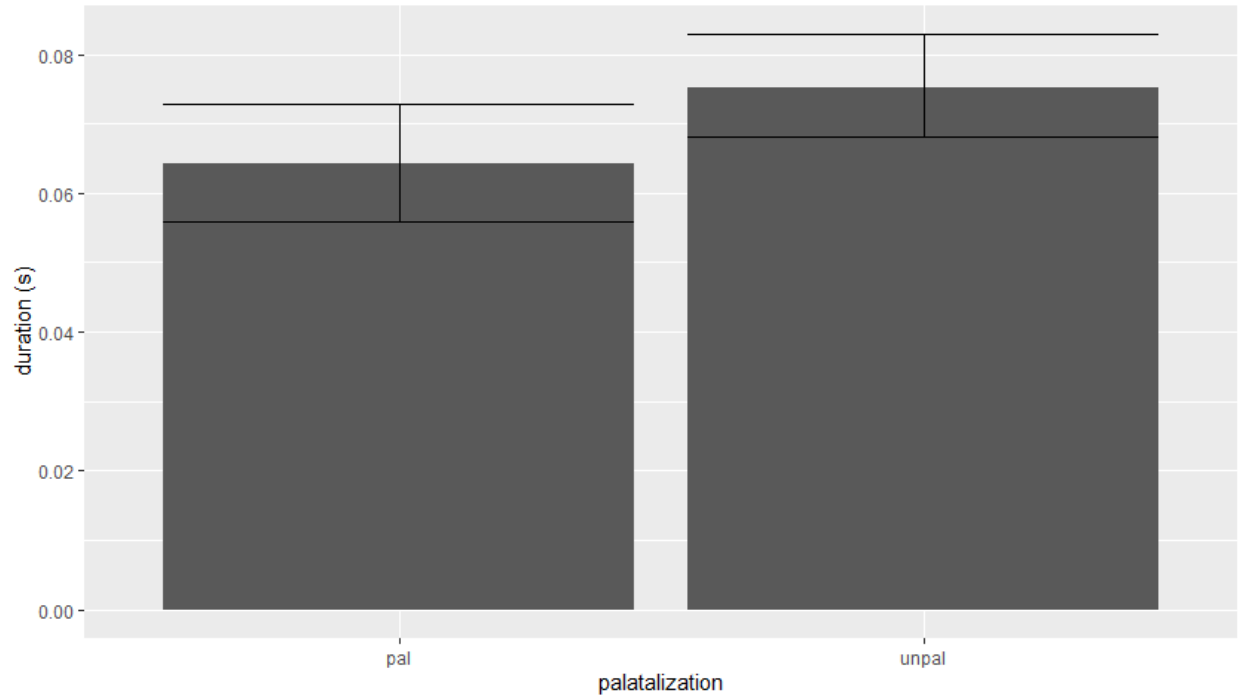


Figure 32: the duration (s) of rhotics articulated as approximants by participant FL4 for canonically palatalized and unpalatalized tokens

The following graph illustrates the mean F3 value of rhotics articulated as approximants by FL4 as categorized by their being palatalized or unpalatalized.

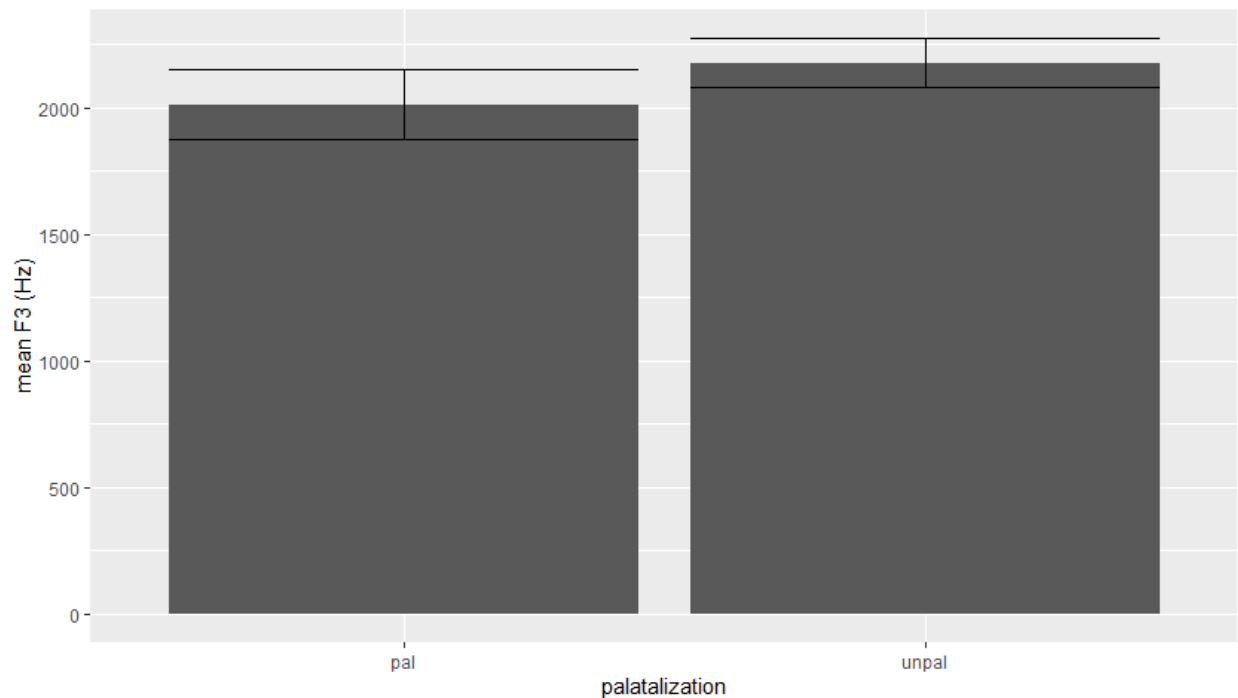


Figure 33: the mean F3 (Hz) of rhotics articulated as approximants by participant FL4 for canonically palatalized and unpalatalized tokens

Speaker FL4 produced three of the four categories of rhotics: approximants, taps, and trills, and in differing proportions depending on whether the consonant was canonically palatalized or unpalatalized. For unpalatalized consonants, FL4 produced approximants in around 80% of tokens, with mostly taps and occasionally trills accounting for the rest of tokens. For palatalized consonants, FL4 produced approximants in half of all tokens. The participant then articulated taps in almost all of the remaining half of tokens, with trills accounting for a small number that is roughly equivalent to the number produced for canonically unpalatalized rhotics. Of the rhotics where FL4 articulated as approximants, there was no significant difference in mean F3 or duration between canonically palatalized and unpalatalized consonants. Unpalatalized approximants were slightly longer and the mean F3 value was at a slightly higher frequency than those which were palatalized.

4.3. Phonological Environments

This subsection outlines the results from the experiment as they pertain to articulation of rhotic type and the phonological environment of the target rhotic. I begin first with looking at the rhotic type in the different phonological environments controlled by canonical palatalization, and then at the same data but controlled for speaker background. The following graph looks at the proportion of rhotic type articulated in complex and simple consonant constructions in palatalized and unpalatalized forms.

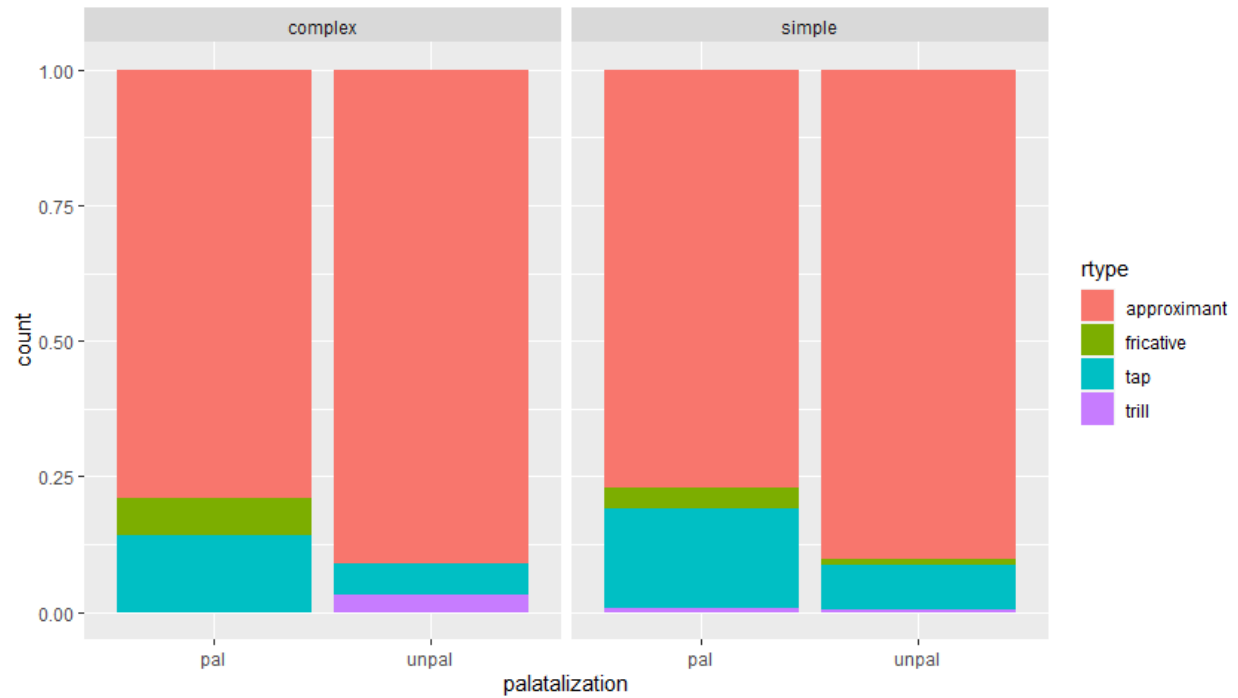


Figure 34: the percentage of rhotic types used by all speakers in simple and complex consonant clusters in palatalized and unpalatalized positions.

The following graph displays the proportion of rhotic type articulated in coda and onset syllable positions, controlling for palatalization.

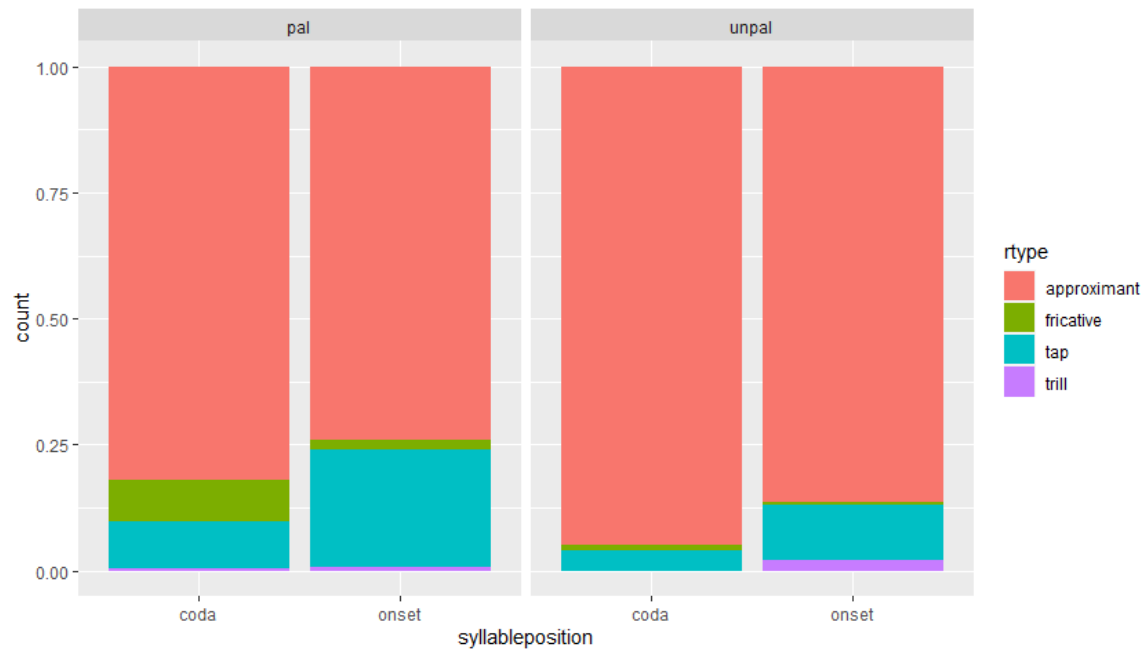


Figure 35: the percentage of rhotic types used by all speakers in coda and onset syllable positions in canonically palatalized and unpalatalized forms.

The participants in this experiment produced different proportions of each rhotic type depending on their syllable position and whether they were a part of a consonant cluster and, depending on whether these tokens were canonically palatalized or unpalatalized. In complex consonant clusters, speakers produced approximants in at least 80% of cases for both palatalized or unpalatalized rhotics, although closer to 90% of unpalatalized rhotics in complex clusters were articulated as approximants. In simple consonant constructions, the proportions were similar for palatalized and unpalatalized rhotics. The main salient differences were the greater proportion of fricatives articulated in palatalized complex constructions and trills in unpalatalized complex constructions. Among all syllable positions, regardless of whether they are canonically palatalized or not, the approximant was the dominant articulation of the rhotic as well. Other rhotic types were more common in onset position than in coda position, with taps being the most common alternative realization across all positions. Fricatives made up a large proportion of those palatalized coda rhotics which were not approximants. As per figure 35, the proportion of approximants does appear to be smaller in onsets than in codas, meaning that non-approximants are slightly more common in onsets than in codas.

The following graph looks at the proportion of rhotic type articulated in complex and simple consonant constructions, controlling for speaker type.

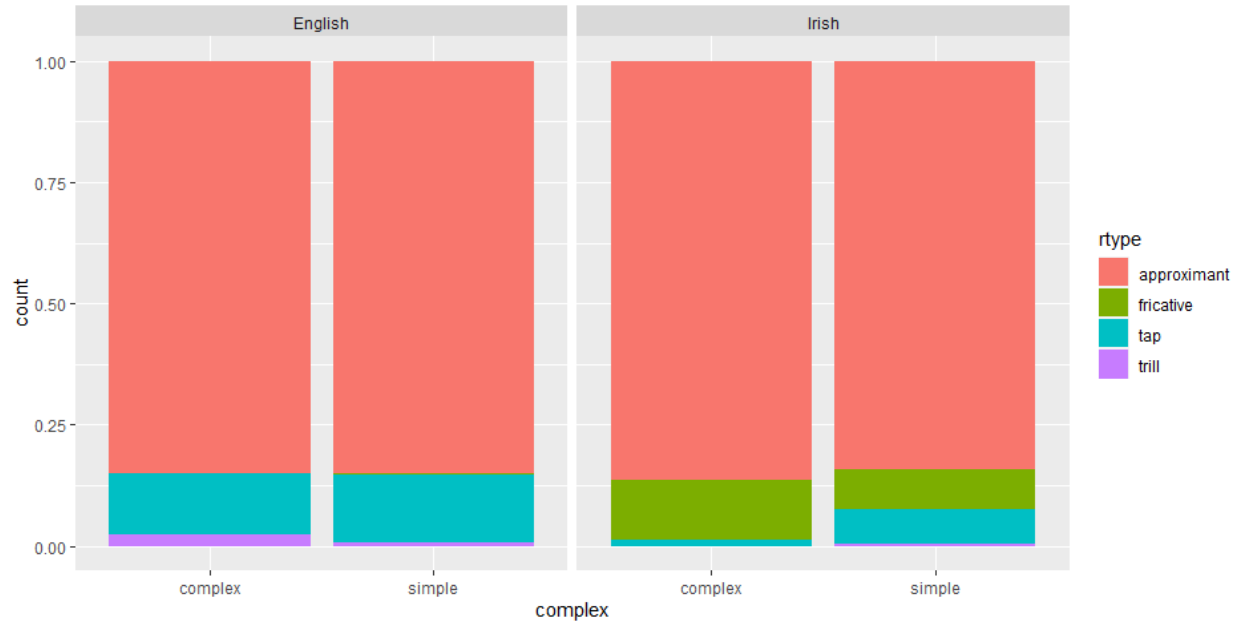


Figure 36: the percentage of rhotic types used by all speakers in simple and complex consonant clusters

The following graph displays the proportion of rhotic type articulated in coda and onset syllable positions by speaker background.

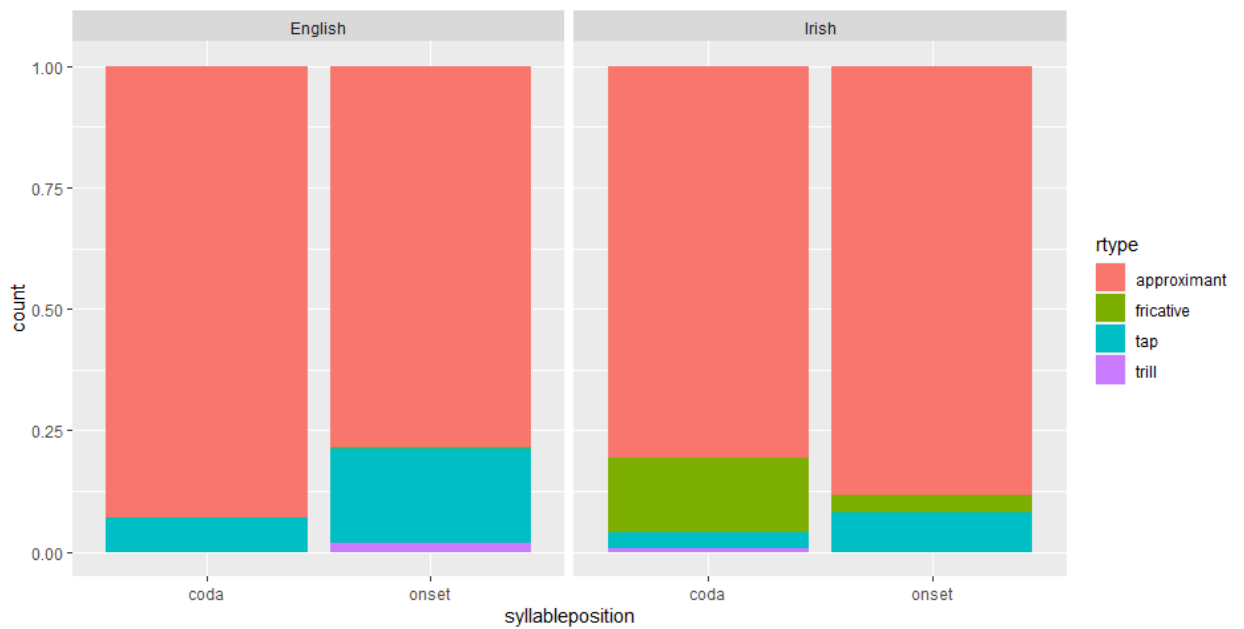


Figure 37: the percentage of rhotic types used by all speakers in coda and onset positions

Each speaker group produced different proportions of each rhotic type depending on their syllable position and construction. Both native speakers and high-level L2 users mostly produced the approximant in all consonant constructions, however high-level L2 users almost exclusively articulated taps in the remaining cases while native speakers produced nearly all rhotics in complex constructions as fricatives, and then a mixture of fricatives and taps in simple constructions. The two groups also generally produced approximants across coda and onset positions. As alternatives though, the high-level L2 users exclusively produced taps in coda position and mostly taps with rare trills in onset position, whereas the native speakers articulated mostly fricatives with some taps in coda position, and mostly taps with some fricatives in onset position.

5. Discussion

The results of this experiment were a mixture of surprises and otherwise. Regarding my primary hypothesis, it was borne out that the high-level L2 users made dominant (and in some cases exclusive) usage of the approximant [ɹ] as the rhotic across environments. This was most pronounced in the four high-level L2 users who had been born and raised in Ireland, and who had therefore received many years of instruction in the language. Contrasting with them were the two high-level L2 users who had been raised in North America, and had learned Irish through self-study, which included occasional immersion-style educational trips to a *Gaeltacht*. These two users made the most substantial usage of the tap [ɾ], with ML3 also being the only participant to use all four categories of rhotics. I theorize that this discrepancy is due to the fact that in self-study material, learners are often taught the most conservative forms of speech, with the tap realization of the rhotic included. The high-level L2 users who were from Ireland on the other hand would have been exposed to more contemporary norms of speech in the language,

which would have included the approximant [ɹ]. While this aspect of my hypothesis was true, I did not find that my native-speakers participants preserved the tap in most cases. Instead, both speakers preferred the approximant, and while MN1 still used the tap substantially, FN1 hardly used it at all.

In controlling for palatalization, I found that for most of my participants there was a distinction made in their choice of rhotic. For each speaker that used more than one category of rhotic, the tap [ɹ] was either used more frequently, or was first realized in canonically palatalized positions. As the palatalized form is considered the more marked phoneme, it would therefore be expected that in an ongoing sound-change such as this that the most marked phoneme (in this case /ɹʲ/) might be preserved for longer.

The other element of my primary hypothesis related to the preservation of the palatalized/unpalatalized distinction. As the approximant was by far the dominant rhotic utilized by all speakers, I was interested as to whether Ó Sé (2000) and Nikolaev & Kukhto (2016) were on the right track, and that a palatalization distinction might be preserved even with the approximant. To this end, I focused on three acoustic cues: mean F3, F1 and duration. An increase in the F3 value, along with a decrease in F1, has been pointed to as a defining feature of palatalization in Irish (Ní Chiosáin & Padgett 2012.) Duration on the other hand, is often referenced as distinctive in languages with contrastive palatalization (Kochetov 2006; Ordin 2010; Malmi *et al.* 2022.) The approximants produced by all high-level L2 users were similar in canonically palatalized and unpalatalized positions, with no statistically significant difference in mean F3 or duration, with no identifiable F1 drop. It is noteworthy that MN1's approximants did not conform to this pattern, and as a result his data skewed the native speakers as whole, marking a clear contrast with the high-level L2 users in mean F3 and F1 values. According to the

sociolinguistic questionnaire, his background would point to his having the most conservative speech patterns (*Gaeltacht* origins, all schooling done through Irish, still living in a *Gaeltacht*, etc.) Further work with other native speakers would be required to draw a more concrete conclusion, as the approximants of the other native speaker (FN1) did not conform to this categorization. However, if the speech patterns of other native speakers conform to that of figure 10, then it would be indicative of a palatalized/non-palatalized contrast being maintained with the approximant [ɹ]

There does not appear to be any evidence that older speakers would be more conservative than younger speakers. This is most clear when it comes to the high-level L2 users who participated in this experiment, as their ages ranged from 25 to 69, as there was no identifiable difference in the rhotic type preference of older versus young participants. As both of the native speakers who participated were in their early forties, it would be a stretch to say that this would also be true for native speakers as well.

The data from all participants did not show a substantial difference in the articulation of the rhotic depending on its position within a word or syllable. As evident in Figures 34, there is no substantial difference in rhotic type whether it is part of a simple or complex coda/onset. However, as per figure 35, there is a trend present that non-approximants may be more common in onset position. The amalgamation of the data does wash out one salient divergence with MN1 again bucking the trend. It is clear that this speaker has a stronger preference for articulating primarily fricatives, when the rhotic is in coda position and is canonically palatalized. There is an established trend in many languages for rhotics to undergo a diachronic change where approximants become fricatives, and so this may also be happening in Irish in this environment (Schaarschmidt 1998; Howson 2018.) Although this is again but one speaker, the fact that he is a

native speaker with a more conservative background could point to such variation being more common.

Despite its limitations, the results of this experiment are valuable both as a basis for further research into Irish phonetics and rhotics specifically, and for those currently working in those areas. While further investigation is required to confirm these findings, it is clear that the approximant [ɹ] is the dominant realization of the rhotic in Irish. Going forward, it should be recognized as such, and it should be considered that /ɾ/ has been replaced by /ɹ/ given the extent of preference for the approximant over the tap. It remains to be seen however, if contrastive palatalization should be considered for this phoneme, as there is both evidence and counterevidence present in these results.

While the design of the experiment was easy to build, the execution presented a couple of difficulties. Due to the ongoing COVID-19 global pandemic, and my location based at a university in Toronto, Canada, the recruitment of both native and high-level Irish speakers was not without its challenges. I was unable to travel to Ireland, and so any participants I recruited would need to be local or be able to participate by way of Irish speakers are numerically few outside of Ireland, but given the multicultural character of Toronto and my prior relationship with Irish cultural groups in the area this was made easier. I had originally set out to recruit at least five native speakers and five high-level L2 users, and although I was able to meet this quota of high-level L2 users, finding native speaker participants was substantially more challenging and time constraints forced me to stop at two.

An additional limitation was the technology available. As this was an unfunded study, I was limited to the acoustic recording equipment which was readily available to me. As my intent was to simply make the determination as to the broad category of rhotic being utilized, and

whether it was obviously palatalized or not, what I had at my disposal was more than sufficient. However, I think that an ultrasound study in the vein of Bennett *et al.* (2018.) would be worthwhile to confirm what the acoustic and perceptual cues had been pointing towards regarding the precise tongue movements of the speakers.

6. Conclusion

This paper has investigated the articulatory properties of rhotic consonants in contemporary Modern Irish, by putting a recent experiment in conversation with past scholarly inquiries into the nature of Irish rhotics and Irish phonetics as whole. Prior to the new millennium, earlier studies into Irish phonetics focused on native speakers in individual *Gaeltacht* dialect areas. At that point in time, and among those speakers, the Irish rhotic was most often realized as a tap /ɾ/ with contrastive palatalized and unpalatalized secondary articulatory properties. In recent decades, other investigations into Irish phonetics or phonology have made passing note of the emergence of the approximant [ɹ] as an allophone of /ɾ/. Given that there was seemingly no explanation, or deeper inquiry into this phenomenon, I conducted an experiment using native speakers and high-level L2 users to determine the full extent of this sound change. The results of this experiment point to a substantial shift, and one which is likely quite recent. The data points to [ɹ] as the most common realization of the Irish rhotic in both palatalized and unpalatalized environments, without any immediately evident secondary articulatory properties. /ɾ/ remains in use by some speakers, however it appears increasingly restricted to canonically palatalized positions, and may also be shifting towards a fricative articulation in coda environments. Further research into this phenomenon with more speakers and from other regions is necessary.

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Appendix A: Experimental word list (excluding distractors)

- *Raidió* – “radio”
- *Roicéad* – “rocket”
- *Rúnaí* – “secretary”
- *Reilig* – “graveyard”
- *Ríomhaire* – “computer”
- *Ribín* – “ribbon”
- *Leabhar* – “book”
- *Túr* – “tower”
- *Saor* – “free”
- *Béir* – “bears”
- *Cúntóir* – “assistant”
- *Leabhair* – “books”
- *Paróiste* – “parish”
- *Iora* – “squirrel”
- *Mórán* – “many/much”
- *Fireannach* – “male”
- *Áirithe* – “certain”
- *Sráid* – “street”
- *Gráin* – “disgust, hatred”
- *Bród* – “pride”
- *Mná** – “women”
- *Gréig* – “Greece”
- *Cré* – “soil, earth”
- *Prionsa* – “prince”
- *Bord* – “table”
- *Corp* – “body”
- *Cuairt* – “visit”
- *Páirc* – “park”
- *Nua-Eabhrac* – “New York”
- *Ocras* – “hunger”
- *Imreoir* – “player”
- *Oibrí* – “worker”
- *Gorta* – “hunger”
- *Iarthar* – “west”
- *Páirtí* – “party”
- *Léirmheas* – “review”

Appendix B: Short Passage

“Uair amháin, nuair a bhí mé sé bliana d’aois, chonaic mé pictiúr iontach i leabhar fán fhoraois chianaosta, darbh ainm Scéalta Fíora. Sa phictiúr, bhí nathair buachrapaire ag slogadh siar ainmhí. Seo cóip den phictiúr.

Dúradh sa leabhar: ‘Slogann na nathracha buachrapaire siar a seilg ina hiomláine, gan í a chogaint. Ina dhiaidh sin, ní bhíonn siad ábalta bogadh a thuilleadh agus codlaíonn siad ar feadh sé mhí, a fhad agus a bhíonn siad ag díleá an bhia.’

Chuir seo ag meabhrú go domhain mé faoi eachtraí na foraoise agus, le pionsail daite, d’éirigh liom sa deireadh mo chéad phictiúr a tharraingt. Mo Phictiúr Uimhir a hAon. Seo mar a tháinig sé amach:

Thaispeáin mé mo bharrshaotar do na daoine fásta agus chuir mé ceist orthu ar scanraigh mo phictiúr iad.

Is é freagra a thug siad orm: ‘Cad chuige a mbeadh eagla ar dhuine roimh phictiúr de hata?’”