Pronunciation among Adult Indigenous Language Learners: the case of SENĆOŦEN /t’/

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Abstract: This paper describes the features that set adult Indigenous language learning apart from other types second language learning, examining in particular the role that unique teaching and learning contexts might play in the acquisition of pronunciation. As a case study, the pronunciation of SENĆOŦEN (Coast Salish) /t’/ is compared across four groups of speakers, including two groups of adult learners. Acoustic analysis shows that /t’/, described as a weak ejective in previous work, is now consistently realized as a strong ejective, especially among learners and teachers. These findings are discussed with reference to factors relevant to language learning and teaching in general, as well as to ones relevant to Indigenous language learning and teaching in particular.

Keywords: Adult Indigenous Language Learning, SENĆOŦEN, ejectives, hyperarticulation, social identity, language revitalization.

1 Introduction

I read and write the language often, but speaking the language is the standard by which to measure language revitalization – PENÁĆ (2010, p. 32)

In many North American communities, the Indigenous Language Revitalization (ILR) movement is currently being carried by adult second language learners (Hinton, 2011; Morgan, 2017), who

are very much committed to pronouncing their language in a way that honours their elders’ ways of speaking (Bird & Kell, 2017). Although an emerging body of literature is focused on how best to support learners’ pronunciation-related efforts (Fitzgerald, 2017; Fitzgerald & Hinson, 2015; Herrick et al., 2015; Miyashita & Chatsis, 2013), very few studies have documented the phonetic details of learners’ pronunciations (in comparison to first language speakers). On a practical level, this lack of phonetic documentation makes it difficult to know what the specific challenges are for learners of a given language, and therefore how to help them overcome these challenges. On a more theoretical level, it is difficult to make claims about what factors might affect Indigenous language learners’ pronunciation, and to what extent these factors are specific to the ILR context or common to all language learning situations. Given the overwhelming focus on English in the second language (L2) pronunciation literature (Lee, Jang, & Plonsky, 2015), examining pronunciation in an entirely different context will thus undoubtedly shed important light on L2 pronunciation as a whole.

This paper focuses in particular on the SENĆOŦEN (Coast Salish) language learning context. The first part of the paper (Section 2) introduces this context (2.1) and what factors might be affecting SENĆOŦEN leaners’ pronunciation (2.2). The second part of the paper (Sections 3 and 4) considers how these factors play out in the realization of one particular phoneme, /t’/. The paper concludes (Section 5) with a call to action for continuing to build the body of literature on pronunciation in the context of ILR, which has important theoretical implications in terms of our understanding of second language pronunciation as a whole, as well as practical implications in terms of developing the best possible approaches to teaching and learning pronunciation in the context of ILR.

2 Pronunciation in ILR: SENĆOŦEN

2.1 SENĆOŦEN and Indigenous Language Learning

SENĆOŦEN[i] (Central Salish) is the language of the W̱SÁNEĆ people, whose traditional territory includes the Saanich Peninsula on the southern tip of Vancouver Island (BC, Canada) and parts of the adjacent Gulf (BC) and San Juan (Washington State, USA) Islands, as well as the Point Roberts area (USA) across the Salish Sea (Elliott, 1990; PENÁĆ, 2017). Although there are very few first language (L1) speaking elders (Dunlop, Gessner, Herbert, & Parker, 2018, p. 47), there is a vibrant language revitalization movement underway in the community, including a language nest (ages 3-5), an immersion school (up to Grade 6 in 2019-20), community language classes, post-secondary programs offered in partnership with the University of Victoria (Diploma, Bachelor of Education, and Masters in Indigenous Language Revitalization), and proficiency-building support for young adults studying and working in the area of language revitalization, adapted from Hinton’s (2002) mentor-apprentice model[ii]. The number of language learners of all ages is thus rapidly increasing. In addition, some of the young adults working in the immersion programs are raising their children in SENĆOŦEN.

An important feature of the SENĆOŦEN language context, highly relevant for the study of L2 pronunciation in this context, is that adult L2 learners are now primarily responsible for passing down their language to future generations: they hold positions of authority in language matters, they support and teach in language programs, and they are raising bilingual children (see Hinton (2011)). These L2 learners take very seriously their responsibility to become as proficient as possible in the language[iii]. In his auto-ethnographic reflection on his own language learning process, SENĆOŦEN scholar PENÁĆ (2017, p. 60) notes:

> "In the course of learning from our elders, I have always wanted to honour them. I cherished them and hoped to see them smile, knowing they were assured that we were carrying the language forward and that the language was going to be safe with us."

This will likely turn out to be a period of rapid change for SENĆOŦEN, and the speech community as a whole understands that if the language is to live, it must be allowed to evolve. Nonetheless, PENÁĆ's words reflect the deep commitment that learners feel to stay true to their elders' way of speaking.

The SENĆOŦEN context is representative of many Indigenous language contexts in North America, which differ in consistent ways from broader L2 learning contexts with respect to pronunciation (Hinton, 2011; Morgan, 2017). Three differences of note, based in part on Thomson & Derwing (2015), are 1) learners are often highly motivated to achieve more than intelligibility and comprehensibility in their speech (c.f. Derwing & Munro, 2009), aiming for pronunciation that honours their elders' way of speaking (Speas, 2009). This is quite different from the English as a Second Language (ESL) context, for example, where learners may specifically *not* be aiming for native-speaker like pronunciation, instead using their L2 pronunciation as a way of indexing their L1 cultural and social affiliation (Nance, McLeod, O'Rourke, & Dunmore, 2016); 2) A major challenge to achieving high levels of proficiency is that most BC Indigenous languages currently have very few L1 speakers, and there are therefore limited opportunities for L2 learners to engage in communicative interactions with L1 speakers; 3) On the other hand, learners generally share their L1 - English, which means that recognizing and addressing pronunciation challenges can be easier than in a typical ESL classroom, for

example, in which learners often have very different linguistic backgrounds from one another and consequently different difficulties to overcome.

An additional challenge for teachers and learners of North American Indigenous languages is paucity of materials: very few resources exist to support learners in their pronunciation work (Hinton, 2011; Morgan, 2017). Cree scholar McIvor (2015) points out that “… many of our people struggle with accessing successful, research-based, meaningful, and useful learning experiences as adult learners in order to become proficient speakers of our languages. The rise of, and need for, effective Indigenous adult language learning approaches is a relatively new societal phenomenon” (p. 38). In terms of pronunciation specifically, phonetic documentation is not available for most Indigenous languages of North America (c.f. McDonough & Whalen, 2008), and if it is, it is generally not accessible to community members (c.f. Gerdts, 2010), including language teachers.

On a broader level, Indigenous language learning differs from other L2 learning in how deeply connected learners are to the language they are learning (Hinton, 2011; King, 2009; Morgan, 2017). They are not simply acquiring another language for reasons related to work or leisure; they are acquiring their ancestral language as a way of connecting with their roots and understanding their identity (on a personal level) and keeping their traditions and culture alive (on a societal level). McIvor (2015) talks about Indigenous language learning “to fulfill a cultural identity emptiness that exists due to a history of dislocation from land, family, or community” (p. 589). Recent research has underscored how important language and culture are to health and wellness in Indigenous communities (e.g. Oster, Grier, Lightning, Mayan, & Toth, 2014). Indeed, learning one’s Indigenous language serves as a protective factor against a wide range of health risks: diabetes, obesity, smoking, substance misuse, cancer rates, to name a few (McIvor,

Napoleon, & Dickie, 2009). Various terms have been used to formalize the uniqueness of Indigenous language learning, e.g. *Adult Indigenous Language Learning* (McIvor, 2015) and *Indigenous Second Language Acquisition* (Ratima & May, 2011). In keeping with such terminology, in the paragraphs below, I distinguish between general second language (L2) learning/learners and Indigenous second language (IL2) learning/learners.

2.2 Pronunciation in Indigenous language contexts

One might expect that SENĆOŦEN pronunciation would be shifting towards English, as the dominant language in the area and the one spoken by learners as their L1. On an individual level, L1 transfer effects on L2 are well documented (e.g. Flege, Schirru, & MacKay, 2003). On the perception side, Werker and Tees (1984) show, for example, that adult English listeners cannot reliably hear the contrast between Nlaka’pamux (Thompson, Interior Salish) velar and uvular stops. They attribute this finding to the fact that English does not have a velar~uvular contrast; therefore all ‘back’ stops are categorized by listeners as /k/[iv]. Similarly, on the production side, research shows that adult L2 learners are unlikely to ever achieve native-like pronunciation (e.g. Flege et al., 2003), because of the influence of their L1 (Flege, 2003; Iverson et al., 2003).

On a societal level, there is also good evidence for language shift in situations where a (small) minority language is surrounded by a (large) majority language. For example, Maclagan and King (2007) show that aspiration in Māori plosives has shifted over the course of the last 100 years, with VOTs moving towards English values, and that Māori vowels (monophthongs in particular) are also shifting under the influence of English. Other researchers have found similar patterns in other minority/majority language contexts (Marti, Adreeva, & Barry, 2009; Nance & Stuart-Smith, 2013).

For both individual (L2 learning) and societal (language contact) reasons then, it seems likely that SENĆOŦEN would be shifting towards English in terms of pronunciation. Community members themselves have expressed the concern that SENĆOŦEN sounds are being replaced with more English-like sounds (Bird & Kell, 2017). Sounds that speakers are particularly concerned about include ejective consonants and what are commonly called the “K sounds”: velar and uvular stops /k q q’ k^w q^w k^w’ q^w’/ (See Section 3.1 below).

An important factor potentially mitigating against the influence of English on SENĆOŦEN is motivation among learners, as mentioned above. Krashen (1982) talks about the role of the “Affective Filter” in second language acquisition, noting that “performers with high motivation generally do better in second language acquisition” (p. 30). In the ILR context, Ratima & May (2011) list motivation as one of the ten most important factors in the successful acquisition of Māori. Closer to home, McIvor (2015) and PENÁĆ (2017) both emphasize the role of motivational factors in IL2 learning, in particular the dedication of learners to pronounce their ancestral language in a way that reflects and honours their elders’ way of speaking. Thus, although the broader literature reviewed above suggests that SENĆOŦEN pronunciation is likely to be shifting towards English, motivational factors may be strong enough to minimize at least some aspects of this shift.

A closely related factor which may mitigate against language shift is social identity: a number of studies have shown that language learners’ pronunciation is affected by how they identify themselves as L2 speakers (Gatbonton, Trofimovich, & Segalowitz, 2011; Nance, McLeod, O’Rourke & Dunmore, 2016; Rindal, 2010). For example, in a study on /ð/ pronunciation by Québecois L2 English speakers, Gatbonton et al. showed that /ð/ accuracy was inversely correlated with *Ethnic Group Affiliation*: “speakers who indicated stronger support for

the political aspirations of their group and great belief in the role language plays in group identity had significantly lower levels of overall English /ð/ accuracy” (p. 195). Gatbonton et al. do not explicitly address the question of whether /ð/ (mis)pronunciation is an intentional marker of participants’ social identity, but we know from other work (e.g. Nance et al., 2016) that L2 speakers do use L2 pronunciation to index their social and cultural affiliation. In Gatbonton et al.’s study, speakers who feel strongly connected to their Québecois identity likely maintained their non-native-like pronunciation of /ð/ as a way of expressing their Québecois identity while speaking English[v].

Much of the work on L2 pronunciation and identity (e.g. Gatbonton et al., 2011) focuses on L2 speakers maintaining their L1 identity through their L2 pronunciation. In the case of IL2 learners, their social identity is most often associated with their IL2 rather than with their L1. In this case, one would not expect that they would aim to maintain their L1 features in their IL2 speech; one would expect the exact opposite: that they would (over-) emphasize those features of their IL2 that distinguish it from their L1. In support of this idea, Bird, Gerdts, and Leonard (2016) note that Hul’q’umi’num’ (Central Salish) IL2 speakers sometimes replace /ts/ with /ts’/ and /θ/ with /ɬ/, and attribute these sound substitutions to speakers wanting to sound less English and more Hul’q’umi’num’. Indeed, [ts] and [θ] both exist in English, whereas [ts’] and [ɬ] do not.

Glottalization seems especially prone to over-emphasis as an identity marker. Babel (2009), citing Woolard (1989), discusses over-glottalization of consonants in Xinca (Central America) and talks about how the lack of glottalized consonants in Spanish has motivated the overgeneralization of this feature in Xinca (p. 363). Along the same lines, Haynes (2010) finds that Indigenous but non-Numu learners of Numu (Oregon Northern Paiute) tend to produce ejectives rather than plain stops, even if their own Indigenous language does not have ejectives.

She notes “it is likely that the sounds are used to create a perceptual distance from English, and possibly to index speakers’ identities as Native American” (p. 112).

A related factor is hyperarticulation in the second language teaching and learning context (Saito & van Poeteren, 2012; Uther, Knoll, & Burnham, 2006), targeting those speech sounds that are distinctively non-English. At the moment, interactions in languages like SENĆOŦEN very often occur in pedagogical settings. This can result in heightened awareness of speech sounds specific to Salish languages, particularly when linguists are part of the ILR team (c.f. Gerdts, 2010). Along-side this heightened awareness often comes hyperarticulation, as a way of increasing the salience of these non-English sounds for learners’ benefit.

In summary, while there are well documented reasons for SENĆOŦEN pronunciation to be shifting towards English among (adult) IL2 learners, there are also factors which may work against this potential shift. These competing factors are not unique to the SENĆOŦEN context; seeing how they play out SENĆOŦEN IL2 pronunciation will increase our understanding of IL2 pronunciation more generally, and the extent to which it may or may not reflect L2 pronunciation as a whole. The following section provides a case study, as a preliminary exploration of how these factors might interact in shaping pronunciation. The focus is on one particular phoneme, the alveolar ejective /t’/, among SENĆOŦEN adult IL2 learners. The question asked is, is /t’/ being pronounced as it has been in previous generations; is it showing signs of shifting *towards* an English-like, non-ejective stop, as one might expect given (a) its phonetic realization in previous times and (b) the literature on individual and societal pressures; or is it showing signs of shifting *away from* an English-like, non-ejective stop, as one might expect given factors related to motivation among IL2 learners and hyperarticulation in pedagogical settings?

3 IL2 pronunciation of SENĆOŦEN /t’/

The preliminary study reported here is part of a larger project exploring, on the one hand, pronunciation across a range of SENĆOŦEN speakers and, on the other, their attitudes towards pronunciation (Bird & Kell, 2017). The goal of the larger project is to ensure that we – linguists working on pronunciation – align our research with the priorities of our community-based partners, in terms of focusing resource development on those features of pronunciation that are of most concern to learners and speakers and, more generally, in terms of approaching pronunciation with careful consideration of how the speech community feels about the role of pronunciation in the context of language revitalization (see Czaykowska-Higgins (2009) on ethical practices in community-based work). As is discussed in more detail below, members of the SENĆOŦEN-speaking community have expressed concerns about the pronunciation of ejectives, in particular /p’/ and /t’/, leading to the questions explored in this study.

3.1 SENĆOŦEN /t’/ and the /t/ ~ /t’/ contrast

In terms of its sound structure, SENĆOŦEN is typical of Salish languages in exhibiting an extremely rich consonantal inventory, including many contrasts not found in English (see Table 1). Particularly relevant to this study, SENĆOŦEN contrasts plain and ejective stops.

Table 1: SENĆOŦEN consonants (phonemic representation)

	Labial	Dental	Alveolar	Lateral	Post-alveolar	Velar	Uvular	Glottal
Stops	p p’		t t’			(k) k^w k^w’	q q’ q^w q^w’	ʔ

Affricates		t͡θ’		t͡l’	t͡ʃ t͡ʃ’			
Fricatives		θ	s	ɬ	ʃ	x^w	χ $χ^w$	h
Nasals	m m’		n n’				ɴ ɴ’	
Resonants				l l’	j j’	w w’		

The target sound considered in this study is the alveolar ejective stop /t’/. This sound was selected because it is a particularly good candidate for teasing apart the conflicting factors discussed above, for reasons which are explained in the following paragraphs. Cross-linguistically, ejectives vary substantially in their phonetic realization, from tense (fortis, strong) “popping” sounds to lax (lenis, weak) creaky sounds (Ham, 2008; Kingston, 1985; Lindau, 1984; Warner, 1996; Wright, Hargus, & Davis, 2002). Typical acoustic features of tense ejectives are long Voice Onset Time (VOT), modal or tense voicing, raised fundamental frequency (F0; pitch) at the onset of the following vowel, and sudden increase in amplitude during the following vowel. Typical features of lax ejectives are short VOT, creaky voicing, lowered F0 at vowel onset, and gradual amplitude increase during the following vowel (Ham, 2008). Perceptually, tense ejectives are generally more salient than weak ejectives (Ham, 2008). In the paragraphs below, strong and weak realizations of the alveolar ejective /t’/ are transcribed [t’] and [t̰] respectively, [t] to indicate one and the same basic phoneme, [’] to indicate a strong release, and [˷] to indicate a weak (creaky) release.

Little phonetic documentation on Salish languages exists that might inform us on the range of ejective realizations across the language family. In Flemming, Ladefoged, and

Thomason’s (2008) acoustic study of the sounds of Montana Salish (Interior Salish), they describe the VOTs of ejectives as being “long-lag”, indicative of strong ejectives (p. 471). Percival’s (2019) work on ejectives in Hul’q’umi’num’ (closely related to SENĆOŦEN) indicate that they share some properties with strong ejectives (release duration and burst intensity) and others with weak ejectives (spectral tilt and pitch at vowel onset). Based on his auditory impressions working with fluent speakers in the 1970s and 1980s, Montler (1986, section 1.1.1) describes SENĆOŦEN ejectives as follows: “The glottalized obstruents are ejective but weakly so”. In my own work (as a trained phonetician) transcribing SENĆOŦEN stories told by L1 speaking elders in the 1980s and 1990s, I have also noticed (impressionistically) that, for those speakers, ejectives are generally quite weak, lacking a strong ‘pop’, and sounding somewhat creaky, in other words [t̰]. Interestingly, in Montler’s (2018) dictionary, he describes ejectives as “ejected out of the mouth with a strong pop” (p. xii), corresponding to [t’]. These discrepant descriptions at two distinct points in time, 32 years apart (1986-2018), are revisited in Section 4 below, where it will be claimed that Montler’s more recent description matches the current /t’/ realizations, as well as those reported in Bird (2016) for velar and uvular ejectives.

Although the focus of this study is on /t’/, to understand the effect of its potential phonetic shift on the phonemic system as a whole, it is necessary to also describe /t/. Montler (1986) describes plain stops as “usually lenis but never voiced” (Section 1.1.1). He adds that “It is often difficult, especially in the anterior consonants, to perceive the contrast [between plain and ejective stops]”. In other words, in the 1980s at least, /t/ was realized as a lenis voiceless stop [d̥], similar to English orthographic <d>, and /t/ and /t’/ (phonetically [d̥] and [t̰] respectively) were easily confusable (at least to non-speakers), presumably because of shared short VOTs and

possibly other acoustic features (no instrumental analysis has been conducted on these sounds in legacy recordings)[vi].

Table 2 compares the orthographic, phonemic, and phonetic representations of the alveolar stops in SENĆOŦEN (minority/L2 language) and English (majority/L1 language), as a starting point for considering potential phonetic and phonemic sound change related to /t’/ and the /t/ ~ /t’/ contrast. Note that SENĆOŦEN <T> and English <d> are very similar phonetically, both corresponding to a lenis voiceless stop [d̥].

Table 2: alveolar stops in SENĆOŦEN and English

Language	Orthographic transcription	Phonemic transcription	Phonetic transcription (initial, pre-tonic position)
SENĆOŦEN (Montler 1986)	<D>	/t’/	[t̪]
	<T>	/t/	[d̥]
English	<d>	/d/	[d̥]
	<t>	/t/	[t^h]

Members of the SENĆOŦEN-speaking community have expressed the concern that SENĆOŦEN orthographic conventions may be influencing adult learners in their pronunciation of ejective stops (Bird & Kell, 2017). Since adult SENĆOŦEN learners are all literate in English and are learning SENĆOŦEN in pedagogical settings alongside literacy, the concern is that they are associating the SENĆOŦEN letters <B> and <D> with the English letters <b> and <d>, and consequently with English-like voiceless unaspirated stops ([b̥] and [d̥]) rather than with

SENĆOŦEN ejective stops ([p̰] and [t̰]) (Bird & Kell, 2017). As shown in Table 2, [d̥] is also the phonetic realization of SENĆOŦEN /t/; thus, if learners are pronouncing /t’/ as [d̥] under the influence of English, they may also be merging /t/ and /t’/ in their realizations, pronouncing both as [d̥] (a possible alternative is that they are also shifting their /t/ to [t^h], thereby turning the plain ~ ejective contrast into an English-like unaspirated ~ aspirated contrast).[vii] At this point, no concerns have been expressed by members of the SENĆOŦEN-speaking community about losing the phonemic voicing contrast altogether, but we revisit the question of potential /t/ ~ /t’/ merger in Section 4 below.

The potential phonetic shift of /t’/ from [t̰] to [d̥] seems particularly plausible given the documented perceptual similarity between plain and ejective alveolar stops (Montler 1986). Indeed, Blevins (2004) and Ohala (1981) both attribute sound change to perception: listeners misperceive one sound as another and incorporate this misperception into their own productions, leading to sound change. Strong ejectives being perceptually very salient (with a strong “popping” noise), we would not expect these sounds to be particularly challenging for learners to hear, even if they do not occur in their L1. Consequently, they should be stable in their realization over time, and among L2 populations. Research on Q’eqchi Mayan, for example, which has strong ejectives, has shown that they are realized similarly by L2 and L1 speakers (Wagner & Baker-Smemoe, 2013). Weak ejectives such as those described by Montler (1986) for SENĆOŦEN are very different in this respect. The realization of /t’/, at least in the past, has been perceptually weak, sounding quite similar to its voiceless unaspirated counterpart /t/ and to English /d/ (both phonetically [d̥]). In addition, it is a relatively rare sound[viii], and not found in English, the dominant language in the area and the L1 of SENĆOŦEN learners. Thus,

SENĆOŦEN’s weak /t’/ (as opposed to Q’eqchi Mayan’s strong /t’/) seems like an ideal candidate for sound change, towards and English-like [d̥].

Summarizing, the literature on L1 transfer in L2 acquisition and on sound shift in minority language contexts supports community members’ concerns, pointing towards /t’/ *converging* towards SENĆOŦEN /t/ (English /d/), potentially neutralizing the /t/~/t’/ contrast over time. On the other hand, our understanding of motivation and identity in IL2 contexts and of hyperarticulation in pedagogical contexts (see Section 2 above) point towards /t’/ *diverging* from /t/ in SENĆOŦEN, as a way of emphasizing this non-English sound and maintaining the phonemic contrast between /t/ and /t’/. To understand how these competing effects play out in the SENĆOŦEN-speaking community, a pilot study was conducted to investigate the acoustic details of /t’/ across a range of SENĆOŦEN speakers. In terms of how /t’/ is currently being pronounced, there are three possibilities:

- [t̲]: remaining stable as a weak ejective, as described by Montler (1986)
- [d̥]: shifting towards a plain unaspirated stop, due to the influence of English (majority/L1 language) on SENĆOŦEN (minority/L2 language), partly via orthographic conventions
- [t’]: shifting towards a (more perceptually salient) strong ejective, due to hyperarticulation motivated by social and educational contexts

3.2 Methods

Participants

Participants for this study included 12 speakers of different generations: three elders (E; L1 speakers who acquired SENĆOŦEN as children), three latent speakers (LS; older adults who

heard the language as children and are re-awakening as speakers – see Basham and Fathman (2008)), three senior teachers (ST; older adults who learned SENĆOŦEN as young adults through mentorship programs and have been involved in ILR efforts for several decades), and three junior teachers (JT; younger adults who learned SENĆOŦEN through more recent mentorship programs and have been involved in ILR efforts in the last decade). Both senior and junior teachers are highly proficient IL2 speakers.

Target words and elicitation

Stimuli consisted of four disyllabic words in total, two with word-initial /t’/ and two with word-final /t’/ (Table 3). These words were extracted from a much larger word list, designed to elicit a wide range of SENĆOŦEN sounds, and put together by a community-based research assistant, who prioritized lexical items that would be familiar to participants. One potential issue with the stimuli is that word position is confounded with stress position in these particular words: word-initial /t’/ is always at the beginning of the stressed syllable; word-final /t’/ is at the end of the unstressed syllable. Although in theory this may have implications for how the results are interpreted, in practice, word-initial and word-final ejectives were by and large realized in the same way (see Results section), making this potential confound moot.

Table 3. Elicitation – target words

	SENĆOŦEN orthography	IPA transcription (target /t’/ bolded)	Gloss	# tokens
Word-initial	DIEM	ˈ**t’**ajəm	is on	31
	DILEK̲	ˈ**t’**il’əq	strawberry	34
Word-final	N̲IED	ˈŋiʔə**t’**	blue grouse	30
	QONED	ˈkʷ’ɑnə**t’**	porpoise	36

During the word-list recording, target words were elicited in a two-step process, to try to minimize orthographic effects. In the first step, speakers were provided with English words (e.g. ‘strawberry’) and asked for the SENĆOŦEN translation (‘DILEK̲’). In cases where speakers did not spontaneously come up with the SENĆOŦEN word, it was skipped and the next word on the list was elicited. In the second step, the words that were skipped in the first step were revisited; this time the orthographic form was presented to the speaker, to jog their memory. Although speakers were asked to repeat each word three times, they did not always do so. In total, 65 word-initial and 66 word-final tokens were analyzed (see Table 3).

It is worth commenting at this point on what is admittedly a limitation of this study, in that words were elicited from a word list rather than in a more naturalistic, conversational task. Word-list elicitation was chosen so as to target specific consonants that were deemed the most challenging to the speech community, while also keeping the recording sessions manageable (time-wise) for participants. Given the task, we might expect that all sounds, including the target /t’/ tokens, would be articulated in a more clear way than if they were embedded in continuous speech. This being the case, the results presented below should be taken with caution: in

particular, the strong “poppy” ejective quality of /t’/ (see Results section below) may be in part a function of the elicitation task. My own impression from listening to current SENĆOŦEN speakers is that strong ejectives are indeed the norm even in continuous speech.

Data analysis

Target words were extracted from the recordings and segmented using Praat’s Textgrid function (Boersma & Weenink, 2018). Ejectives were initially coded auditorily (by the author, a trained phonetician with extensive experience listening to ejectives across languages), using a narrow transcription to distinguish between different phonetic realizations. Targeted acoustic measurements were then taken to confirm auditory judgements; they were analyzed using R (R Core Team, 2018).

In word-initial position, four different transcriptions were used, corresponding to four different types of perceived stops: [t’] - strong ejectives (first token in Figures 1 and 2), [t^h] - voiceless aspirated stops (second token in Figures 1 and 3), [t] - voiceless unaspirated stops (first token in Figure 3), and [t̰] - weak, creaky ejectives (second token in Figure 2)[ix].

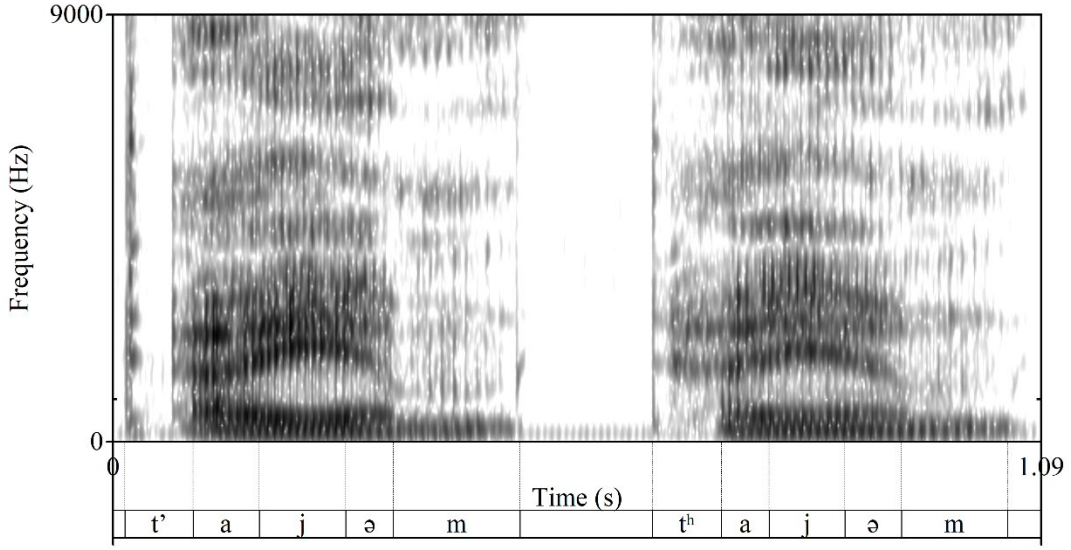

Figure 1. Word-initial [t’] vs. [tʰ], in two repetitions of /ˈt’ajəm/ *DIEM* (‘is on’) pronounced by speaker E2.

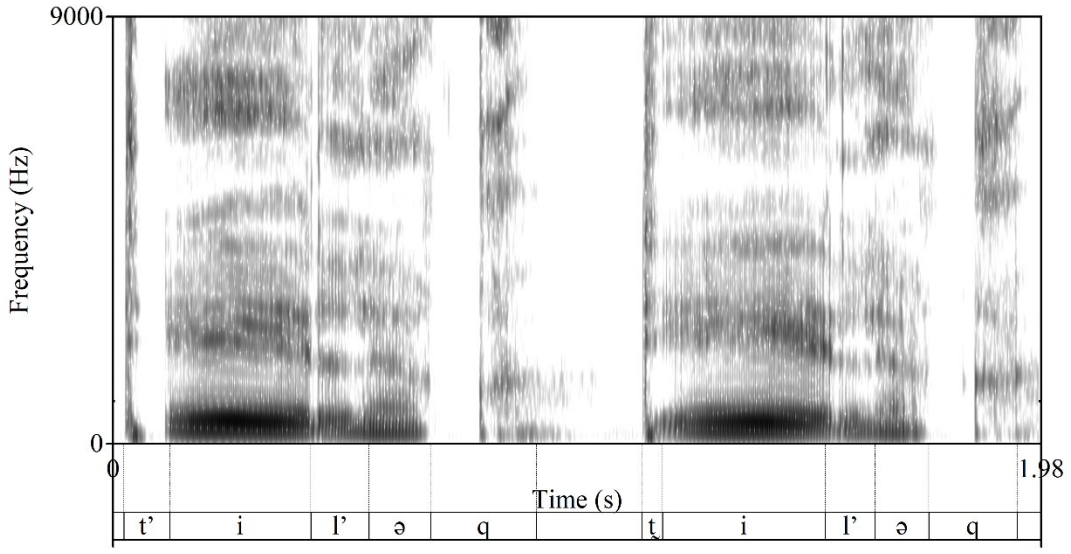

Figure 2. Word-initial [t’] vs. [t̪], in two repetitions of /ˈt’il’əq/ *DILEḴ* (‘strawberry’) pronounced by speaker E1.

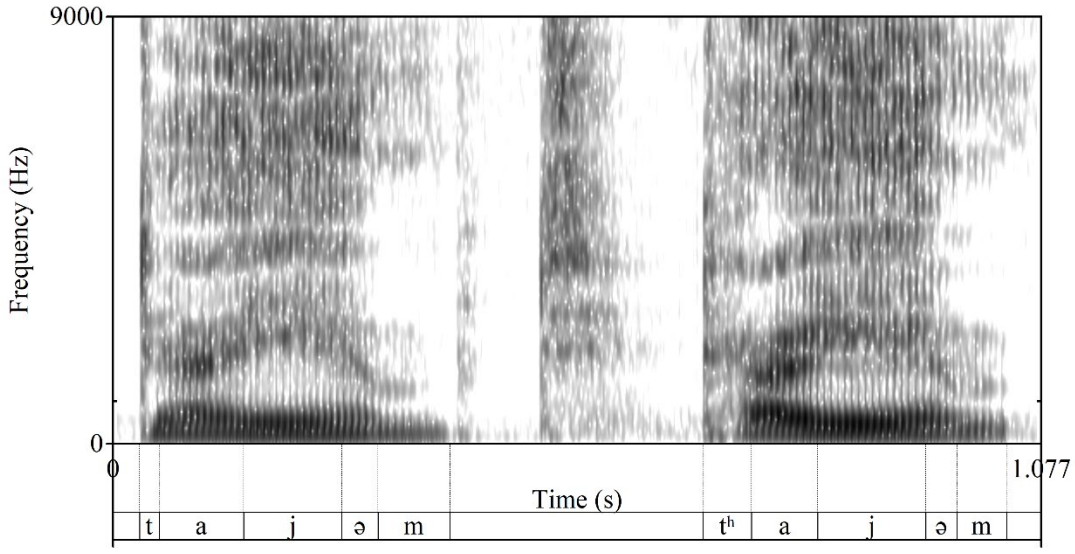

Figure 3. Word-initial [t] vs. [tʰ], in two repetitions of /ˈt’ajəm/ *DIEM* (‘is on’) pronounced by speaker LS3.

Four acoustic measurements were automatically extracted from word-initial /t’/ tokens, based on Wright et al. (2002), to confirm auditory impressions: voice onset time (VOT; the time between the stop release and the onset of voicing in the following vowel, in ms), jitter perturbation (jitter at vowel onset minus jitter at vowel midpoint, in %), F0 perturbation (F0 at vowel onset minus F0 at vowel midpoint, in Hz), and amplitude rise time (amplitude at vowel peak minus amplitude at 30ms from vowel onset, in dB). Following Wright et al., measurements were averaged over 30ms windows at vowel onset and vowel midpoint (jitter and F0) or around the vowel’s amplitude peak (amplitude); the only measurement taken at a single time point was amplitude at 30ms from the vowel onset (for the amplitude rise time calculation).

Word-final ejectives were transcribed in three different ways: [t’] - strong ejectives (Figure 4), [d’] - strong ejectives but that were nonetheless voiced during a substantial portion of the closure period (in contrast to [t’] tokens in which the closure was mostly voiceless) (Figure 5), and [d] – voiced (non-ejective) stops (Figure 6). Note that [d’] and [d] differ in terms of the strength of their release, as seen in Figure 5 vs. Figure 6.

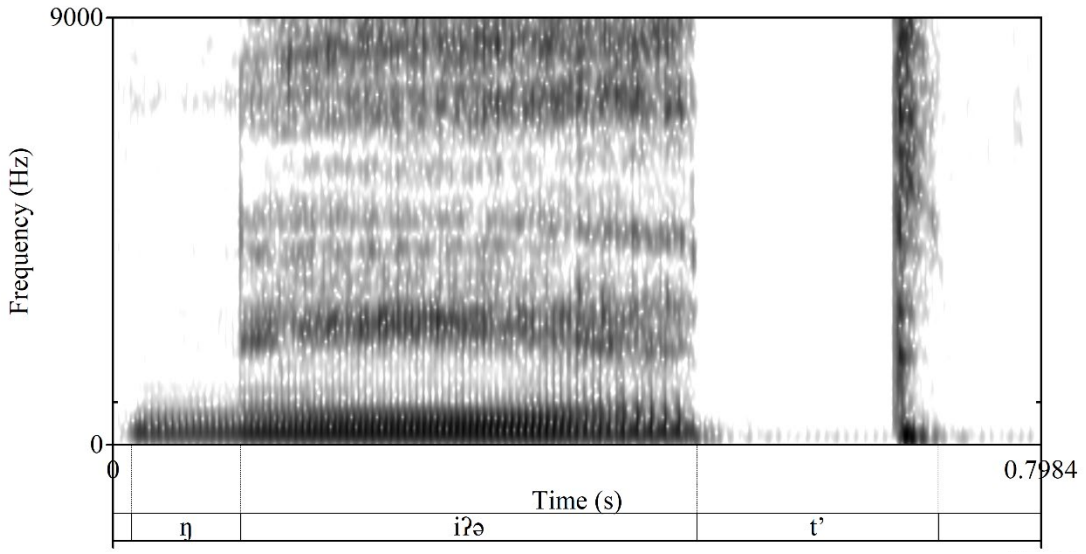

Figure 4. [t’] in /ˈŋiʔət’/ *N̲IED* (‘blue grouse’) pronounced by E1.

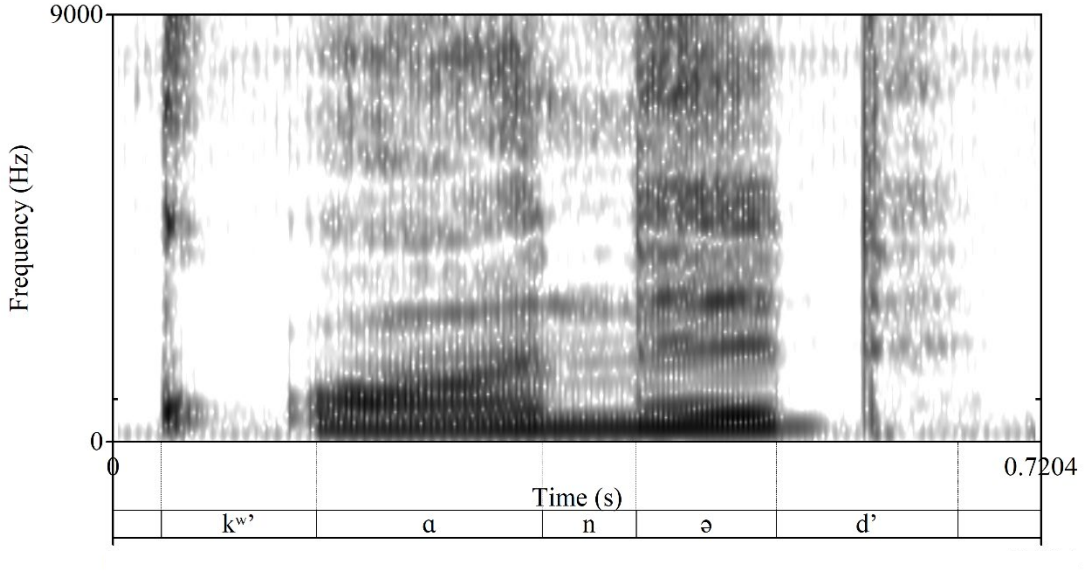

Figure 5. [d’] in /ˈkʷ’ɑnət’/ *QONED* (‘porpoise’) pronounced by A1.

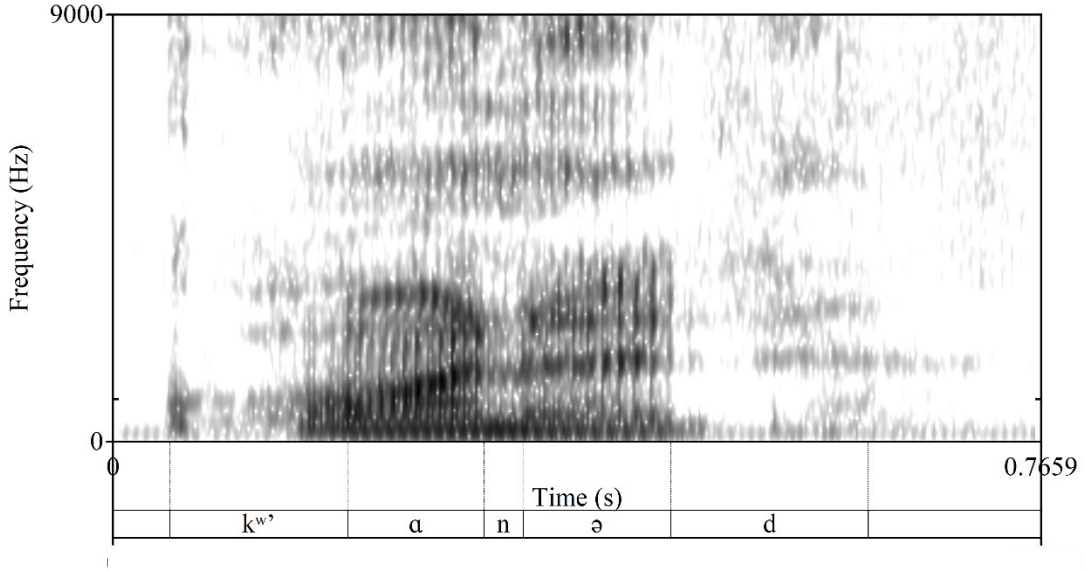

Figure 6. [d] in /ˈkʷ’ɑnət’/ *QONED* (‘porpoise’) pronounced by E2.

Given that word-final /t’/ tokens were not followed by a vowel, it was not possible to use the same measurements to quantify them acoustically as were used for word-initial tokens. Instead, two measures of voicing lag were taken in [t’] and [d’] tokens in particular, to quantify the proportion of the closure[x] that was voiced (there were only two [d] tokens; no acoustic analysis was conducted on them): 1) the raw duration (in ms) of voicing following the stop closure and 2) the ratio (as a percentage) of this duration over the duration of the entire closure. Although no precedent was found for these measurements in the literature, they reflected a clear distinguishing factor between differently realized /t’/ tokens based on auditory impressions.

3.3 Results

The overall finding of this study is that /t’/ was overwhelmingly realized as a strong ejective, across both word positions. This is particularly true for senior and junior SENĆOŦEN teachers, who, recall, are also IL2 speakers. The ejectives as pronounced by current speakers are thus more perceptually and acoustically salient than those documented by Montler (1986). In the following sections, results are provided for word-initial (3.3.1) and word-final (3.3.2) ejectives separately.

3.3.1 Word-initial ejectives

In terms of understanding the overall pronunciation patterns, the clearest results are those of the auditory analysis, simply because they abstract away from the detailed acoustic variability of individual realizations. In order to show that these results are reliable, this section begins by providing acoustic support for the auditory distinctions made. Recall from Section 3.2 that word-initial ejectives were heard in one of four ways: strong ejective, weak ejective, voiceless aspirated stop, voiceless unaspirated stop. Acoustic measurements supported only three distinct

categories: strong ejective, weak ejective, and plain stop; the distinction between aspirated and unaspirated voiceless stops was not supported.

Strong ejectives were easily distinguishable from other realizations in VOT, as illustrated by Figure 7.

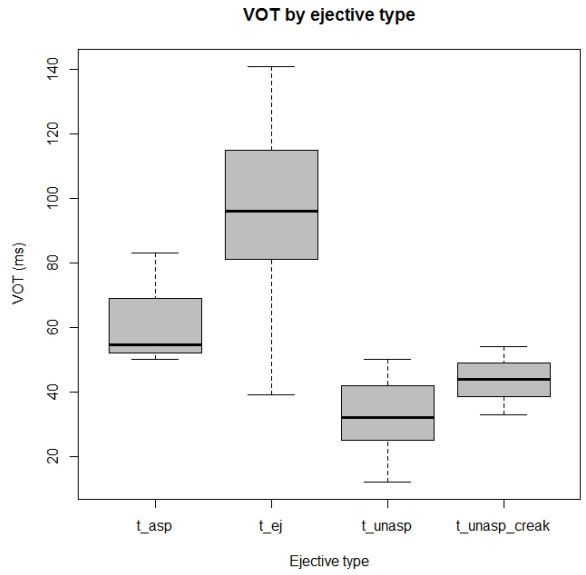

Figure 7. VOT by category of word-initial ejective; “t_asp” = [t^h]; “t_ej” = [t’]; “t_unasp” = [t]; “t_unasp_creak” = [t̰]; horizontal bars = median values.

A single-factor ANOVA comparing VOT across the four auditory categories of /t’/ yielded significant differences among categories ($F(3, 61) = 36.67$, $p < .0001$), with Tukey post-hoc tests showing statistically significant differences between strong ejective [t’] and all other categories ($p<0.02$ for [t’] vs. [t^h]; $p < 0.0001$ for [t’] vs. [t]; $p < 0.01$ for [t’] vs. [t̰]), and no significant differences among the other three categories. Although not analyzed acoustically, the VOT difference between [t’] and [t^h] was enhanced by the nature of the interval between the release of the stop and the onset of voicing: this interval was mostly silent for [t’] but filled with aspiration noise for [t^h] (see Figure 1 above).

Weak [t̲] tokens were fairly reliably distinguishable from other realizations in terms of jitter perturbation, especially in combination with other acoustic parameters. Jitter perturbation across the four auditory-based categories is illustrated in Figure 8.

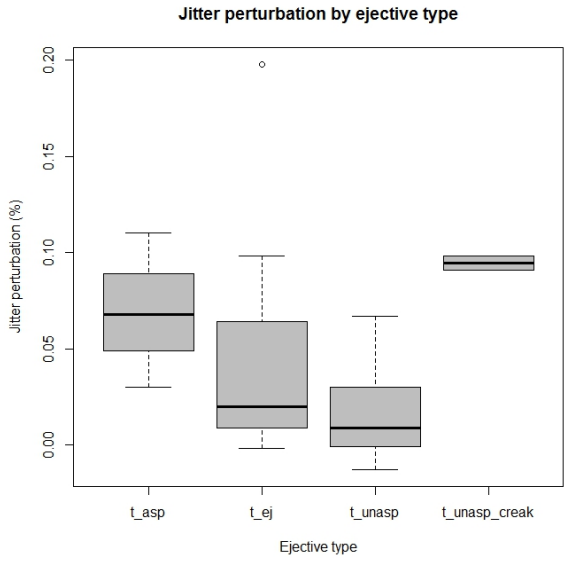

Figure 8. Jitter by category of word-initial ejective; “t_asp” = [t^{h}]; “t_ej” = [t’]; “t_unasp” = [t]; “t_unasp_creak” = [t̲]; horizontal bars = median values.

A single-factor ANOVA comparing jitter perturbation across the four auditory categories of /t’/ yielded significant differences among categories $F(3, 54) = 3.34$, $p < .05$)[xi], with Tukey post-hoc tests showing a statistically significant difference only between weak ejective [t̲] and unaspirated voiceless [t] (p = 0.05).

Figures 9 and 10 provide mean values across perceived ejective realizations for F0 perturbation and amplitude rise time respectively. Although neither parameter lead to any statistically significant differences across auditory categories, amplitude rise time in particular showed a similar pattern to jitter perturbation, with [t̲] tokens exhibiting the highest values.

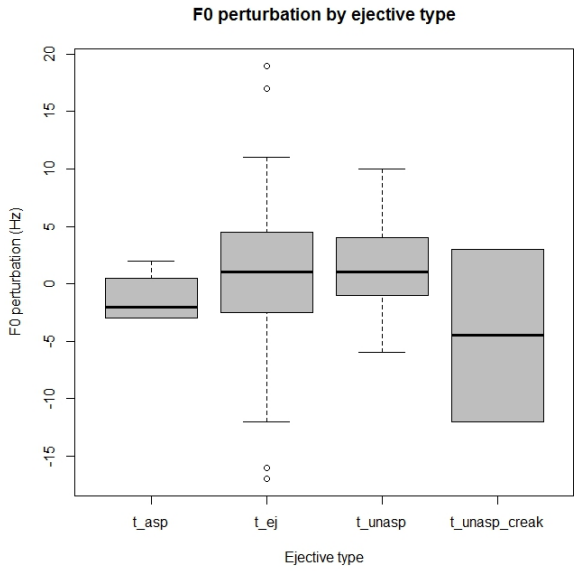

Figure 9. F0 Perturbation by category of word-initial ejective; “t_asp” = [t^h]; “t_ej” = [t’]; “t_unasp” = [t]; “t_unasp_creak” = [t̰]; horizontal bars = median values.

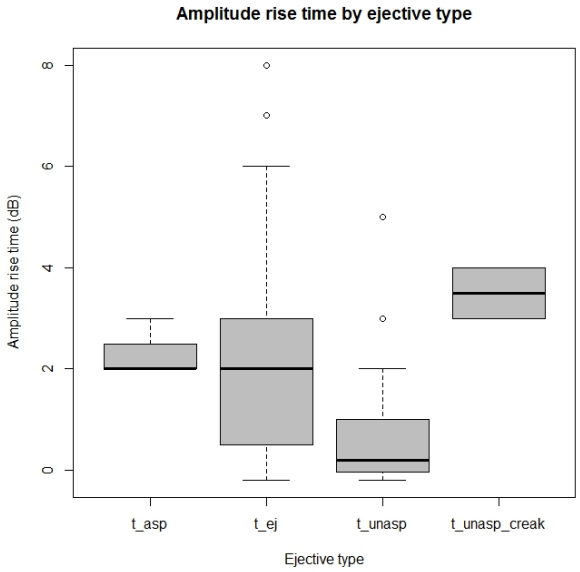

Figure 10. Amplitude Rise Time by category of word-initial ejective; “t_asp” = [t^h]; “t_ej” = [t’]; “t_unasp” = [t]; “t_unasp_creak” = [t̰]; horizontal bars = median values.

Summarizing, [t’] was easily distinguishable from the other realizations in terms of VOT (Figure 7); [t̰] seemed distinguishable from other realizations terms of jitter (Figure 8) and amplitude rise time (Figure 10), but statistical support was limited, likely due to small sample sizes. Because [t̰] was easily distinguishable from other realizations auditorily, and because the acoustic analyses showed trends distinguishing [t̰] from other realizations along both jitter and amplitude rise time, [t̰] was kept as a separate realization for the purposes of the following auditory analysis (Table 4)[xii]. The one contrast not supported by the acoustic analysis was the one between aspirated and unaspirated voiceless stops: [t^{h}] vs. [t] (see Figure 3). This was also the most difficult distinction to make auditorily, since VOT varied along a continuum. For this reason, [t^{h}] and [t] were merged into a single category for the purposes of the auditory-based analysis.

Table 4 summarizes the results of the auditory analysis of /t’/ realization by speaker, including the three categories supported by the acoustic analysis: strong [t’], weak [t̰], and plain (more or less aspirated) [t]. Speakers are categorized according to their language use background (see Section 3.2 above): Junior Teachers (JT), Senior Teachers (ST), Latent Speakers (LS), and Fluent Elders (E). [xiii]

Table 4. Word-initial ejective realization by speaker

Speaker	[t’]	[t]	[t̰]	Total
JT1	6			6
JT2	6			6
JT3	3	3		6
ST1	5			5
ST2	3			3
ST3	3			3
LS1		6		6
LS2	2	2	1	5
LS3		7	1	8
E1	5		1	6
E2	3	3		6
E3	5			5
Total	41	21	3	65

Table 4 shows that 41 out of 65 (63%) word-initial /t’/ tokens were pronounced as strong ejectives. This realization is especially striking among junior and senior teachers (IL2 speakers): with the exception of one junior teacher (JT3), all /t’/ tokens are pronounced [t’]. Latent speakers have the most variable pronunciations, including multiple instances of [t]; they are also the ones (along with E1) who pronounced weak ejectives, which match Montler’s (1986) description. None of the junior or senior teachers had weak ejectives.

3.3.2 Word-final ejectives

As in section 3.3.1, I start here by providing acoustic evidence for the auditory categories of ejectives summarized in Section 3.2 above, in particular [t’] vs. [d’] (only two tokens of /t’/ were transcribed as [d]). Table 5 summarizes the numbers of tokens coded auditorily as [t’] vs. [d’] which exhibited a voicing lag, as well as their average voicing lag durations and ratios (as described in Section 3.2).

Table 5. Voicing lag in word-final /t’/ realizations

Ejective type	# tokens with voicing lag	Voicing lag (ms)	Voicing lag ratio (%)
[t’]	24/47	27	21
[d’]	17/17	38	44

Table 5 shows that voicing lag was quite common (24/47 = 51%) even for tokens coded auditorily as [t’]. Where [t’] and [d’] differed acoustically was in the duration of the voicing lag when it occurred (average of 27ms for [t’] vs. 38 ms for [d’]) and in the voicing lag ratio (average of 21% of the stop closure was voiced for [t’] vs. 44% for [d’]). Figure 11 provides box plots of voicing lag (left) and voicing lag ratio (right) in [t’] vs. [d’]; in both cases, the difference was significant based on a Welsh’s independent samples t-test (voicing lag: $t(39) = 3.01$, $p < 0.01$; voicing lag ratio: $t(30) = 5.62$, $p < 0.001$).

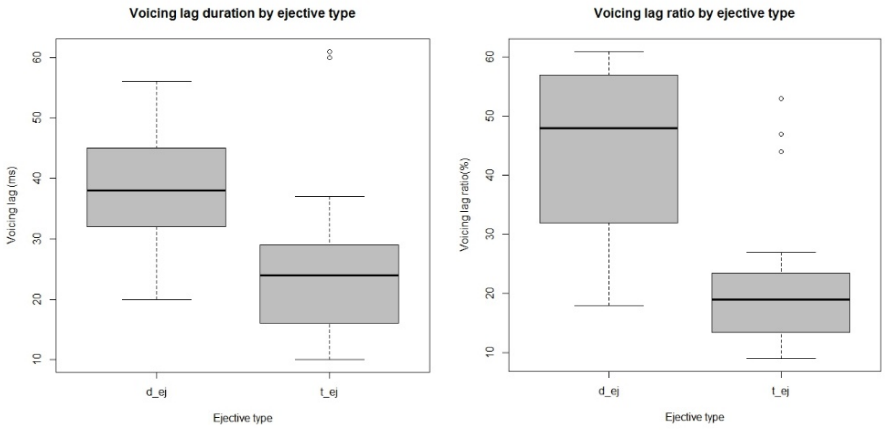

Figure 11. Voicing lag (left) and voicing lag ratio (right) in word-final ejectives; “d_ej” = [d’]; “t_ej” = [t’]; horizontal bars = median values.

In short, the acoustic analysis supports the auditory distinction made between [t’] and [d’], and therefore justifies the auditory analysis below.

Similar to Table 4, Table 6 summarizes the results of the auditory categorization of word-final /t’/ realization by speaker, including the two categories supported by the acoustic analysis – [t’] and [d’] – as well as two [d] tokens, which were clearly differentiated from [d’] in terms of their release (see Figures 5 and 6). As in Table 4, speakers are categorized according to their language use background (see Section 3.2 above): Junior Teachers (JT), Senior Teachers (ST), Latent Speakers (LS), and Fluent Elders (FE).

Table 6. Word-final ejective realization by speaker

Speaker	[t’]	[d’]	[d]	Total
JT1	1	4		5
JT2	6			6
JT3	6			6
ST1	2	4		6
ST2	6			6
ST3	6			6
LS1	6			6
LS2	2	3	1	6
LS3	3	3		6
E1	6			6
E2		3	1	4
E3	3			3
Total	47	17	2	66

Table 6 shows that 47 out of 65 (72%) word-final /t’/ tokens are pronounced as strong ejectives. As with word-initial ejectives, this realization is especially striking among junior and senior teachers: with the exception of one junior teacher (JT1) and one senior teacher (ST1), all /t’/ tokens are pronounced [t’]. Latent speakers have the most [d’] tokens, and LS2 and E2 had the only two [d] tokens.

4 Discussion

Both word-initially and word-finally, /t’/ is most often pronounced as a strong ejective [t’], as reflected by relatively long VOTs in word-initial position and relatively short voicing lags in word-final position. In addition, junior and senior teachers were the most consistent in their pronunciation. The latent speakers have the most variable pronunciations, including most of the weak and/or voiced ejectives, which possibly reflects a combination of their high proficiency in pronunciation (Basham & Fathman, 2008) and their lack of recent involvement in language teaching and learning: their pronunciation is the closest to that of previous generations because it is what they remember, and they have not been exposed to more recent realizations through interactions with learners and teachers to the same extent that other speaker groups have.

Thinking back to Montler’s description of ejectives as “ejective but weakly so” (1986, Section 1.1.1), their realization has clearly shifted, but not in the direction anticipated based on the literature on L2 pronunciation and language shift and the concerns expressed by members of the SENĆOŦEN speech community. Their realization has shifted from a relatively weak ejective to a relatively strong one. In fact, this shift is reflected in Montler’s (2018) updated description of the SENĆOŦEN sounds, in which he says of /t’/ (<D>) that it is “like T but “ejected” out of the mouth with a strong pop” (p. xx). [xiv] As mentioned above, the findings of this study must be taken with caution because of the elicitation technique used. Nonetheless, it seems clear that SENĆOŦEN /t’/ is shifting away from a voiceless unaspirated stop [d̥] rather than towards it, and this is especially true among junior and senior teachers, who are all IL2 speakers. This finding matches those reported by Bird (2016) for SENĆOŦEN velar and uvular ejectives (see especially their Figure 2 (p. 26), comparing a weak ejective spoken by an elder vs. a much stronger one spoken by a young speaker/teacher).

Of course, it is not possible with the results presented here to make strong claims about how acoustic features translate (or not) to perceptual salience. My own impression is that strong ejectives are perceptually more salient than weak ones (see also Ham (2007)), and that this is why ejectives tend to be particularly strong in IL2 contexts (see below). It is also not possible to make claims about the strength of the *phonemic* contrast between plain and ejective stops in the language as a whole, regardless of the *phonetic* strength of contrast. Examining learners’ speech in closely related Hul’q’umi’num’, Bird et al. (2016) found that a common pattern was to strengthen plain stops and affricates in word-initial position, replacing them with ejectives. One possibility is that the phonological status of ejectives is shifting, from distinct phonemes to allophones of their plain counterparts that occur in prosodically strong positions. This possibility seems especially plausible in SENĆOŦEN given the relative frequency of plain and ejective stops in the language: while /t/ is the second most common sound in the lexicon, /t’/ is one of the rarest; [xv] it would therefore not be entirely surprising for /t’/ to become increasingly marginal as a phoneme, with /t/ slowing taking over its functional load. My sense is that the phonological status of SENĆOŦEN ejectives is not in fact shifting at this point (from phoneme to allophone), but time will tell how the plain ~ ejective phonemic contrast plays out in the long term.

Returning to phonetic realization, two factors are likely contributing to the observed strengthening of SENĆOŦEN /t’/ to [t’] (from [t̰]), one related to social identity and the other related to the IL2 context that currently characterizes the SENĆOŦEN language transmission. As discussed in Section 2.2, we know that language learners sometimes aim to express their identities through their L2 pronunciation (Gatbonton et al., 2011; Nance et al., 2016; Rindal, 2010). Most studies on identity and L2 speech have focused on English L2, and the ways in which learners maintain their L1 identity in their English pronunciation (e.g. Gatbonton et al.,

2011). In IL2 contexts though, it seems likely that learners would index their IL2 identity rather than their L1 (English) identity in their IL2 speech. Indigenous Language Learning is only just emerging as a field of study, and there is as yet very little documentation on the detailed phonetic characteristics of IL2 speech. In my own work with learners of SENĆOŦEN and Hul’q’umi’num’, I have noticed several patterns that point towards a strong emphasis of non-English sounds, e.g. insertion of glottal stops where they have no clear morphological function and substitution of sounds that exist in both English and Salish languages with ones that exist only in Salish languages (e.g. substitution of [ɬ] for /θ/ - noted for Hul’q’umi’num’ in Bird et al. (2016)). A strengthened ejective realization may act as another way of emphasizing the unique sound system of SENĆOŦEN; and this may reflect IL2 speakers expressing their IL2 identity through their speech. This would be in keeping with what others have found for a wide range of Indigenous languages (Babel, 2009; Haynes, 2010).

Given that ejectives are particularly strong, and consistently so, among junior and senior teachers, another factor which is likely to be at play is “hyperarticulation” in the context of language learning and teaching (Eckman, Iverson & Song, 2013; Saito & van Poeteren, 2012; Uther et al., 2006). Hyperarticulation refers to cases where enunciation is exaggerated to raise learners’ awareness of a particularly challenging sound or sound contrast (Saito & van Poeteren, 2012). Recall Montler’s (1986) description of SENĆOŦEN ejectives and the ejective~plain stop contrast: “The obstruents are usually lenis but never voiced. The glottalized obstruents are ejective but weakly so. It is often difficult, especially in the anterior consonants, to perceive the contrast” (Section 1.1.1). Given that on the one hand ejectives have not in the past been very perceptually salient sounds and that, on the other hand, they are an integral component of the SENĆOŦEN sound system (and one that highlights the uniqueness of SENĆOŦEN compared to

English), it is not surprising that teachers make efforts to increase the salience of these sounds for learners, so that they remain in the language’s sound inventory, and so the contrast between /t/ and /t’/ stays robust. Because there are currently relatively few opportunities for learners to interact with fluent speakers who are not also teachers, the effects of hyperarticulation on the language as a whole are likely much greater than they would be if it were easier to engage in conversations outside of pedagogical settings.

What is interesting about the patterns observed here is that, while ejectives are clearly being maintained as SENĆOŦEN sounds, their realization is in fact changing substantially from previous generations. Given that language transmission currently rests on the shoulders of adult IL2 speakers, it seems likely that this pronunciation change will be solidified, and strong ejectives will remain the norm in SENĆOŦEN even as new generations of speakers emerge. Future longitudinal and diachronic research will hopefully be able to tell us how /t’/ realization plays out in the long run and whether the /t/ ~ /t’/ contrast is maintained or whether, for example, the distribution of the two sounds – phonetical [d̥] and [t’] - becomes allophonic (e.g., with [d̥] occurring in prosodically weak positions and [t’] occurring in prosodically strong ones). In the short term at least, it seems clear that factors related to motivation and identity in IL2 contexts and to pedagogical techniques (hyperarticulation) are winning out over factors related to L1 transfer and language shift in minority language contexts. This finding sheds important light on the ways in which pronunciation acquisition can differ based on the context in which it occurs.

5 Conclusion

The study reported on here was part of a larger project on pronunciation and attitudes towards pronunciation among the SENĆOŦEN speech community. The aim of the larger project was to

ensure that we - linguists - focused our research on areas of concern to members of the speech community. This study has shown that ejective /t’/ - which community members were concerned was shifting in pronunciation to English-like [d̥], is in fact healthy and strong.

As a linguist working with speakers and learners of an Indigenous language, my responsibility is in providing information to the community about existing speech patterns, and supporting them in the decisions that they make based on this information. In this particular case, the speech community was satisfied that ejectives were not being lost; perhaps at another point in time, they will decide to make it a priority to teach learners a way of pronouncing ejectives that matches more closely that of previous generations. At that point, we will have the foundation for creating instructional resources to help. In fact, in a workshop I conducted recently with another Central Salish language community, we used Praat to visualize ejective releases, and students were able to shift their ejective pronunciation from stronger to weaker by matching an elder’s ejectives (recorded in the same workshop) visually, using waveform and spectrogram displays as guides (e.g. for shortening their VOTs). This kind of Computer Assisted Pronunciation Training, focusing on visual feedback (Olson, 2014), has potential for teaching the details of pronunciation, and could certainly be invoked to shift ejective pronunciation, if that becomes a priority of the speech community.

I would like to end this paper with a call to action to continue building the body of literature on (adult) IL2 pronunciation. McIvor (2015) notes that “Adult learners are an underused resource for the uphill, urgent battle against Indigenous language loss in Canada” (p. 47). Research in IL2 pronunciation will not only make important contributions to our understanding of the factors influencing L2 pronunciation as a whole, it will also allow us to provide the best possible support to adult learners of Indigenous languages and their teachers.

Acknowledgments

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References

Babel, M. (2009). The phonetic and phonological effects of obsolescence in Northern Paiute. In J. Stanford & R. Preston (Eds.), *Variation in indigenous minority languages* (pp. 23-46). Amsterdam, Netherlands: John Benjamins.

Bashan, C., & Fathman, A. (2008). The latent speaker: Attaining adult fluency in an endangered language. *International Journal of Bilingual Education and Bilingualism, 11*(5), 577-597.

Best, C. (1994). The emergence of native-language phonological influences in infants: A perceptual assimilation model. In J. Goodman & H. Nusbaum (Eds.), *The development of speech perception: The transition from speech sounds to spoken words* (pp. 167-224). Cambridge, MA: MIT Press.

Bird, S. (2016). A phonetic study of the “K sounds” across generations of SENĆOŦEN speakers. *UBCWPL 42: Proceedings of the 51st International Conference on Salish and Neighbouring Languages (ICSNL),* 19-36.

Bird, S., Gerdts, D., & Leonard, J. (2016). The realization of obstruents across speakers of Hul'q'umi'num'. *Canadian Acoustics, 44*(3), 134-135.

Bird, S., & Kell, S. (2017). The role of pronunciation in SENĆOŦEN language revitalization. *Canadian Modern Language Review, 73*(4): 538-569.

Blevins, J. (2004). *Evolutionary Phonology: the emergence of sound patterns*. Cambridge UK: Cambridge University Press.

Boersma, P., & Weenink, D. (2018). Praat: Doing phonetics by computer (version 6.0.43) http://www.praat.org/.

Czaykowska-Higgins, E. (2009). Research models, community engagement, and linguistic fieldwork: Reflections on working within Canadian Indigenous communities. *Language Documentation and Conservation, 3*(1), 15-50.

Derwing, T., & Munro, M. (2009). Putting accent in its place: Rethinking obstacles to communication. *Language Teaching, 42*(4), 476-490.

Dorian, N. (1994). Purism vs. compromise in language revitalization and language revival. *Language in Society, 23*, 479-494.

Dunlop, B., Gessner, S., Herbert, T., Parker, A. (2018). *Report on the status of B.C. First Nations languages* (3rd ed). Brentwood Bay, Canada: First Peoples' Cultural Council.

Eckman, F., Iverson, G., & Song, J. (2013). The role of hypercorrection in the acquisition of L2 phonemic contrasts. *Second Language Research 29*, 257–283.

Elliott, D. Sr. (1990). *Saltwater people*. Saanich, Canada: School District 63.

Fitzgerald, C., & Hinson, J. (2015). "Using listening workshops to integrate phonology into language revitalization: Learner training in Chickasaw pronunciation." Presentation given at the *4th International Conference on Language Documentation and*

Conservation, Honolulu HI.

Flege, J. E. (2003). Assessing constraints on second-language segmental production and perception. In A. Meyer & N. Schiller (Eds.), *Phonetics and phonology in language comprehension and production: differences and similarities* (pp. 319–345). Berlin: Mouton de Gruyter.

Flege, J.E., Schirru, C., & MacKay, I.R.A. (2003). Interaction between the native and second language phonetic subsystems. *Speech Communication 40*, 467-491.

Flemming, E., Ladefoged, P., & Thomason, S. (2008). Phonetic structures of Montana Salish. *Journal of Phonetics*, *36*, 465-491.

Gatbonton, E., Trofimovich, P., & Segalowitz, N. (2011). Ethnic group affiliation and patterns of development of a phonological variable. *The Modern Language Journal*, *95*(2), 188-204.

Gerdts, D. B. (2010). Beyond expertise. The role of the linguist in language revitalization programs. In L. Grenoble & L. Furbee (Eds.), *Language documentation practice and values* (pp. 173–192). Amsterdam: John Benjamins.

Ham, S. (2008). *Tsilhqut'in Ejectives: A Descriptive Phonetic Study*. Masters Thesis, University of Victoria.

Haynes, E. (2010). *Phonetic and phonological acquisition in Endangered Languages Learned by adults: A case study of Numu (Oregon Northern Paiute)*. PhD Dissertation. University of California, Berkeley.

Herrick, D., Berardo, M., Feeling, D., Hirata-Edds, T., & Peter, L. (2015). Collaborative Documentation and Revitalization of Cherokee Tone. *Language Documentation &*

Conservation, 9, 12-31.

Hinton, L. (2002). *How to keep your language alive: A commonsense approach to one-on-one language learning* (with Matt Vera, Nancy Steele, and the Advocates for Indigenous Language Survival). Berkeley, CA: Heyday Books. (Original work published 1959)

Iverson, P., Kuhl, P.K., Akahane-Yamada, R., Diesch, E., Tohkura, Y., Kettermann, A., & Siebert, C. (2003). A perceptual interference account of acquisition difficulties for non-native phonemes. *Cognition, 87*(1), B47–B57.

King, J. (2001). Te Kōhanga Reo: Māori language revitalization. In L. Hinton and K. Hale (Eds.), *The Green Book of Language Revitalization* (pp. 119-128). San Diego, CA: Academic Press.

King, J. (2009). Language is Life: The Worldview of Second Language Speakers of Maori. In L. Lockard (Ed.), *Indignenous language revitalization: Encouragement, guidance, and lessons learned* (pp. 97-108). Flagstaff AZ: Northern Arizona University.

King, J., Harlow, R., Watson, C., Keegan, P., & MacLagan, M. (2009). Changing pronunciation of the Maori language: Implications for revitalization. In J. Reyhner & L. Lockard (Eds.), *Indigenous language revitalization: Encouragement, guidance & lessons learned* (pp. 85-96). Flagstaff, AZ: Northern Arizona University.

Kingston, J. (1985). *The phonetics and phonology of the timing of oral and glottal events*. PhD dissertation, University of California, Berkeley.

Krashen, S. D. (1982). *Principles and practice in second language acquisition.* Oxford: Pergamon.

Lee, J., Jang, J., & Plonsky, L. (2015). The effectively of second language pronunciation instruction: A meta-analysis. *Applied Linguistics, 36(1)*, 345-366.

Lindau, M. (1984). Phonetic differences in glottalic consonants. *Journal of Phonetics, 12*, 147-155.

Marti, R., Adreeva, B., & Barry, W. (2009). Korpora bedrohter Sprachen asl eierlegende Wollmilchsau? Bas Beispiel GENIE. *Linguistik online, 39*(3/09), 137-148.

McDonough, J., Whalen, D. H. (2008). Editorial: The phonetics of native North American languages. *Journal of Phonetics, 36*, 423–426.

McIvor, O. (2015). Chapter 4: Adult Indigenous language learning in Western Canada: What is holding us back? In K. Michel, P. Walton, E. Bourassa, & J. Miller (Eds.), *Living Our Languages: Papers from the 19th Stabilizing Indigenous Languages Symposium* (pp. 37-49). Ronkonkoma, NY: Linus Learning.

Montler, T. (1986). *An outline of the morphology and phonology of Saanich, North Straits Salish*. Missoula, MT: University of Montana Working Papers in Linguistics 4.

Montler, T. (2018). *SENĆOŦEN: A Dictionary of the Saanich Language*. Tsartlip, BC: W̱SÁNEĆ School Board.

Morgan, J. (2017). *The Learner Varieties of the Chikasha Academy: Chickasaw Adult Language Acquisition, Change, and Revitalization*. PhD Dissertation, University of Oklahoma.

Nance, C., & Stuart-Smith, J. (2013). Pre-aspiration and post-aspiration in Scottish Gaelic stop consonants. *Journal of the International Phonetic Association, 43*(2), 129-152.

Nance, C., McLeod, W., O’Rourke, B., & Dunmore, S. (2016). Identity, accent aim, and motivation in second language users: New Scottish Gaelic speakers’ use of phonetic variation. *Journal of Sociolinguistic,s 20*(2): 164-191.

Ohala, J. (1981). The listener as a source of sound change. In C.S. Masek, R.A. Hendrick & M.F.

Miller (Eds.), *Papers from the parasession on language and behaviour* (pp. 178-203). Chicago: Chicago Linguistic Society.

Olson, D.J. (2014). Benefits of visual feedback on segmental production in the L2 classroom. *Language Learning and Technology, 18*(3), 173-192.

Oster, R., Grier, A., Lightning, R., Mayan, M., & Toth, E. (2014). Cultural continuity, traditional Indigenous language, and diabetes in Alberta First Nations: a mixed methods study. *International Journal for Equity in Health*. Retrieved from https://equityhealthj.biomedcentral.com/articles/10.1186/s12939-014-0092-4.

PENÁĆ G.D. Underwood (2017). *SX̱ENIEṈ YEW̱ C̓NEs I, TW̱E SENĆOŦEN? How is it that I have come to speak SENĆOŦEN?: My Reflections on Learning and Speaking SENĆOŦEN*. Masters project, University of Victoria.

Percival, M. (2019). Contextual variation in the acoustics of Hul'q'umi'num' ejective stops. In Calhoun. S., Escudero, P., Tabain, M., & Warrne, P. (Eds.) *Proceedings of the 19th International Congress of Phonetic Sciences. Melbourne, Australia 2019* (pp. 3270-3274). Canberra, Australia: Australian Speech Science and Technology Association Inc.

R Core Team. 2018. *R: A language and environment for statistical computing*. Vienna: R Foundation for Statistical Computing. http://www.R-project.org/

Ratima, M., & May, S. (2011). A Review of Indigenous Second Language Acquisition: Factors leading to proficiency in te reo Māori (the Māori language). *MAI Review, 2011*(1), 1-21.

Rindal, U. (2010). Constructing identity with L2: Pronunciation and attitudes among Norwegian learners of English. *Journal of Sociolinguistics, 14* (2), 240-261.

Ryan, E. B. (1983). Social psychological mechanisms underlying native speaker reactions to nonnative speech. *Studies in Second Language Acquisition, 5*, 148-159.

Saito, K., & van Poeteren, K. (2012). Pronunciation-specific adjustment strategies for intelligibility in L2 teacher talk: results and implications of a questionnaire study. *Language Awareness, 21*(4), 369-385.

Speas, M. (2009). Someone Else’s Language: On the Role of Linguists in Language Revitalization. In J. A. Reyhner & L. Lockard (Eds.), *Indigenous Language Revitalization: Encouragement, Guidance & Lessons Learned.* Flagstaff, AZ: Northern Arizona University.

Uther, M., Knoll, M.A., & Burnham, D. (2006). Do you speak E-NG-L-I-SH? A comparison of foreigner- and infant-directed speech. *Speech Communication, 49*, 2-7.

Thomson R., & Derwing, T. (2015). The effectively of L2 pronunciation instruction: A narrative review. *Applied Linguistics, 36*(3), 326-344.

Wagner, K. O. C., & Baker-Smemoe, W. (2013). An investigation of the production of ejectives by native (L1) and second (L2) language speakers of Q’eqchi’ Mayan. *Journal of Phonetics, 41*, 453-467.

Warner, N. (1996). Acoustic characteristics of ejectives in Ingush. *Proceedings of the International Conference on Spoken Language Processing*, 1525-1528.

Watson, C., Maclagan, M., King, J., Harlow R., & Keegan, P. (2016). Sound change in Māori and the influence of New Zealand English. *Journal of the International Phonetic Association, 46*(2), 185-218.

Werker, J. & Tees, R. (1984). Cross-language speech perception: Evidence for perceptual reorganization during the first year of life. *Infant Behavior and Development, 7*, 49-63.

Woolard, K. (1989). Language convergence and language death as as ocial process. In N. Dorian

(Ed.), *Investigating Obsolescence* (pp. 181-196). Cambridge: CUP.

Wright, R., Hargus, S., & Davis, K. (2002). On the categorization of ejectives: data from Witsuwit’en. *Journal of the International Phonetic Association 32*, 43-77.

[i] SENĆOŦEN is pronounced [sɛn‿t͡ʃɑθən]. The SENĆOŦEN orthography, consisting of all capital letters (plus diacritics) was developed by the late PENÁĆ (David Elliott Sr.) and was adopted as the standard orthography by the W̱SÁNEĆ School Board in 1984 (http://wsanecschoolboard.ca/about-the-school/history-of-the-sencoten-language).
[ii] Tye Swallow, personal communication (July 4, 2017).
[iii] Nance, McLeod, O’Rourke, and Dunmore (2016) discuss a similar situation for Scottish Gaelic.
[iv] Models such as Best’s Perceptual Assimilation Model (1994) account for findings like those of Werker and Tees by positing that listeners’ ability to perceive contrasts in an L2 (or unfamiliar language) depend on how the target sounds are categorized in their L1, e.g. two sounds that correspond to different phonemes in their L1 are easier to distinguish than two sounds that correspond to a single phoneme in their L1.
[v] As a budding linguist growing up bilingual in Quebec, I offered one time to help a Québecoise friend of mine with her English accent; her response has always stuck with me: she told me she liked her French accent because it was part of who she was, and wasn’t interested in changing it.
[vi] Acoustic analysis of legacy recordings requires obtaining separate approval from the SENĆOŦEN-speaking community; this is an area of future research.
[vii] This an area for future instrumental research.
[viii] Timothy Montler, personal communication (February 14, 2019).
[ix] Note: only the release portion of /t’/ is segmented in Figures 1-3.
[x] All [t’] and [d’] tokens were released, making it possible to measure the closure duration.
[xi] Seven tokens were excluded from the analysis because of undefined jitter values.
[xii] For jitter, Elders had significantly higher values than Junior Teachers; similarly, for amplitude rise time, Elder had significantly higher values the three other groups; these are possibly age effects.
[xiii] For JT3 and LS2, realization is split by lexical item: /t’íl’əq/ ‘strawberry’ has [t] and /t’ájəm/ ‘is on’ has [t’]; for E2, realization is not entirely lexical, although two of the three repetitions of /t’íl’əq/ have [t] (the third [t] is in /t’ájəm/). It seem likely that lexical item has an effect on ejective realization; further study is needed to confirm to what extent this effect is consistent and observable in other lexical items.
[xiv] I had the chance to ask Timothy Montler about his descriptions of ejectives over time (January 24, 2019); he attributed the shifting descriptions to his own shifting perception of ejectives, to variation across the L1 speakers he has worked with over the years, and to prioritizing phonetic descriptions in his recent dictionary that were accessible to today’s speakers and learners. Clearly, a thorough longitudinal study of these sounds is in order, to clarify their realization over time.
[xv] Timothy Montler, personal communication (February 14, 2019).

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