PRONUNCIATION PATTERNS AMONG L2 HUL'Q'UMI'NUM' LEARNERS: PRELIMINARY FINDINGS AND FUTURE DIRECTIONS

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This paper reports on the type and frequency of pronunciation patterns among a group of Hul'q'umi'num' (Central Salish) adult language learners. With its rich phonological and morphological systems, Hul'q'umi'num' contains many consonants and consonantal sequences that are unfamiliar for learners whose first language is English. Analysis of a set of four pronunciation tests reveals that learners' pronunciation is affected by test, speaker, word, number of unfamiliar sounds within the word, and specific phonological make-up of these sounds. These findings lay the foundation for more in-depth studies targeting each of these factors, to understand their implications for a) additional language pronunciation in Hul'q'umi'num', b) models of second language pronunciation more generally, and c) pedagogical approaches to Hul'q'umi'num' pronunciation.

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INTRODUCTION

Across Canada and the United States, adult Indigenous language learners have taken on the responsibility of passing on their language to future generations, as researchers, teachers, and parents. They have high standards when it comes to pronunciation, aiming to honour their elders by speaking in a way that they think of as "authentic" (Bird & Kell, 2017). In this context, achieving "intelligibility and comprehensibility" (Derwing & Munro, 2009) is not enough. Speaking with an English accent is deemed among some learners to be particularly undesirable, because it is a reminder of the colonial history that has ravaged their linguistic and cultural identity (2020 UVic Masters in Indigenous Language Revitalization cohort, personal communication, January 27, 2021).

The language we focus on in this paper is Hul'q'umi'num', one of three closely related dialects collectively called Halkomelem (Central Salish). Hul'q'umi'num' territory extends along the Salish Sea, from Malahat to Nanoose Bay on Southern Vancouver Island and adjacent Southern Gulf Islands, in British Columbia, Canada (Figure 1).[1] It is the healthiest of the Salish languages, with approximately 30-40 mother-tongue speakers. Hul'q'umi'num' is currently making a strong comeback, with many new opportunities for engaging in language learning, from early childhood

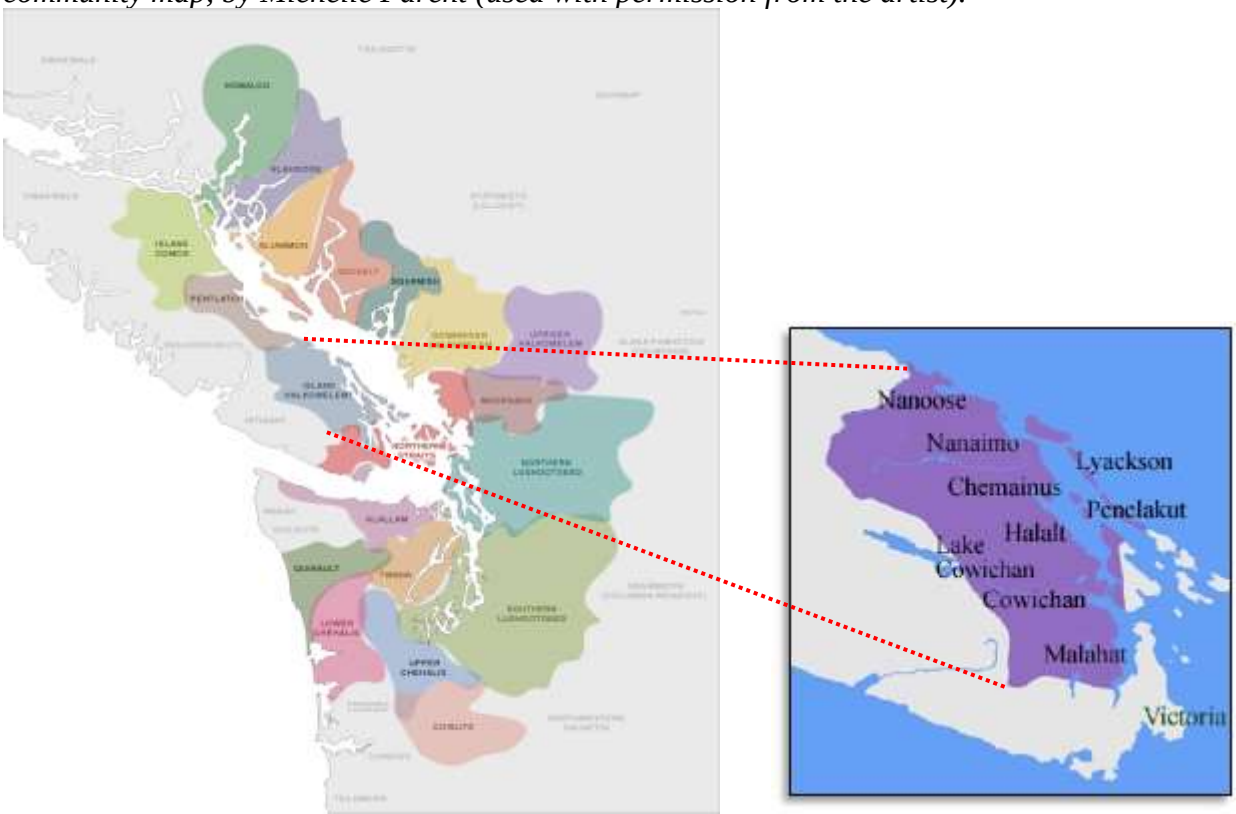
[1] Hul'q'umi'num' is labelled Island Halkomelem in Figure 1a.

to adulthood.

Achieving fluent Hul'q'umi'num' pronunciation is no small feat: as is typical in the Salish language family, Hul'q'umi'num' has a rich sound system, including many consonants and complex consonant clusters not found in English, the majority language in the area and the first language of the speakers we worked with (see Section 2). In partnership with the Hul'q'umi'num' Language & Culture Society (HLCS), we have been working to identify ways to support learners with their pronunciation efforts (McIvor, 2015). We are non-Indigenous academics at the University of Victoria, team members on a SSHRC-funded Partnership Development Grant (Principal Investigator: Bird), *Hul'q'umi'num' phonetic structures: Exploring paths towards fluency*. The team also includes Dr. Donna Gerdts (SFU Linguistics), and elders, teachers, and learners affiliated with the HLCS. Our goals are to 1) document L1 and L2 pronunciation features, 2) identify challenges for L2 speakers, and 3) develop and assess tools and techniques for overcoming these challenges. This paper address goal 2--we provide a broad overview of learner pronunciation patterns and the factors that affect them, laying the foundation for future, more in-depth work on these factors, to better understand Hul'q'umi'num' L2 pronunciation, and L2 pronunciation more generally.

Figure 1

(a) Map of Coast Salish linguistic distribution in the early to mid 1800s, by Noahedits, 2019, https://en.wikipedia.org/wiki/Coast_Salish_languages#/media/File:Coast_Salish_language_map.svg (reproduced following Creative Commons License CC-BY-SA 4.0; (b) Hul'q'umi'num' community map, by Michelle Parent (used with permission from the artist).



(a) (b)

HUL'Q'UMI'NUM' SOUNDS AND L2 PRONUNCIATION

Hul'q'umi'num' has 37 consonants, 21 of which do not occur in English, including glottalized stops and affricates (ejectives), glottalized resonants, contrasting velar and uvular consonants, and a rich set of coronal fricatives and affricates.

Figure 2

Hul'q'umi'num' Sounds (bolding indicates sounds not found in English)[2]

	Lab	Dent	Alv	Lat	Pal	Vel	Lab Vel	Uvul	Lab Uvul	Gl
Stop	p		t			k	kw	**q**	**qw**	’
Gl. Stops	**p’**		**t’**				**kw’**	**q’**	**qw’**	
Affricates		**tth**	ts		ch					
Gl. Affricates		**tth’**	**ts’**	**tl’**	**ch’**					
Fricatives		th	s	**lh**	sh		**hw**	**x**	**xw**	h
Resonants	m		n	l	y		W			
Gl. Resonants	**m’**		**n’**	**l’**	**y’**		**w’**			

A small number of previous studies have examined specific aspects of L2 Hul'q'umi'num' pronunciation. Onosson and Bird (2019) show that *vowel-glide* sequences are more reduced among learners than elders, possibly due to English influence. Percival (2019) shows that L2 speakers' ejectives are more consistently strong/tense (Kingston, 1985) than elders', reflecting hyper-articulation of these sounds (Eckman et al., 2013). Bird et al. (2016) show evidence of both convergence on and divergence from English, among coronal fricatives (e.g. *lh* → *th* and *th* → *lh,* respectively).

[2] Throughout this paper, example words and sounds are written in Hul'q'umi'num' orthography for accessibility to the Hul'q'umi'num' community; an IPA to orthography conversion chart is provided in Appendix A.

Taken together, previous findings indicate that Hul'q'umi'num' L2 pronunciation is influenced by a number of factors that warrant more thorough consideration, and that go beyond what might straight-forwardly be predicted by models of second language acquisition based on L1 transfer effects (Archibald, 2017; Flege et al., 2003, Gass & Selinker, 1983; Iverson et al., 2003). These include phonetic and phonological factors like syllable and word position (Carroll, 1999; González Poot, 2011; Bird et al., 2016), lexical factors like sound and word familiarity (Johnson et al., 2018; Flege, 1995; Morrison & Hudson Kam, 2009; Koirala, 2015; Thomson & Isaacs, 2009), pedagogical factors, specifically hyper-articulation (Eckman et al., 2013; Uther et al., 2006; Saito & van Poeteren, 2012), and social factors related to cultural identity (Gatbonton et al., 2011; Nance et al., 2016; Rindal, 2010; Hinton, 2011; King, 2009; Morgan, 2017; Bird, 2020). To explore these factors further, we need a comprehensive picture of learners' pronunciation patterns. The goal of this paper is to paint this picture.

METHODS

The data for this study consists of recordings from four tests designed by Donna Gerdts to assess pronunciation among Hul'q'umi'num' learners. The tests were administered over a four-year timeframe to different learners (see Table 1). They were carried out in groups with two to three students, one linguist and one elder. One student took the test and the elder either modeled and/or guided the pronunciation. The test was recorded by the other student(s) and the linguist using Audacity and a Yeti USB microphone on an Apple iMac computer. In total, we included tests from 35 English speaking learners, who ranged in age from 20 to 70. Although exposure to and education in Hul'q'umi'num' differed for each learner, all had university-level experience in both Hul'q'umi'num' and Linguistics.

Table 1

Pronunciation Tests

Test name	Focus/content	# Words	# Speakers	# Tokens analyzed
Prontest 1 (2016 + 2019)	Coronals - Set 1* Imitation task	48	17	974
Prontest 2 (2016 + 2019)	Coronals - Set 2* Reading + imitation task	24	17	644
Prontest 2018 (2018 + 2019)	Animals Imitation task	30	20	1176
Numbers (2016)	Numbers Lexical retrieval	10	12	121
TOTAL		112	35	2915

* The coronal tests included word-initial clusters, which are very common in Hul'q'umi'num'

Each word was transcribed in Praat (Boersma & Weenink 2020). Janet Leonard transcribed 100% of the words and Tess Nolan transcribed a random 30% of the same words. The agreement

rate was 83%, the most common source of disagreement being the presence or absence of glottalization. The transcriptions were exported into Excel via a Praat script, where supplemental coding was done, including, for each pronunciation pattern: syllable and stress position, type of error[3] (general and specific), and whether it converged on or diverged from English (Table 2). We also included the number of unfamiliar, i.e., non-English, sounds and sequences in each word, as an approximate measure of difficulty (see Johnson et al., 2018). In analyzing the data, we distinguished between *token* and *type. Token* refers to a single instance of a pronunciation pattern; *type* refers to a set of tokens of the pattern. For example, learners pronounced the word *kw'et'un'* ('mouse') in five different ways: *kw'et'un', kw'etun', kw'et'un*, *kw'etun*, and *kwetun*. These five pronunciations contain seven error tokens, which are of three types: *kw'* → *kw* (x1)*, t'* → *t* (x3), and *n'* → *n* (x3). The error tokens tell us the total number of errors learners make. The error types tell us about the (lack of) variety in these errors. All data analysis was conducted in R (R Core Team, 2020).

Table 2

Examples of Data Coding

Orth.*	Transc.*	Error	Syll Pos.*	Stress Pos.*	Error-General	Error-Details	L1 Relation	Unfamiliar sounds & sequences**
thqet	Lhqet	th → lh	#_CV	pre-stress	place	dental → lateral	diverge	2
shes	Shelh	s → lh	VC#	post-stress	place	lateral → alveolar	diverge	0
sququweth	squxuweth	q → x	V_V	un-stressed	manner	stop → fricative	neither	3
spaal'	Spaal	l' → l	V_#	post-stress	glottal	de-glottal	converge	1

*Orthog. = Orthography; Transc. = Transcription; Pos. = Position
** *thqet* (2): *q*, *thq*; *shes* (0): nothing unfamiliar; *sququweth* (3): *q*, *q*, *sq*; *spaal'* (1): *l'*.

RESULTS

This section summarizes learner pronunciation patterns according to five factors: test, speaker, word, number of unfamiliar sounds within the word, and specific phonological make-up of these sounds. Overall, we observe that errors reflect all of these factors, as well as interactions between them. We also see previously documented effects of cultural identity and the pedagogical context in which learners are speaking, reflected in the over-use and hyper-articulation of non-English

[3] In the sections that follow, we use 'error' to indicate learner pronunciation patterns. We do this for simplicity, but also recognize that this terminology is based on a deficit model of L2 pronunciation acquisition, which we do not support.

sounds (Bird et al., 2016). Table 3 summarizes error rates across tests, including raw number of errors, percentage of words with errors, mean ratio of errors to word, and mean number of unfamiliar sounds per word.

Table 3

Errors by Test

Test	# Errors	% Words with Errors	Ratio # Errors to # Words with Errors	Mean (SD) # Unfamiliar Sounds and Sequences/word
Prontest 1 (2016 + 2019) Imitation task	547	39%	1.44	1.92 (1.29)
Prontest 2 (2016 + 2019) Reading + imitation task	663	60%	1.71	3.71 (1.21)
Prontest 2018 (2018 + 2019) Imitation task	773	45%	1.47	1.82 (1.25)
Numbers (2016) Lexical retrieval	55	33%	1.38	1.9 (1)

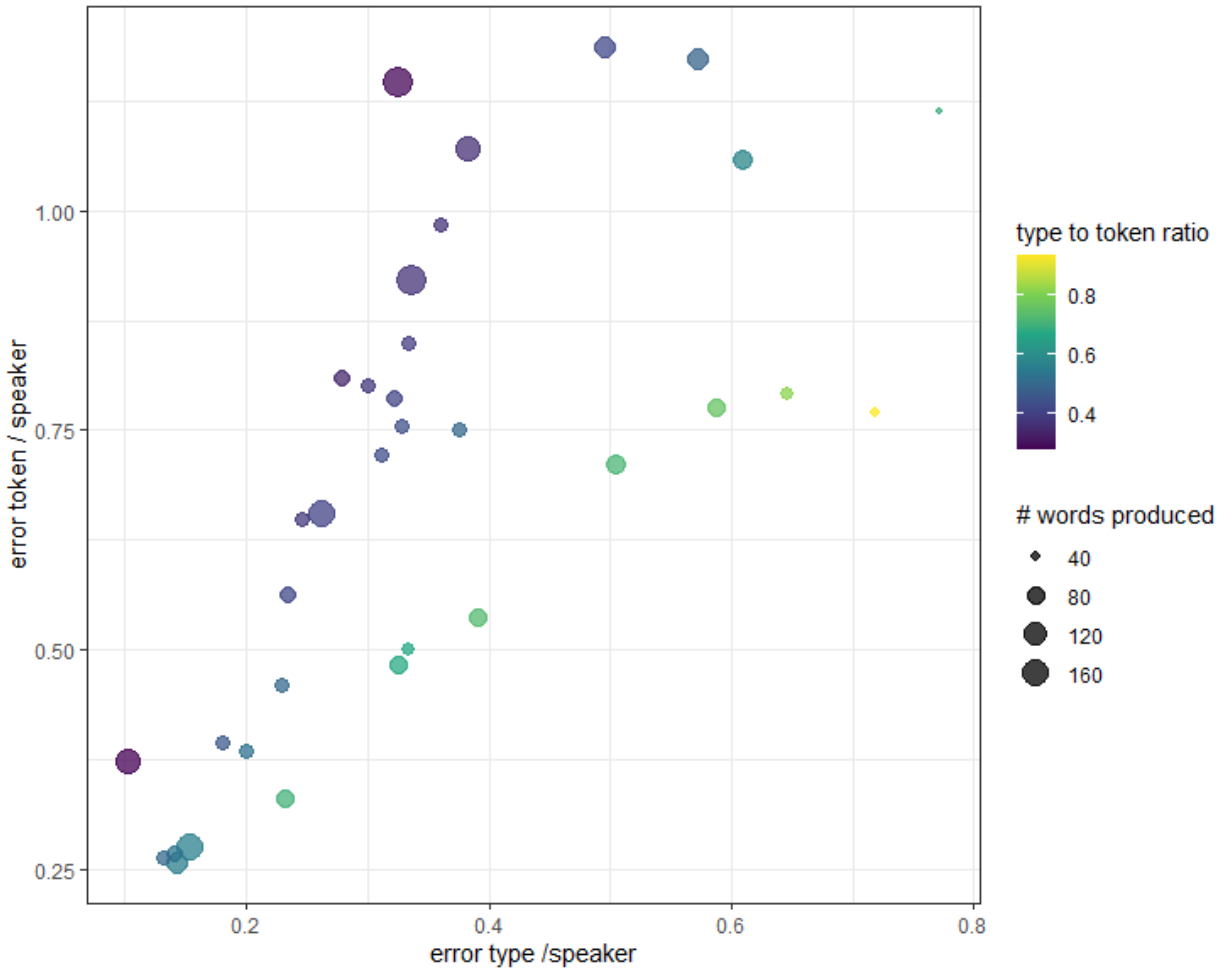
The best performance was on the Numbers test, despite it having a similar number of unfamiliar sounds/sequences to other tests. This is likely due to the high frequency and familiarity of the target words (Koirala, 2015; Thomson & Isaacs, 2009), since numbers are introduced very early to Hul'q'umi'num' learners. The worst performance was on Prontest 2, which had a particularly high number of unfamiliar sounds and sequences. This was also the only reading test, and Hul'q'umi'num' learners have reported difficulty with reading. Future work should clearly tease apart effects of task type and sound-based familiarity. One thing that is clear is that seeing unfamiliar sounds/sequences in written form (as opposed to hearing them) does not make pronouncing them any easier.

Figures 3 and 4 plot error type (x-axis) by error token (y-axis), for individual speakers (Figure 3) and words (Figure 4). Each circle represents one speaker/word. The larger the circle, the more data for the speaker/word. The more yellow the circle, the closer the by-type and by-token ratios. Both speakers and words show variation in the consistency of errors: consistent speakers/words exhibit the same errors over and over again (low type count); inconsistent speakers/words exhibit many different errors (high type count). In Figure 3, two groups of speakers can be distinguished: the inconsistent group (green-yellow) produced more error types per token,

approaching a 1:1 ratio between types and tokens; the consistent group (purple-blue) produced few error types but many error tokens.

Figure 3

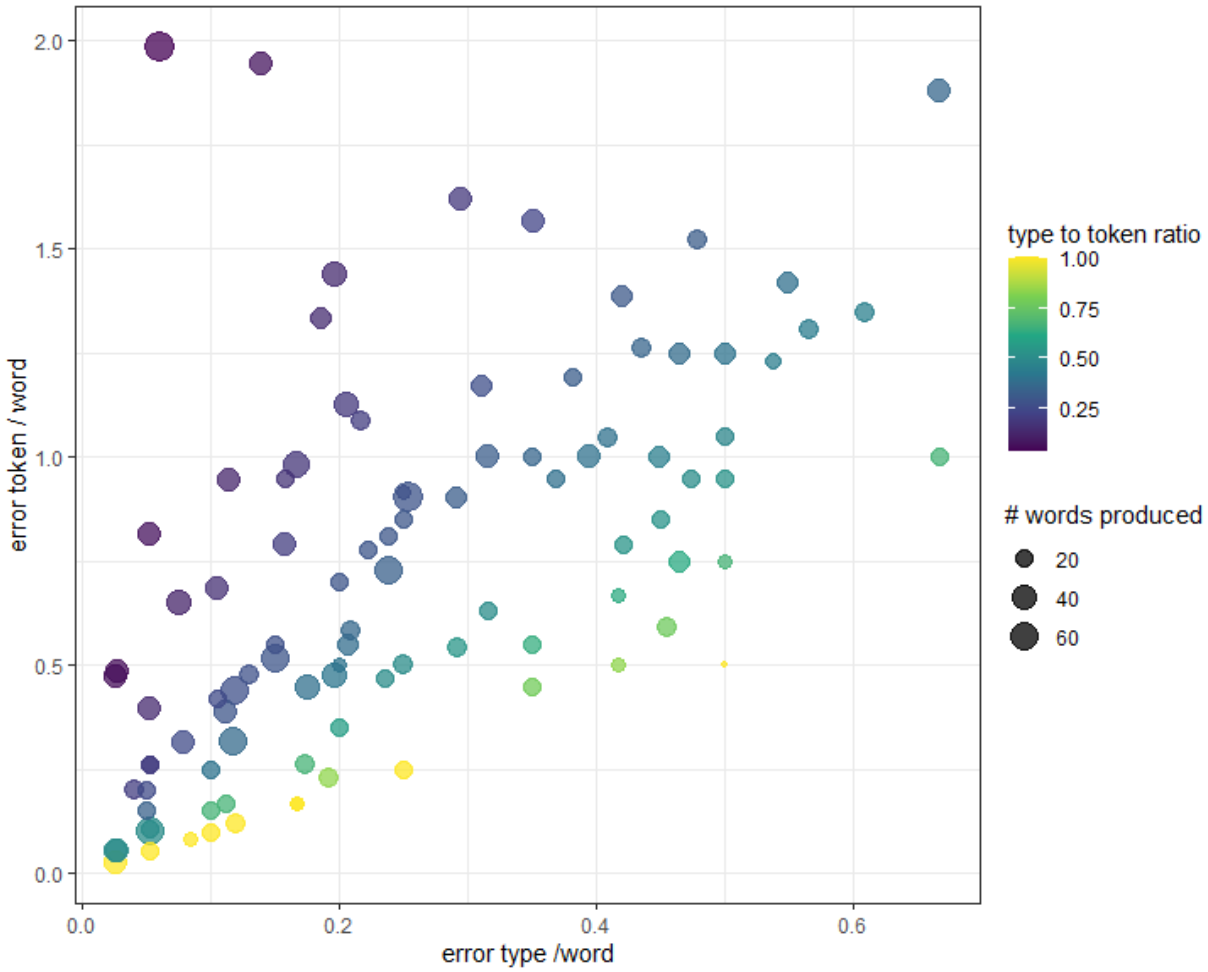
Effect of Speaker – Tokens vs. Types



In Figure 4, we see that individual words also differ in how consistent their errors are. For example, the word *kw'et'un'* ('mouse'; upper left) had many errors, but these were very consistent across instances (all related to glottalization). In contrast, *wetth'ut* ('pry it'; far right) had a medium number of errors but they were very inconsistent, the sound *tth'* being pronounced six different ways: *tth*, *t*, *ts*, *ts'*, *th*, and *ch*. Interestingly, there were no errors in the words *yuxwule'* ('bald eagle') and *toohw* ('nine') despite both containing unfamiliar sounds. This suggests that word familiarity (Thomson & Isaacs, 2009) may counteract effects of sound-based unfamiliarity, and also that the correlation between the number of unfamiliar sounds and the number of errors is not linear (Johnson et al., 2018).

Figure 4

Effect of Word – Tokens vs. Types

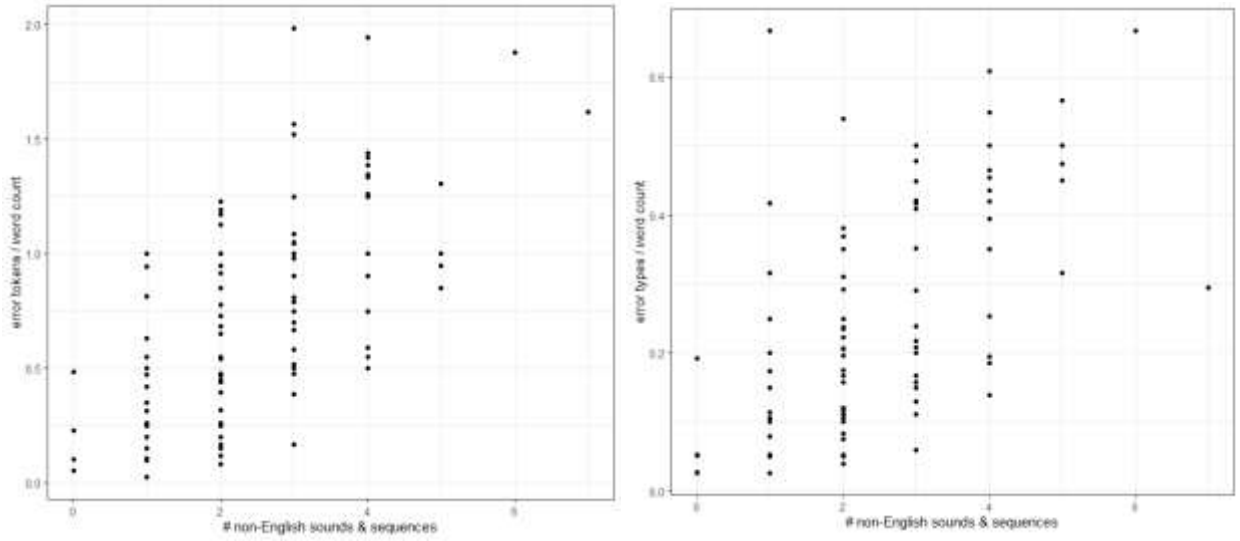


The two graphs in Figure 5 plot number of unfamiliar sounds/sequences on the x-axis and error/word count ratios on the y-axis, by token (a) and type (b). Not surprisingly, as the number of unfamiliar sounds in a word increases, so does the error ratio (Koirala, 2015; Thomson & Isaacs, 2009). Familiarity counts 1-4 show the most variability in error ratios, likely indicative of word familiarity mitigating effects of sound unfamiliarity. As mentioned above, given an equal number of unfamiliar sounds, familiar words seem to lead to fewer errors than unfamiliar words; an example of this is the aforementioned *yuxwule'* ('bald eagle'). Although this word has two unfamiliar sounds (*xw* and final glottal stop), it exhibits no errors. This is likely because it is one of the first words Hul'q'umi'num' learners come across, and a very common word, especially in pedagogical settings.[4]

[4] Note: we currently do not have access to lexical frequency data, or word familiarity data of any kind that we could use to assess the role of word-level familiarity on pronunciation. This is an area of future research.

Figure 5

Error ratios by unfamiliarity of sounds and sequences, by token (a) and by type (b).



(a) by token (b) by type

Finally, we turn to effects related to the specific phonological characteristics of the sounds involved in errors. Table 4 summarizes the most common phonological error types observed in all tests. Not surprisingly, the general pattern was a tendency for learners to produce less marked forms than their elders, which generally also corresponded to forms with increased similarity to English. Voicing errors were the most common (42% of total) and almost always involved pronouncing a glottalized consonant as its plain counterpart (e.g. *kw'et'un'* → *kwetun* 'mouse'). Place of Articulation errors (20% of total) most often involved replacing a Hul'q'umi'num' sound with an English sound (e.g., *snuhwulh* → *snuhwuth* 'canoe race'; *qiq'quq'ul's* → *kikkukuls* 'policemen'). Manner of Articulation errors (12%) often included affricates, pronounced either as stops, (*stseelhtun* → *steelhtun* 'salmon') or fricatives (*tsiitmuhw* → *siitmuhw* 'owl'). Another common error was replacing a fricative with a stop, especially with velar and uvular sounds (e.g., *'es-hw* → *'eskw* 'seal'). Deletion errors (11% of total) most often involved word-initial consonant cluster reduction (e.g., *stseelhtun* → *tseelhtun* 'salmon') and word-final glottalization (e.g., *stqeeye'* → *stqeeye* 'wolf'). Finally, many errors involved more than one phonological property, for example, voicing and place (e.g., *wetth'ut* → *wetsut* 'pry it').

Table 4

Number of Errors by General Phonological Category

Error type	Most Common Error and (#) of Examples	Number (% of total)
Deletion	’ → ∅ (N=86) stqeey**e’** → stqeey**e**	254 (11%)
Voicing	n’ → n (N=119) kw’et’u**n’** → kw’et’u**n**	967 (42%)
Place	lh → th (N=95) snuhwu**lh** → snuhwu**th**	466 (20%)
Manner	ts → t (N=57) s**ts**eelhtun → s**t**eelhtun	283 (12%)
TOTAL (4 most common error categories)		1970 (85%)

Although most errors converged on less marked/English-like pronunciations (59%), this was not always the case. In some cases (19%), errors involved swapping one Hul’q’umi’num’ sound for another (e.g. *snuhwulh* → *snuhwux* ‘canoe’). Interestingly, 7% of errors involved diverging from English, by swapping a shared sound with English for a Hul’q’umi’num’ specific sound (e.g., *thqet* → *lhqet* ‘tree’; *shes* → *shelh* ‘sea lion’). Bird et al. (2016) documented such substitutions as well and suggested that they resulted from Hul’q’umi’num’ learners and teachers being hyper-aware of the unique sounds of their language and wanting to emphasize those sounds, partly to make sure to ‘get them right’ in this pedagogical context (Saito & van Poeteren, 2012; Uther et al., 2006) and partly to distance themselves from English (Babel, 2009; Bird, 2020; Haynes, 2010).

DISCUSSION AND CONCLUSION

Our aim in this preliminary ‘broad sweep’ study has been to document and analyze Hul’q’umi’num’ L2 pronunciation patterns in such a way as to provide useful information to Hul’q’umi’num’ learners and teachers, which pinpoints the challenges learners face and provides explanations for them. Our findings are as follows:

(1) not all tests are created equal (Jilka et al., 2007, Thomson & Isaacs, 2009): reading tasks with unfamiliar words are more difficult than lexical retrieval tasks with familiar words

(Table 3). Our take-home message from this is that tests need to be designed intentionally, to tap into specific abilities.

(2) Consistency in pronunciation varies as a function of speaker (Figure 3), suggesting that individually tailored instruction would be useful, especially to avoid the fossilization of individual-specific (consistent) substitutions.

(3) Consistency also varies as a function of word, and more specifically as a function of the sounds contained within the word (Figure 4): some sound substitutions are consistent (e.g. *kw'* → *kw* in *kw'et'un'* 'mouse') while others are not (e.g. *tth'* → *tth*, *t*, *ts*, *ts'*, *th*, and *ch* in *wetth'ut* 'pry it'). An interesting follow-up would be to work with elders to determine which substitutions are the least disruptive to communication. For pedagogical purposes, it would also be beneficial to know what the developmental pathway is for sound replacements, to see whether any substitutions become more consistent over time and if so, which ones.

(4) The number of unfamiliar sounds correlates highly with the number of errors within words (Figure 5). This is not surprising of course, but it suggests that - where possible - it might be useful to consider phonological content in deciding how and when to introduce new vocabulary.

(5) Phonological specification and distribution (word and syllable position) of sounds determines error patterns (Table 4). Now that we have a sense of the overall error patterns, teachers can flag these with their learners at the early stages, and help them focus their pronunciation work.

(6) Though most sound substitutions converge on English and less marked forms, this is not categorically true. Some substitutions (e.g. *th* → *lh*; *p* → *p'*) diverge from English, likely an effect of learners wanting to privilege the sounds they know make Hul'q'umi'num' sound unique. Further work is needed to understand what makes certain sounds especially prone to diverging from, as opposed to converging on English sounds (Bird, 2020).

Our study lays the foundation for future, more targeted research on factors that affect Hul'q'umi'num' learners' pronunciation. These will undoubtedly contribute to our understanding of additional language pronunciation learning as a whole, given the richness of the Hul'q'umi'num' sound inventory. They will also allow us to fine-tune the way that we teach Hul'q'umi'num' pronunciation, to support learners as they work towards proficiency and fluency (McIvor, 2015).

ABOUT THE AUTHORS

Sonya Bird is an associate professor in the Linguistics Department at the University of Victoria. She is particularly interested in the role of pronunciation in Indigenous language revitalization. Her current work is focused on supporting adult Hul'q'umi'num' learners to speak proficiently and fluently. In collaboration with the Hul'q'umi'num' Language & Culture Society and the Hul'q'umi'num' Language Academy, she has been documenting the details of pronunciation across Hul'q'umi'num' speakers of different generations and fluency levels, to understand what the challenges are for learners and to help design pedagogical tools and methods to overcome these challenges. On the pedagogical side, she is interested in exploring the benefits of incorporating phonetic analysis and "speech visualization" into pronunciation learning and teaching.

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Janet Leonard has been documenting, describing, and analyzing the sound patterns of various Coast Salish languages since 2004. Her master's and doctoral research focused on the sound patterns of schwa in SENĆOŦEN. Building on her previous work, she is now interested in how the interaction of two different phonological systems (i.e., Hul'q'umi'num' and English) influence learner pronunciation. Currently, she works as a part-time post-doctoral researcher in the Linguistics Department at the University of Victoria, as part of a team investigating learner pronunciation and the role of linguistic research in the Hul'q'umi'num' teaching and learning context. She also works as a contract linguist on various Salish documentation and archiving projects.

Tess Nolan is a PhD candidate in the Linguistics Department of the University of Victoria. Tess's current work focuses on studying the pronunciation of adult Hul'q'umi'num' learners and Hul'q'umi'num' speaking elders, and the attitudes of these learners to their own and their elders' pronunciation. Tess is part of a broader team studying Hul'q'umi'num' language learning, the role of phonetic analysis and feedback on pronunciation learning specifically, and pedagogical applications of that research.

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Appendix A

IPA ~ Hul'q'umi'num' Orthography Conversion Chart

HUL	**IPA**	**HUL**	**IPA**
a (aa)	ɑ (ɑː)	s	s
e (ee)	e (e)	sh	ʃ
i (ii)	i (iː)	hw	x^w
U	ə	x	χ
O	o	xw	$χ^w$
ou (oo)	u~əw	h	h
Ei	ej	tth	tθ
Ay	aj	tth'	tθ'
Uy	əj	ts	ts
P	p	ts'	ts'
p'	p'	tsh	tʃ

T	t	tsh’	tʃ’
t’	t’	tl’	tl’
K	k	w	w
Kw	k^w	w’	w’
kw’	k^w’	y	j
Q	q	y’	j’
q’	q’	l	l
qw	q^w	l’	l’
qw’	q^w’	m	m
’	ʔ	m’	m’
th	θ	n	n
lh	ɬ	n’	n’