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Seeing Speech: Using Praat to Visualize Hul'q'umi'num' Sounds

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As is typical across Turtle Island, the Hul'q'umi'num' (Coast Salish) language revitalization movement is being carried by adult language learners (Haynes 2010; McIvor 2015) but becoming a proficient Hul'q'umi'num' speaker is challenging given the complexity of its sound system. In this paper, we share our experiences using the speech analysis software Praat (Boersma & Weenink 2018) to help in our pronunciation work. We describe the types of pronunciation patterns that can benefit from Praat-based speech visualization, including whole sound adjustments, glottalization adjustments, and timing adjustments. We then discuss how this tool has helped us, by providing tangible feedback on our speech, by allowing us to learn by observing and modelling (a more gentle and culturally appropriate form of learning than explicit instruction), and by learning from Elders through their voices, even when they are not able to be present during pronunciation sessions. In our experience, these benefits combine to increase the confidence that learners feel in working on their pronunciation and therefore in becoming more proficient speakers.

1. Introduction[1] Our project focuses on the Hul'q'umi'num' language (Coast Salish, BC, Canada). As is typical across Turtle Island, the Hul'q'umi'num' language revitalization movement is being carried out by adult second-language (L2) learners (Haynes 2010; McIvor 2015), who have taken on the task of transmitting their

[1] We would like to thank Elders Dr. Sti'tum'at Ruby Peter, Swustanulwut Delores Louie, and Tth'ulsulthw Merle Seymour for their time, support, and expertise; other students of SFU's Linguistics 830 class whose knowledge is also incorporated into this work; the audience at our ICLDC 2019 presentation for feedback on our project; the two reviewers for their valuable comments on this paper; and SSHRC (Partnership Development Grant # 890-2017-0026) for financial support.

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language to future generations as teachers, researchers, and parents. These learners have very high standards when it comes to pronunciation (see Bird & Kell 2017), but they are faced with a difficult task: Hul'q'umi'num' has thirty-seven consonants, twenty-one of which do not occur in English. Very few Elders are available to provide learners with one-on-one support to master the unfamiliar sounds, and existing descriptions of these sounds are generally written for linguists and are relatively inaccessible for community members (Bird & Miyashita 2018).

To support pronunciation work, we have recently begun using *speech visualization*, which is emerging as an effective way of teaching and learning pronunciation both within the Indigenous language revitalization movement (Herrick et al. 2015; Fish & Miyashita 2017; Hirata-Edds & Herrick 2017; Bliss et al. 2018) and in the broader field of second-language acquisition (Olson 2014). The software we use, Praat (Boersma & Weenink 2018), allows learners to work with Elders' speech even when they are not able to sit with them.[2] It also makes phonetic descriptions of speech sounds concrete, allowing for tangible and accessible feedback on pronunciation. For example, it is much easier to understand how plain versus ejective stops are produced if we are able to see the stop closure and burst noise and play each part of the consonant individually, as we can do with Praat (see Figure 7). Finally, it allows students to learn pronunciation through observing and modelling their Elders, a more gentle and culturally appropriate pedagogical approach than explicit instruction. All of these features help to increase learners' confidence to fine-tune their pronunciation and become proficient speakers.

The context for the work reported on here was a Master's level course, Phonetics and Phonology of an Indigenous Language: Hul'q'umi'num', offered in the summer of 2018, in which we participated as instructors (Sonya, Maida) and students (Rae Anne, Luschiimtunaat, S-hwutstus, Squtxulenuhw). Together, we worked with Praat to visualize the acoustic properties of a range of Hul'q'umi'num' sounds, with the goal of increasing our understanding of what to pay attention to in pronouncing and listening to Hul'q'umi'num'. In this paper, we describe our work and what we gained from it. We first introduce the Hul'q'umi'num' language context (§2) and some of the pronunciation challenges identified by teachers and learners (§3). We then summarize how we have been using speech visualization in Praat to overcome these challenges (§4). We end with a discussion of the value of this technique for Indigenous language learning (§5). Our goal is to share what we are doing to fine-tune our pronunciation so that others may learn from it and can feel comfortable incorporating similar work within their own language-learning journey.

2. Hul'q'umi'num' language context Hul'q'umi'num' (Island Halkomelem) is the language spoken by the people whose territory extends along the Western Salish Sea, from Me'luxulh (Malahat) to Snuw'nuw'us (Nanoose) on Vancouver Island,

[2] In subsequent coursework, students used preexisting recordings of Elders in their pronunciation work. In this way, Elders continued to support students' work, even if they were not able to be present at a particular time.

BC, Canada, and the neighbouring islands in the Strait of Georgia (see Figure 1).[3] Hul'q'umi'num' is one of three closely related dialects of what is often called the Halkomelem language, the other two being hən̓q̓əmin̓əm̓ (Downriver Halkomelem), spoken at the mouth of the Fraser River in the Lower Mainland, and Halq'eméylem (Upriver Halkomelem), spoken further up the river in the Fraser Valley, on mainland British Columbia.

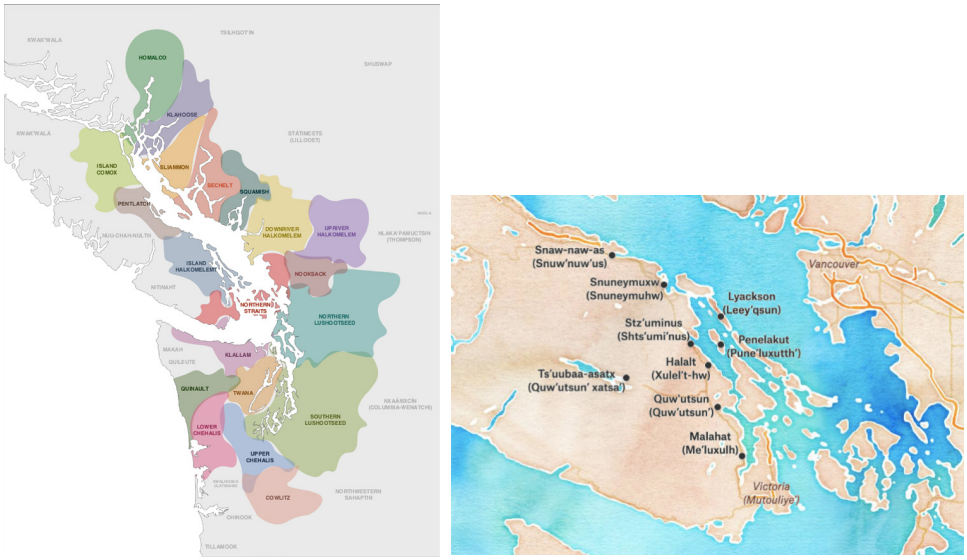

Figure 1. (Left) Map of Coast Salish linguistic distribution in the early to mid 1800s, by Noahedits (2019) (reproduced following Creative Commons License CC-BY-SA 4.0. (Right) Hul'q'umi'num' community map created by Helen Zhang and modified by coauthors Rae Anne Claxton and Maida Percival)

According to Gessner et al. (2022), across Hul'q'umi'num'/hən̓q̓əmin̓əm̓/ Halq'eméylem, 0.5% of a population of 20,371 were fluent speakers and 9.3% were active learners in 2022. While the number of first-language (L1) speakers continues to decline as Elders pass away, the number of L2 speakers is growing rapidly, with 1,901 language learners reported by Gessner et al. (2022). For the Hul'q'umi'num' dialect specifically, we estimate that currently, there are approximately twenty to thirty L1 speakers, over 200 fluent L2 speakers, and over 1,000 learners of all ages. Many L2 speakers – young adults in particular – are currently at intermedi-

[3] In the Hul'q'umi'num' map (right), we use the names used by the bands themselves, spelled in the orthography each band uses. We also include in parentheses the names as spelled in the practical orthography used by the Hul'q'umi'num' Language & Culture Society.

ate to high levels of proficiency; they are leaders in their communities in terms of Hul'q'umi'num' language revitalization, working as linguists, educators, and parents to pass on their language to future generations.

To support new speakers, many new programs have been and continue to be created across Hul'q'umi'num' territory, for all ages and ability levels. The work we describe below was done through the Hul'q'umi'num' Language Academy (HLA), a partnership between Simon Fraser University (SFU) and the Hul'q'umi'num' Language & Culture Society (HLCS), facilitated by SFU linguist Professor Donna Gerdts. The HLA offers SFU undergraduate and Master's level linguistics programs in-community, including courses in phonology and phonetics – the study of speech sounds.

Our project was conducted as part of a Master's level course, *Linguistics 830: Phonetics and Phonology of an Indigenous Language: Hul'q'umi'num'*, offered in summer 2018 by SFU through the HLA. The project itself was funded through a Partnership Development Grant from the Social Sciences and Humanities Research Council of Canada (SSHRC), *Hul'q'umi'num' Phonetics Structures: Exploring Paths Towards Fluent Pronunciation*, the goal of which was to support adult L2 learners in achieving oral proficiency. The research program as a whole involved (1) documenting the pronunciation of L1 and L2 speakers; (2) working with Elders, teachers, and learners to identify challenges for learners; and (3) assessing teaching methods to overcome these challenges. The project described here falls under (3). Specifically, we set out to explore the potential benefit of speech visualization using Praat to provide learners with an engaging and tangible means of understanding their pronunciation and how it might differ from their Elders', and to give them a starting point for further pronunciation work.

3. Hul'q'umi'num' pronunciation In the field of second-language acquisition, it is widely accepted that the goal in teaching and learning pronunciation ought to be comprehensibility and intelligibility rather than native-like accent (Thompson & Derwing 2015). Nonetheless, mastering the details of pronunciation is something that many learners of Indigenous languages take very seriously, to honour their language and their Elders and to ensure they can communicate easily with their Elders (Bird & Kell 2017). Hul'q'umi'num' learners also recognize that hearing and articulating all the sounds of their language will allow them to expand their vocabulary, helping them to distinguish words with similar sounding consonants (e.g., *smukw* /smuk^{w}/ 'a ball' vs. *smuqw* /smuq^{w}/ 'something that's thick or big around') and to recognize morphemes that are expressed by subtle changes in pronunciation, like glottalization (e.g., Hul'q'umi'num' *'imush* /ʔiməʃ/ 'walk' vs. *'i'mush* /ʔiʔməʃ/ 'walking'). For Hul'q'umi'num' (and other Salish language) learners, mastering the sound system means learning to articulate many sounds and sound sequences that are not present in English, most learners' L1 (Bird et al. 2016; Bird et al. 2022). One of the biggest challenges is the consonant system: Hul'q'umi'num' has thirty-seven consonants, twenty-one of which are not in English (Table 1). These include many sounds that are especially tricky for learners:

- Ejective stops *p' t' kw' q' qw'* (/p' t' kʷ' q' qʷ'/)
- Glottalized resonants *m' n' l' y' w'* (/m' n' l' j' w'/)
- Uvular sounds *q qw q' qw' x xw* (/q qʷ q' qʷ' χ χʷ/)
- An extensive set of coronal fricatives *th s lh sh* (/θ s ɬ ʃ/) and affricates *tth tth' ts ts' tl' ch ch'* (/tθ tθ' ts ts' tɬ' tʃ tʃ'/)

Table 1. Hul'q'umi'num' consonants (using the Hul'q'umi'num' alphabet)

	Labial	Dental	Alveolar	Lateral	Palatal	Velar	Labialized velar	Uvular	Labialized uvular	Glottal
Stops	p		t			k	kw	q	qw	'
Ejective stops	p'		t'				kw'	q'	qw'	
Affricates		tth	ts		ch					
Ejective affricates		tth'	ts'	tl'	ch'					
Fricatives		th	s	lh	sh		hw	x	xw	h
Resonants	m		n	l	y		w			
Glottalized resonants	m'		n'	l'	y'		w'			

Hul'q'umi'num' learners do remarkably well in their pronunciation overall (Bird et al. 2022). Nonetheless, many learners do use strategies to ease articulation, which can be grouped into three types: adjustments to whole sounds (especially uvular and velar sounds), adjustments to glottalization (ejective stops and glottalized resonants), and adjustments to timing, both within segments (e.g., labialized velar and uvular sounds) and across segments (in consonant clusters). In our pronunciation work, which we call "fine-tuning" to recognize the overall success of students in their speaking skills, we have in mind two things: (1) ensuring that sound contrasts are maintained (e.g., between velar and uvular consonants) and (2) ensuring that individual sounds are pronounced in a way that is recognizable and sounds right to Elders (e.g., the burst release in ejective stops).

Adjustments to whole sounds Consonants with places of articulation that are similar to a single English place of articulation often present challenges, especially the uvular *q q' x qw qw' xw* (/q q' χ qʷ qʷ' χʷ/) versus velar *k kw kw' hw* (/k kʷ kʷ' xʷ/) series. Learners sometimes confuse these sounds, replacing one with another (see Figure 5), and have difficulty pronouncing the right sound in a given word. It is also not uncommon for students to mix up similar sounds, such as the lateral *lh* (/ɬ/) and dental *th* (/θ/) fricatives (Bird et al. 2016).

Adjustments to glottalization Glottalization is marked by an apostrophe in Table 1. Two sets of sounds involve glottalization: 1) glottalized resonants *m' n' l' y' w'* (/m' n' l' j' w'/) and 2) ejective stops *p' t' kw' q' qw'* (/p' t' kʷ' q' qʷ'/) and affricates *tth' ts' tl' ch'* (/tθ' ts' tɬ' tʃ'/). Glottalized resonants are difficult in that the timing of the

glottal articulation can vary based on phonological environment and also in that the realization of glottalization can sometimes be quite subtle, as in word-final (post-) glottalized resonants. For learners, the result is that it can be challenging to remember where to pronounce glottalization within words (see Figure 6). Ejectives can also be tricky to produce consistently, with learners replacing plain stops or affricates with ejective ones (see Figure 7) or vice versa (Bird et al. 2016), and pronouncing ejectives with slightly different phonetic properties than Elders/teachers (Percival & Bird 2018).

Adjustments to timing Another aspect of Hul'q'umi'num' pronunciation that is challenging for learners is the timing and spacing of sounds. Within the velar and uvular labialized series, timing of labialization can be an issue, with learners pre-emptively rounding their lips and shifting labialization onto preceding vowels (see Figure 8). Timing also comes up in terms of the rhythmic properties of Hul'q'umi'num': unlike in English, each Hul'q'umi'num' sound needs to be given its own space in order for words and phrases to sound natural. For example, unstressed vowels do not tend to be shortened as much as they are in English (see Figure 9). Finally, as is typical in Salish languages, Hul'q'umi'num' words often feature long strings of consonants, or "clusters." Onset clusters can have up to five consonants in a row (e.g., *hwthtiwun* /**xʷθt**iwən/ 'think'; *hwtth'xwuw'i'tst* /**xʷtθ'χʷ**əw'i'tst/ 'wash someone's back'). When some of these consonants are already challenging on their own, stringing them together is extra challenging (see Figures 2 and 10).

One aspect of the Hul'q'umi'num' consonant inventory that is interesting to consider in the context of language learning, but that we do not address here, involves the contrasts between the dental *th tth tth'* (/θ tθ tθ'/) and alveolar *s ts ts'* (/s ts ts'/) series and between the alveolar *ts ts'* (/ts ts'/) and post-alveolar *ch ch'* (/ʧ ʧ'/) series. These sounds involve substantial dialectal variation in terms of how salient the contrast is, which has yet to be documented thoroughly (see Elmendorf & Suttles 1960; Suttles 2004). For some speakers, these sounds (e.g., *th*) are pronounced quite differently than they are in English, and as a result, the key phonetic correlates of the related contrast (e.g., *th* vs. *s*) differ from what they are in English (see Mellesmoen & Babel 2020 on the same sounds in ʔayʔaǰuθəm). Our impression is that learners who grew up hearing Hul'q'umi'num' at home and/or in the community pronounce the dental and alveolar fricatives and affricates the way they heard them growing up. Learners who were not exposed to the language growing up tend to fall back on their English (L1) pronunciation.

Learners of Hul'q'umi'num' have very high standards with respect to pronunciation, but little by way of resources to support them when working on their own speech. As mentioned above, very few Elders are available to provide individual support to learners, and there are few opportunities to hear natural spoken language outside of pedagogical and ceremonial settings. Learners might hear Hul'q'umi'num' spoken in the community, but not all families have language speakers to listen to and engage with in conversations in the home. In addition, many of the more popular teaching methods for Hul'q'umi'num' and other Indigenous languages – for exam-

ple, TPR (Total Physical Response; Asher 1977), TPR-Storytelling (Cantoni 1999), and Greymorning's (2011) Accelerated Second Language Learning Approach – de-emphasize pronunciation, assuming that learners can improve their pronunciation over time through hearing and modelling Elders. Other methods, such as Where Are Your Keys (WAYK),[4] do incorporate some pronunciation techniques but still do not provide much support in terms of concrete strategies to master pronunciation.

Until recent years, work on Hul'q'umi'num', both linguistic and pedagogical, was done primarily through collaborations between Elders and linguists (Hukari & Peter 1995; Gerdts & Hinkson 1996; Gerdts & Peter 2011). While the materials produced are of great value to language learners now and many of them do target pronunciation, they do not necessarily concentrate on the fine phonetic details of pronunciation, for example what the timing properties are within and across sounds (see Figures 2, 8, 9, and 10). In addition, as noted above, these materials can be inaccessible to learners who are not familiar with linguistic terminology. Since 2016, pronunciation has played a central role in HLCS and HLA programming, in recognition of how important it is for developing oral proficiency among new speakers. Starting in 2018, learners have been training to do pronunciation work themselves, on their own speech and in collaboration with their language mentors, and with phonetics experts, partnering on various projects and courses at the HLCS/HLA.

4. Hul'q'umi'num' pronunciation and speech visualization in Praat To address the pronunciation challenges described above, and as part of continued training for Hul'q'umi'num' learners, we explored the potential of Praat (Boersma & Weenink 2018), a free speech analysis software that is used by speech scientists around the world to examine the details of speech sounds. In the following paragraphs, we introduce who we are (§4.1), what context we were working in (§4.2), and what we did, providing concrete examples of the kinds of speech patterns we focused on in our work (§4.3).

4.1 Who we are At the time we collaborated on this project, we were Master's students (four of fifteen total) and instructors in SFU's Master's program in linguistics of a First Nations language, Hul'q'umi'num', offered through the HLA (see §2). Our project took place in the context of one of the required Master's courses: *Linguistics 830: Phonetics and Phonology of an Indigenous Language: Hul'q'umi'num'*. The entirety of the course was situated in unceded Quw'utsun' territory, so all coursework was presented in the Hul'q'umi'num' way. To continue honouring Hul'q'umi'num' protocols here, and in keeping with Indigenous epistemologies more generally (Wilson 2008), we take the time in this section to introduce ourselves and our roles in this project.

Rae Anne Claxton I am W̱SÁNEĆ from ST̓ÁUTW̱, born in Quw'utsun' and raised between both of my communities. I am a PhD student in linguistics at the University of Alberta. I studied the linguistics of Hul'q'umi'num' through SFU, where I

[4] https://whereareyourkeys.org (Accessed 2023-06-06.)

completed my Master's degree. I continue to work towards Hul'q'umi'num' fluency with my *si'lu* ('grandmother') Sarah Modeste, my mentor. Outside of my studies, I teach Hul'q'umi'num' in both formal and informal settings, and I am honoured to be called upon from time to time to work alongside my Elders on Hul'q'umi'num' for our community. *Hilukw nu shqwaluwun kwutst hwu'alum'nuhw tthu s'aalh sqwal tst* (I'm happy we are managing to bring back our language). I used Praat extensively for learning Hul'q'umi'num' from 2018-2020. Throughout my recent experience as a sessional instructor for the University of Victoria's Certificate and Diploma programs in Indigenous Language Revitalization focused on Hul'q'umi'num', I chose not to introduce Praat, instead weaving phonetic instruction into classtime with language use.

Luschiimtunaat (Sonya Charlie) *'Een'thu Luschiimtunaat, tun'ni' tsun 'utl' Quw'utsun'. Sonya nu s-hwunituma'lh nu sne.* My parents are Darlene Sylvester Sunatiye' and Arvid Charlie Luschiim, from whom I learned a love for my language and the importance of my culture. I am a busy mother and language learner. I have been working with Hul'q'umi'num' since I was a teenager. I received my Master's degree in Hul'q'umi'num' linguistics from SFU in 2019.

S-hwutstus (Harvey George) *'Een'thu S-hwutstus, tun'ni' tsun 'utl' Lhumlhumuluts'. Harvey nu s-hwunituma'lh nu sne.* I have been teaching Hul'q'umi'num' in School District 79 (Cowichan Valley, BC) for ten years. Recently, a few of us challenged ourselves to acquire a Master's degree from SFU in Hul'q'umi'num' linguistics. Several of us were successful; a few of the students have gone on to their PhDs.

Squtxulenuhw (George Seymour) *'Een'thu Sq'utxelenuhw tthunu s-hwulmuhw'alh nu sne.* I was named after my grandfather and my father. They were headmen of the *Shts'umi'nus mustimuhw* (Shts'umi'nus[5] people). I used to work for the Cowichan School District and recently moved to the Nanaimo School District, teaching kids and high school students. I am very grateful that I earned my Master's degree in linguistics from SFU and got to work with Praat. That really opened my eyes and my mind to a different way of teaching. My program brought a lot of my language back to me, and along with it, it brought a lot of stories back to me, stories that I heard as a child.

Sonya Bird I am a linguistics professor at the University of Victoria, which sits on the territories of the lək̓ʷəŋən and SENĆOŦEN speaking peoples at the southern tip of Vancouver Island. I specialize in the sounds of Coast Salish languages. Recently, my research has focused on supporting learners of these languages, as they work towards oral proficiency and fluency. In 2018, I began collaborating with the HLCS, through a Partnership Development Grant from the Social Sciences Research Council of Canada (SSHRC). I have felt very fortunate to continue to work with members of the HLCS and HLA on pronunciation matters, including teaching LING

[5] Also spelled *Stz'uminus* and anglicized as *Chemainus*.

830 in the summer of 2018.

Maida Percival I am a PhD student in linguistics at the University of Toronto. I first became involved with Hul'q'umi'num' through a field linguistics class taught by Professor Donna Gerdts and Elder Eugene Harry at SFU in 2012. Since then, I have been involved in various workshops, classes, and research projects through Donna, Sonya, and HLCS/HLA. It has been a valuable experience and shaped a lot of my life over the past years, solidifying my interests in phonetics (particularly of glottalization) and language revitalization and encouraging my pursuit of a PhD. For LING 830, I worked as a teaching assistant, mostly in a support role, giving students one-on-one help and doing various tasks to make things run smoothly.

4.2 What we did As mentioned above, our project was embedded in a Master's level course on Hul'q'umi'num' phonetics and phonology. As part of the course requirements, students were required to:

1. Pick a sound or set of sounds that they found challenging
2. Put together a list of words illustrating the (set of) sound(s)
3. Record themselves, other learners, and one of their Elders pronouncing the words[6]
4. Do a comparative analysis of pronunciation across speakers, using Praat as an aid
5. Report to the class on what they discovered and how it helped them in their pronunciation work

The goal of this multipart assignment was to train students in phonetic research methods while also giving them an opportunity to delve into the details of Hul'q'umi'num' pronunciation and to increase their awareness of the challenges that learners face and how they might be addressed.

Praat is a speech analysis software (Boersma & Weenink 2018) that is widely used by speech scientists for analyzing the sound waves associated with speech. Although it is designed to allow for highly detailed quantitative analysis, it can also be used for much less technical applications (e.g., for inspecting speech visually as part of pronunciation work in a pedagogical context) (see examples in §4.3). Our experience in the Hul'q'umi'num' phonetics and phonology class showed us that learners of all ages and comfort levels with technology can quickly learn to see the details of speech using Praat's spectrogram display. This kind of visualization is particularly useful for seeing aspects of pronunciation that are difficult to hear and/or to describe in words.

Students were given a basic guide to Praat,[7] which included instructions on how

[6] See §4.3 for details.

[7] An updated version of the guide is provided in Appendix A; it was used by coauthors Sonya and Rae Anne for the CoLang 2023 Praat workshop and includes visual displays of audio recordings made by coauthor Rae Anne as part of her MA thesis (Claxton 2020).

to download Praat, how to create new and open existing audio recordings, how to navigate through them and listen to them (in whole or in parts), how to create textgrids for them, and how to use the textgrids to segment and annotate the audio for visual and auditory inspection (Figure 2). Among the group of students, there was a mix of comfort levels with computer technology, and the main challenges we encountered involved basic technological literacy rather than Praat use per se (e.g., logging on to computers and locating Praat to open it up). Some students were very comfortable and could get started fairly quickly using the guide and working independently; those students completed their own work efficiently and also assisted other students as needed. Students who were not as familiar and comfortable with technology were encouraged to work in groups of two or three, with each group focusing on the same pronunciation challenge but making individual recordings of their own speech. In the Hul'q'umi'num' community, working together and helping each other are important values. We brought these values into the classroom, helping each other out so that everyone was able to complete the required work.

Figure 2 provides an example of a typical Praat display, including a waveform (top panel), a spectrogram (middle panel), and two annotation tiers (the 'textgrid'). The recording is of a learner pronouncing the Hul'q'umi'num' phrase *kwthunu men* /kʷθənə men/ ('my father'). You can see that they have inserted a vowel between [kʷ] and [θ] (see highlighting) in *kwthunu*. This strategy is typical among learners: consonants within clusters are not released as fully as they are by Elders, and instead, vowels are inserted to ease articulation. Seeing their pronunciation visually can help raise learners' awareness about their own speech in comparison to their Elders and can give them a visual target to aim for when they are unsure of the auditory target. Although not displayed here, Praat also allows for displaying the pitch and intensity contours, which are useful for stress and intonation work.

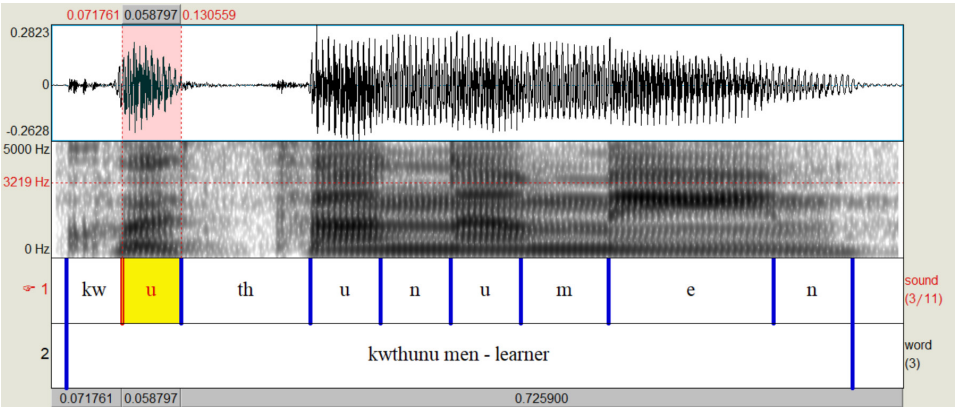

Figure 2. Typical Praat display, showing a recording of a learner pronouncing *kwthunu men* /kʷθənə men/ ('my father') with an extra vowel between *kw* and *th* [kʷəθənə] (highlighted)

Although each student or group focused on a single (set of) sound(s), the class overall examined a wide range of sounds, including the following:

- the *ts* ~ *tth* (/ts ~ tθ/) and *ts'* ~ *tth'* (/ts' ~ tθ'/) contrasts (dental and alveolar, plain and ejective affricates)
- *tl'* (/tɬ'/) (lateral release ejective affricate)
- *lh* (/ɬ/) and *th* (/θ/) (dental and lateral fricatives)
- *l' y' w' m' n'* (/l' j' w' m' n'/) (glottalized resonants, including their timing across positions)
- *e* (/e/) (across segmental environments)
- the *hw* ~ *xw* (/x^{w} ~ χ^{w}/) contrast (velar vs. uvular labialized fricatives)
- the *kw* ~ *qw* (/k^{w} ~ q^{w}/) contrast (velar vs. uvular labialized stops)
- clusters

The process began with students downloading Praat to their personal computers, which most students had (some students shared). We set lab time to sit together as a group, to become familiar with the program.

Figure 3. Doing Praat work together in class

Before any analysis could be done, audio files needed to be created. Students worked with Elders to record a word list targeting the sounds they chose to work on. They were in charge of making the recordings, which they did in a quiet room adjacent to the classroom, using Praat or Audacity[8] (Audacity Team 2018) and a Yeti USB microphone[9] plugged directly into a laptop.

Within Praat, students opened the resulting audio file, created a textgrid for it (see Figure 2), and went about segmenting their own speech and the speech of the Elder they worked with, using both auditory and visual information. In general, not much time was spent on the precise acoustic correlates of particular sounds; instead, the focus was on visually differentiating between sounds in the spectrogram and waveform. Boundaries between sounds were placed based on the following general guidelines:

- Vowels were segmented from the onset to the offset of the voice bar and/or formant bands.
- Resonants were segmented from the onset to the offset of the voice bar and/or formant bands (paler/lower intensity than vowels); in cases where the boundary between a vowel and a resonant was unclear, they were segmented into a single interval unless the focus was specifically on the resonant (glottalized resonants in particular), in which case care was taken to isolate just the resonant.
- Stops and affricates were segmented from the beginning of the stop closure until either the onset of voicing of the following sound or, if no voiced sound followed, until the end of the stop release.
- Fricatives were segmented from the onset to the offset of aperiodicity in the waveform and grey noise in the spectrogram.

When segmenting the recordings, high degrees of accuracy and consistency were not crucial since we were not conducting quantitative acoustic analyses. Students segmented to the level that was helpful for them, focusing on what was relevant to understanding the difficulties in their speech. For example, if a student struggled with ejective stops, they would segment the stop closure, stop burst, and silence following the stop burst separately; if they did not have trouble with these sounds, or if that was not a feature of pronunciation they were concentrating on, they would just segment the whole stop as a single interval.

As students, segmenting sounds and seeing our speech in Praat allowed us to recognize how we were pronouncing sounds and words and to identify the differences between Elders' and our speech that we had not noticed before. For example, we found that students tended to "over-ejectivize" sounds, for example saying [məkʷ'ət]

[8] Another popular, freely accessible recording tool (https://www.audacityteam.org/).

[9] https://www.bluedesigns.com/products/yeti/ (Accessed 2023-06-06.)

instead of [məkʷət] for *mukwut* /məkʷət/ ('hit one's opponent with a ball') (see Figure 6). More generally, we found that being able to *see* the acoustic characteristics of our speech (consonants in particular) was highly beneficial for increasing our awareness and understanding of pronunciation. The last part of our assignment involved presenting our discoveries to the class (see Figure 4). This process allowed us to really think through the patterns we observed in our speech compared to those in our Elders' speech and also provided an opportunity to discuss what strategies we might be able to use to shift our speech so that it better matched our Elders'. In the next section, we provide examples of the pronunciation features we focused on, what we discovered about them, and how working with Praat benefitted us in our pronunciation work.

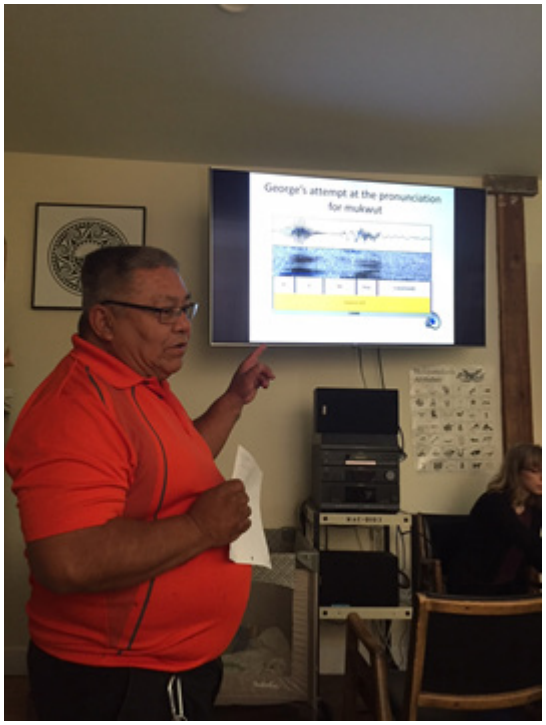

Figure 4. Coauthor Squtxulenuhw reporting on his Praat work

4.3 What we discovered In this section, we illustrate some of the things that we learnt using Praat to 'see' speech, using examples typical of the types of strategies used by learners to ease articulation, including adjustments to whole sounds, adjustments to glottalization, and adjustments to timing. Examples are from the class in general; in cases where they are our own (coauthors), we use the first person to talk about them. We hope that these examples will give readers a sense of the kinds of

features that are useful to explore visually and that they will provide a useful list of the types of patterns that teachers and learners can look out for in their pronunciation work.

Adjustments to whole sounds One common strategy used by learners involves wholesale replacement of one sound by another one. Figure 5 illustrates this with the word *sul'ixw* /səl'iχʷ/ ('covered'), which ends in the voiceless labialized fricative *xw*. This sound is challenging for some learners and is sometimes replaced by the more familiar *kw*, as in Figure 5 (right). The difference between *xw* and *kw* is relatively easy to see: in *xw*, the whole sound is associated with noise (like static/snow on a TV); in *kw*, the first portion of the sound is silent (see highlighting), corresponding to the complete stop in airflow during the time the tongue body is up against the palate for [k] before releasing into [w̥]. Learners do not need to understand the details of articulatory and acoustic phonetics to see the differences between sounds. In this case, by observing the noise on the spectrogram during their Elder's pronunciation of *xw*, the learner was able to aim – visually and auditorily – for the same noise in their own subsequent recordings.

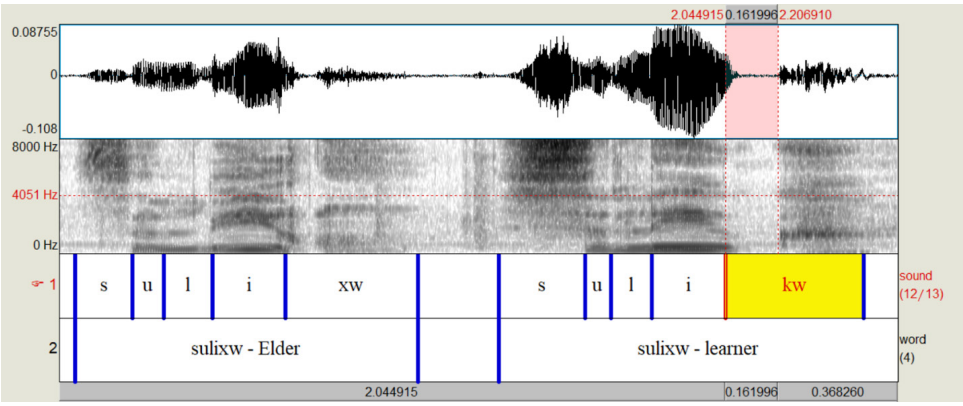

Figure 5. Praat display of a sound replacement in the word *sul'ixw* /səl'iχʷ/ ('covered'): *xw* is pronounced as *kw* by the learner, reflected in the silent period (highlighted) of the *k* before the release into the voiceless *w*.

Adjustments to glottalization Another common pattern among Hul'q'umi'num' learners involves producing glottalized sounds (ejectives and glottalized resonants) in a way that is different from their Elder's pronunciation, either by leaving out or adding glottalization to a sound. Leaving out glottalization occurs most often with glottalized resonants, *l' w' y' m' n'* (/l' w' j' m' n'/). These sounds all have secondary glottalization (a 'catch in the throat') that often (but not always) occurs at the end

of the resonant. Sometimes glottalization is quite strong and sounds like the glottal stop in the middle of the English word *uh-oh*. Other times, it is more subtle and sounds like a short period of creakiness. Glottalization is one of the trickiest features for Hul'q'umi'num' learners to master, partly because it tends to come and go even for L1 speakers. It is nonetheless a very important feature of the language because it changes the meaning of words – for example, *'imush* /ʔiməʃ/ ('walk') versus *'i'mush* /ʔi'məʃ/ ('walking'). Although learners sometimes have difficulty hearing glottalization, it is generally fairly easy to see on a spectrogram. Figure 6 shows the *ul'u* (/əl'ə/) portion of *shqa'ul'uqw* /ʃqaʔəl'əqʷ/ ('soft spot on baby's head'). In the Elder's pronunciation (left), we see that the vertical lines (the pitch pulses, corresponding to the open–close cycles of the vocal folds), become quite spread out and a bit irregular in the second half of the *l* sound and into the following *u*. This is a clear marker of glottalization, which is absent in the learner's speech. Seeing glottalization can help learners notice where it should be pronounced in cases where it is difficult to hear.

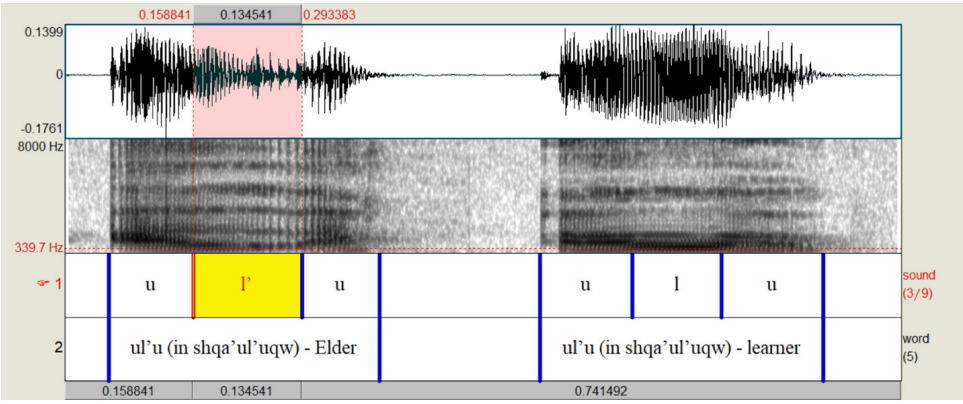

Figure 6. Praat display of /əl'ə/ in *shqa'ul'uqw* /ʃqaʔəl'əqʷ/ ('soft spot on baby's head'). The Elder's pronunciation includes a clear glottalized [l'] (highlighted), which is missing in learner's pronunciation.

When it comes to ejective consonants, the pattern is sometimes reversed: learners tend to over-ejectivize stops, especially at the beginning of words, both phonetically by making ejectives sound more "poppy" than Elders do and by using ejectives instead of plain stops (see also Bird et al. 2016). I (S-hwutstus) had a hard time with *kw* and *kw'*. I used to pronounce the word *mukwut* /məkʷət/ ('hit one's opponent with a ball') with a strong [kʷ'] instead of a soft [kʷ]. This was problematic because it made a completely different word, *mukw'ut* ('pick it up off the ground'). In Figure 7, we can see that, in my Elder's speech (left), the [kʷ] does not have a very strong (dark) release, although it is quite long in this case (longer than usual) because she is emphasizing the softness of the release for me. In my speech (right), *kw* (pronounced [kʷ']) has a more intense release (darker), and there is a little gap or pause between

the release of *kw* and the vowel that comes afterwards. These visual features of my *kw* are the 'trademarks' of strong, "poppy" ejective stops (Lindau 1984; Kingston 1985; Percival 2019). Learning not to overuse ejectives is a big focus for learners. For me, looking at the sounds in Praat, I became aware of the subtle differences between *kw* and *kw'*, and I could see where I should soften my sounds.

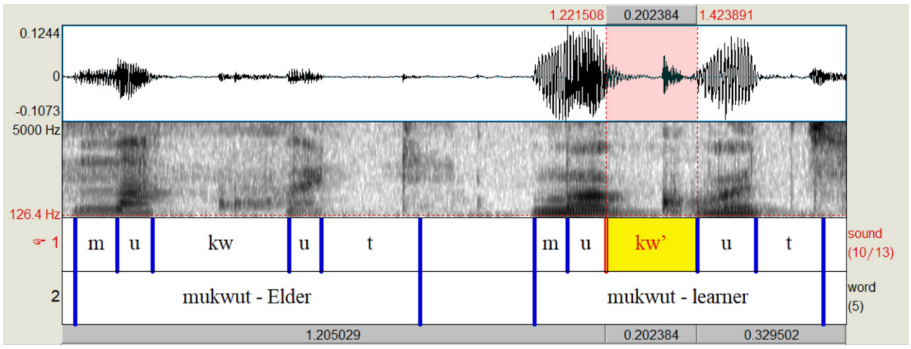

Figure 7. Praat display showing an example of 'over-ejectivizing' /kʷ/ in the word *mukwut* /məkʷət/ ('hit one's opponent with a ball'). Highlighting shows the consonant /kʷ/, which S-hwutstus pronounces as [kʷ'], with a stronger release than the Elder's [kʷ].

Adjustments to timing There are a few challenges related to timing of sounds that we found helpful to visualize in Praat: moving sounds or components of sounds around relative to one another, pronouncing sounds longer or shorter than what is typical in the pronunciation of Elders, and adding vowel sounds into consonant clusters that are difficult to pronounce.

In Hul'q'umi'num', velar and uvular sounds *kw kw' qw qw' hw xw* (/kʷ kʷ' qʷ qʷ' xʷ χʷ/) have what linguists call 'secondary labialization', which refers to rounding of the lips. How this /w/ gesture is timed with respect to the primary sound, and how prominent it is, can vary across speakers. Figure 8 compares *tsakw* /tsakʷ/ ('far'), as pronounced by an Elder (left) and a learner (right). In this example, the learner has a [w] sound between *a* and *kw*, which is absent from the Elder's speech; this is apparent in the downward movement of the dark bands ('formants') during the *aw* portion of the spectrogram (highlighted). In addition, the Elder has a fairly long and audible breathy ('voiceless') [ʍ] at the end of *kw*, which is missing in the learner's speech. In short, the Elder pronounces a voiceless [ʍ] *after* the [k], whereas the learner pronounces a voiced [w] *before* the [k]. Timing differences between components of a sound can be difficult to pinpoint by ear, so seeing them can help learners notice subtle differences that they might not otherwise be aware of.

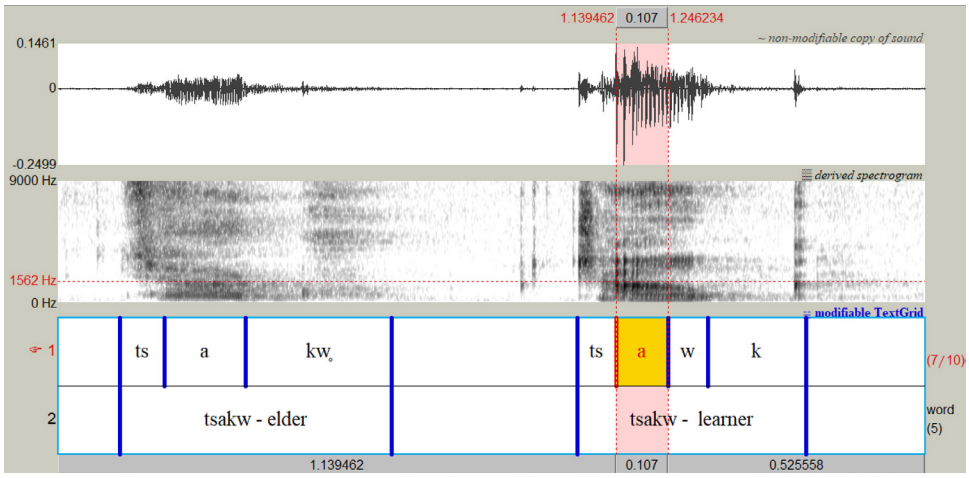

Figure 8. Praat display showing an example of differences in [w] timing and prominence in *kw* between an Elder and a learner, in the word *tsakw* /tsakʷ/ ('far'). The learner has [w] preceding the final *kw* (highlighted), and the *kw* is pronounced [k]; the Elder doesn't have this [w], and the final *kw* is pronounced [kʷ], with fairly long, breathy 'voiceless' [w̥] at the end.

Another timing feature that is helpful to see involves rhythmic structure, which depends in part on the relative length of sounds within words and phrases. Figure 9 provides an illustration with the word *kweyul* /kʷejəl/ ('day'). In the Elder's pronunciation (left), we can see that, aside from the long (heavily aspirated) [kʷ], the sounds are all quite similar in duration, as reflected in relatively equal interval lengths. In the learner's pronunciation (right), the sequence *eyu* is quite short. Auditorily, it sounds more like a single, transitional vowel; the [l] (highlighted) is much longer than any sound in the *eyu* sequence. These durational differences affect the rhythm of the word. In the Elder's pronunciation, *kweyul* clearly has two relatively equally weighted syllables (though the first has primary stress). In the learner's pronunciation, *kweyul* does not clearly have two syllables; it sounds similar to the English word *quail*. It is tricky to teach the rhythm of a language, and as a result, this aspect of pronunciation is often overlooked. By focusing on visual feedback though, we can talk about relative duration, which can be adjusted to improve rhythm in noticeable ways.

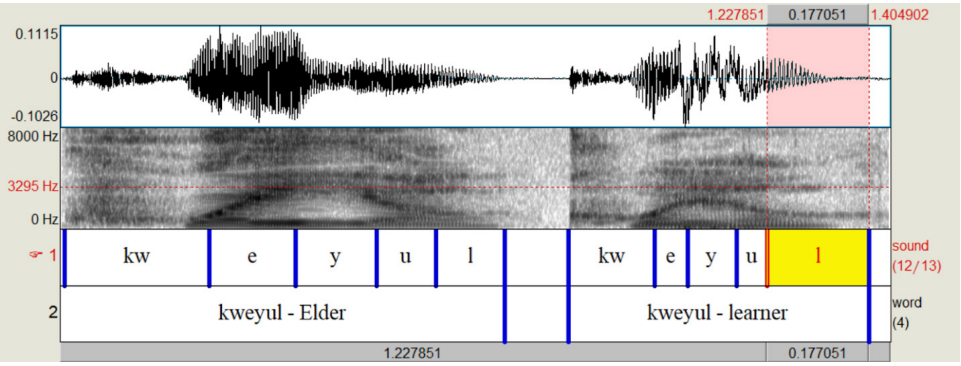

Figure 9. Praat display showing an example of rhythmic differences between an Elder's (left) and learner's (right) speech, in the word *kweyul* /kʷejəl/ ('day').

Finally, Praat can provide an awareness of what strategies learners use to pronounce sequences of consonants, or clusters. In most cases, as in Figure 2, a vowel is inserted between consonants in a cluster, easing the transition between consonants. In some cases though, learners insert a consonant, which leads to overcomplicating a word that is already not easy to pronounce. An example of this is presented in Figure 10, with the word *tth'utth'sh* /tθ'ətθ'ʃ/ ('dragonfly'). In this case, I (Rae Anne) was inserting a third consonant into the final sequence of consonants, pronouncing 'dragonfly' as [tθ'ətθ'ts'ʃ] (*ts'* is highlighted in Figure 10). I knew my pronunciation was not quite right but couldn't put my finger on what the problem was. Once I was able to visualize the extra consonant, I was able to work towards eliminating it, creating further audio files for analysis to see whether I was successful. Isolating and pronouncing each sound in a word is something that Hul'q'umi'num' Elders teach learners to do; visualizing each sound in its exact position within the word helps learners to do this.

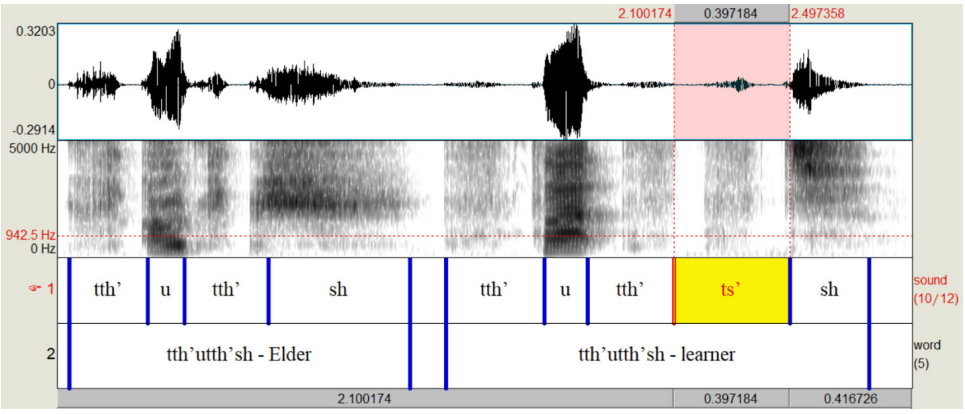

Figure 10. Praat display of a recording of *tth'utth'sh* ('dragonfly'), pronounced by Dr. Sti'tum'at Ruby Peter and repeated by coauthor Rae Anne. Highlighting indicates an extra *ts'* inserted by the learner into an already challenging consonant cluster.

The figures above provide examples of what we can see within words: adjustments to whole sounds (Figure 5), adjustments to glottalization (Figures 6 and 7), and adjustments to timing (Figures 2, 8, 9, and 10). While we did not explore pronunciation challenges above the word level, we have done this outside of the coursework we are reporting on here. Praat allows us to see pitch and loudness as well, providing us with valuable information about sentence-level intonation patterns (Claxton 2020).

As mentioned above, once students had identified the differences between their speech and that of their Elders, their task was to come up with strategies for bringing their speech in closer alignment with that of their Elders. In many cases, we found that Praat provided us with the feedback we needed to try to approximate our Elder's speech. We were able to re-record our speech, keeping in mind the visual (as well as auditory) features we were aiming for, and using Praat to gauge our progress. We would like to acknowledge here that students also worked with their Elders to create additional strategies and plans for how to improve their speech, which were not dependent on Praat. Specific plans varied depending on the challenges being addressed. One particular tip given by late Elder Sti'tum'at (Dr. Ruby Peter) for learning to pronounce a difficult sound was to do it incrementally: start by finding a word that has the sound and that you find less challenging. You can do this by sitting with a fluent speaker who can give you different words to try to pronounce and listen to you saying them, to determine if you are saying any correctly. Once you find a word you can pronounce well, practise it until you are comfortable with it and then transition to the more challenging word(s), the one(s) you are having trouble with. In the case of *tth'utth'sh* (Figure 10), this approach worked well to help with the two *tth'* (/tθ'/) sounds: Sti'tum'at had me (Rae Anne) repeat a number of words that had *tth'*

in them. Of these words, I was able to pronounce the word *stth'am'* /stθ'am'/ ('bone') well. After saying *stth'am'* a number of times, Sti'tum'at reintroduced the more challenging word: *tth'utth'sh*. I was able to pronounce the *tth'*. I was advised to keep using *stth'am'* to set myself up for success with other *tth'* words.

5. Discussion In the following paragraphs, we each express what we feel is the value of working on our pronunciation with Praat. Three main benefits emerge: (1) Praat gives us tangible feedback on our speech, which serves as a starting point for improvement; (2) Praat allows us to learn by observing and modelling our Elders, which is a gentler and more culturally appropriate form of learning than explicit instruction; and (3) Praat makes it possible for our Elders to guide and support us 'from afar', through their voices, even when they are not able to sit with us. These benefits all contribute to increasing the confidence that we feel in working on our pronunciation and therefore in becoming more proficient speakers.

Rae Anne Using Praat takes the guesswork out of pronunciation because Praat shows you exactly what you have said and how it compares to your Elders' way of speaking. Praat also allows us to learn pronunciation without our mistakes being pointed out to us; instead, we can focus on the Elders' speech and try to match it. This is a more efficient way to learn, and one that feels culturally appropriate: learning through observation. Praat is a great resource, whether you are a beginner or whether you are at a more advanced level trying to reach fluency. At first, I used Praat to learn sounds. Then I went back to Praat in studying stories, to look at the way words are spoken and emphasized naturally and the way pitch is raised or lowered. For our remaining L1 speakers, their time is precious and in high demand. It is not practical to think that we will each get the time we need with an Elder to work on our speech. Praat allows us to access their speech, as a model, without having to use their time. It gives us a way to analyze recordings of speech from different Elders, in different styles (e.g., storytelling, conversations), to understand how they use the language in subtle ways to express themselves.

S-hwutstus Any new application to help preserve Hul'q'umi'num' can be added to our toolkit, and any tool we have that can allow us to reconnect with our language is welcome. You can use Praat to play and replay recordings of many speakers telling different stories. Each time I visualize speech, I notice and remember different things; every time I hear a particular speaker, there's a unique flow, and it sounds different. Praat displays are also a softer way to teach and learn. Without Praat, a teacher would just have to say, "No, not that, say it again." This way, a teacher can just point to where the pronunciation differs from the Elder's. You can see the subtle differences, so it is more concrete and the teacher can be less negative. This gives the learner more confidence because it sheds a more positive light on their pronunciation. I think that this tool could be introduced to learners right at the beginning of our university programs, then we would pay more attention to the subtleness of our sounds right from the start. I think Praat could be part of the whole package for reconnecting with our language, for learners of all levels.

Squtxulenuhw For myself, some of the words are really tongue-tiers. When we used Praat, I realized where I was struggling with pronunciation. Out of 1300 people in Shts'umi'nus, we have nine to ten fluent speakers. For learners, Praat will be a really good tool to use, especially with someone who can show them how it will really benefit them. Today, we're losing speakers. Their recordings will be really good for the new learners to use as well.

Maida Since our class in 2018, I have been involved with four other cohorts of students to whom we introduced Praat as a tool to teach pronunciation. Three of these cohorts were introduced to Praat during the COVID-19 pandemic, and I was pleased that the method seems to be flexible enough to be effective even in a virtual environment, either through small-group or one-on-one sessions using screensharing on a videoconferencing platform to replicate the project discussed in this paper, or through larger class settings, where it was less practical to teach how to use Praat but where we instructors still showed Praat using screensharing to help illustrate and explain the different aspects of Hul'q'umi'num' speech. Each group I have worked with has had a positive experience and impressions that mirror those of my coauthors. As for myself, as someone who researches glottalization, it has been rewarding to watch student after student look at and listen to a glottalized sound in Praat and have that moment where they realize that there is a silent portion in those sounds.

Sonya B. Since 2018, I have done quite a lot of pronunciation work with Hul'q'umi'num' learners, through workshops and as part of coursework. In my experience, learners can sometimes feel put on the spot working on pronunciation in front of others. With Praat, learners can practise on their own, in the comfort of their own spaces. This can be less intimidating and a more gentle way to build confidence.

Although we have talked about the pedagogical benefits of Praat here, it is also beneficial for language documentation, as alluded to by Rae Anne and Squtxulenuhw above. As the examples in §4.3 illustrate, Praat lets us describe speech very concretely, in more detail than has been done before and in a way that is accessible to Hul'q'umi'num' teachers and learners. Praat also facilitates transcription work because we can listen to the same chunks of speech over and over again and use our eyes to help us decipher what we are hearing (e.g., whether or not a consonant is glottalized). On a broader level, now that we know how to use Praat, we can use it in our language work ourselves, contributing to developing capacity within our community for oral-based work and for sharing it with others.

6. Conclusion

It can be a difficult task for learners to hear, differentiate between, and produce Hul'q'umi'num' sounds that are not found in English. For us teachers, Praat allowed us to visually pinpoint exact pronunciation challenges for learners, without having to use a lot of technical (linguistic) jargon to describe them. For us learners, even those of us with limited computer/technology skills were able to pick up the basics of Praat relatively quickly, and visualizing and segmenting our speech

gave us something concrete to analyze. Throughout the project and the course, our hands-on involvement with pronunciation through Praat visualization proved to be an effective and fun way to approach pronunciation. Praat helped us increase our awareness about where our challenges were in a tangible and gentle way, without always having to rely on an Elder to sit with us. It also provided us with a clear starting point for improvement, giving us confidence to keep working on our pronunciation as we become proficient speakers.

We hope that, by sharing our experiences, we might encourage others to incorporate speech visualization technology in pronunciation teaching and learning, especially in contexts where resources that support pronunciation work are sparse. So far, we have used Praat to document the speech of Elders and learners and to compare the two. We would like to also use it to compare Elders from different communities and speaking in different contexts (e.g., casually with each other vs. in public speaking). We have found that Praat is an effective tool for our own language-learning journey and also for documenting the language for future generations. We hope to keep using Praat as teachers as well, to help other learners with their pronunciation.

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Appendix A

Appendix A. Praat as a tool for 'seeing speech'

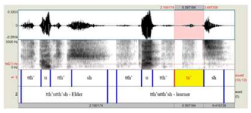
Sonya Bird and Rae Anne Claxton

- This handout was created by co-authors Sonya Bird and Rae Anne Claxton for the Praat workhop that Sonya and Rae Anne taught at the 2022 CoLang summer institute.
- It is an updated version of a handout that was first created by Sonya (2018) for use in Simon Fraser University's Linguistics 830, the course documented in this paper.

1

Introduction

- Praat
  - Tool for seeing, transcribing, and analyzing speech
- Why we use it
  - Slowing down our speaking and listening work
  - Adding a modality: seeing speech to help us hear it
  - Being mindful of Elders' time
  - Working on pronunciation in low-pressure environment
  - Because it's fun!



Praat display of *tth'utth'ish* ('dragonfly') pronounced by Sti'tum'at, Dr. Ruby Peter and Rae Anne Claxton

Praat for Indigenous Language Learning

2

Downloading and opening Praat

- Link to Praat download options: https://www.fon.hum.uva.nl/praat/
  - Select platform
  - Follow download instructions

Download Praat:

* Macintosh, Windows
* Linux, Raspberry Pi, Chromebook
* (FreeBSD, SGI, Solaris, HPUX)
* license and source code

- Double click on the Praat icon to open Praat
- Close the Praat Picture window
  - We won't use it in our workshop

Praat for Indigenous Language Learning

3

Opening sound files

- **Open > Read from file…**

Praat for Indigenous Language Learning

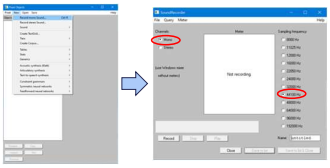
4

Recording new sound files

- **New > Record mono Sound…**
  - Unless you are using two microphones (e.g. for a conversation), in which case you can select **Record stereo Sound…**

5

Recording new sound files



Recording parameters

- Mono (unless you have two mics)
- 44,100 Hz

6

Recording new sound files

Recording

1. Click **Record** to start recording
2. Click **Stop** to stop recording

Recording levels

- Keep the recording level on the on **high end of green** on the meter

7

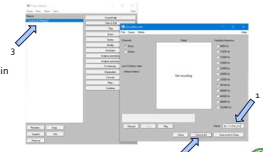
Saving new sound files

In the **SoundRecorder window**

1. Give your sound file a **Name**
1. Click **Save to list**

Your audio recording will show up in the main Praat window

3. Note: if you want to keep your recording after you close Praat, **you need to save it onto your computer** (see next slide)



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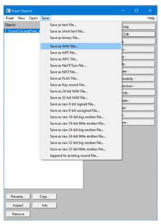
Saving new sound files

- **Save > Save as WAV file…**
- Choose a transparent file name!
  - e.g. 20220620_CoLangPraatDemo_RAC



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Creating a textgrid for annotation

- In the **Praat Objects box,** select a recording you want to create a Textgrid for.
- Click **Annotate > To TextGrid…**
- This will bring up the **Sound: To TextGrid** box

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Creating a textgrid for annotation

- In the **Sound: To Textgrid** box, you can choose names/titles for the Tiers you will use in your Textgrid (to code information you want to track)
  - Separate each Tier name with a space
- Textgrids can include **interval** tiers and **point** tiers
  - **Interval tiers**: let you segment and label sections of speech
  - **Point tiers**: let you label specific points in the recording

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Creating a textgrid for annotation: interval tiers

- When you open the **Sound: To Textgrid** box, the defaults are:
  - **All tier names**: Mary John bell
  - **Which of these are point tiers?** bell
- You can delete the defaults and use your own names (see next two slides). If you aren't using point tiers, you can leave that box blank.
- For our purposes, we will use four tiers (see slide 21):
  - **Sounds**: to code individual sounds
  - **Words**: to locate words
  - **Sentences**: to locate sentences/lines
  - **Notes**: to make note of observations

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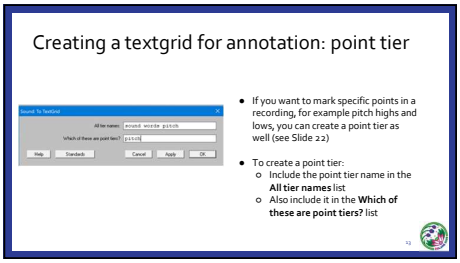

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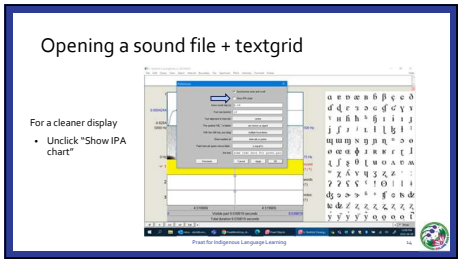

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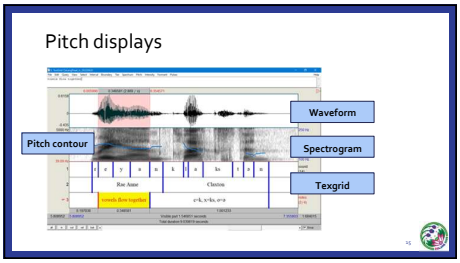

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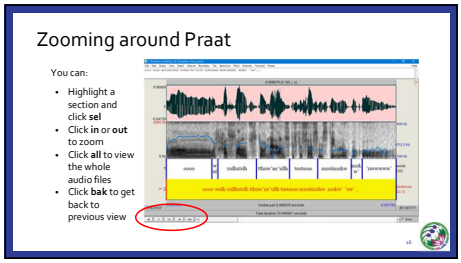

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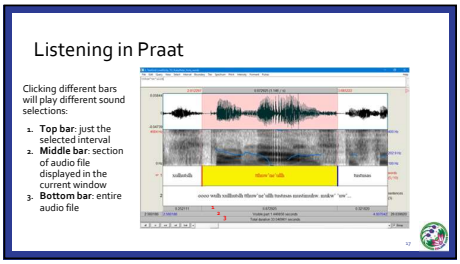

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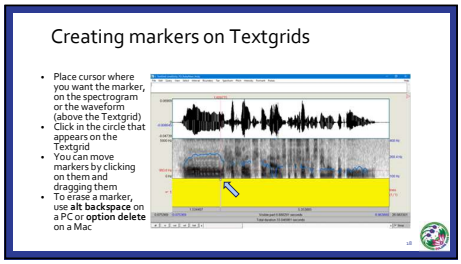

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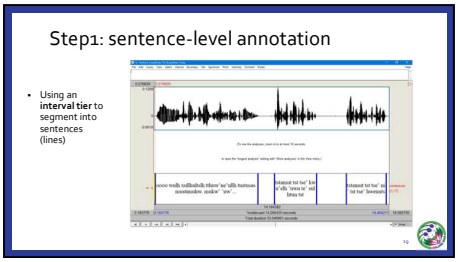
Step1: sentence-level annotation
Using an **interval tier** to segment into sentences (lines)

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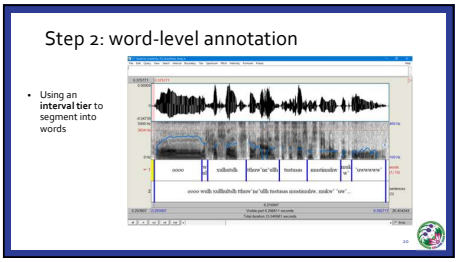
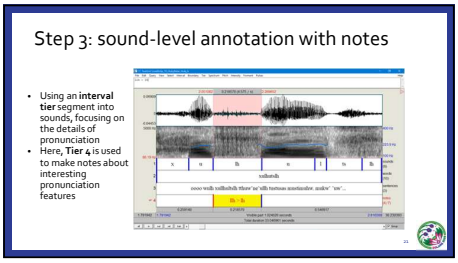

Step 2: word-level annotation
Using an **interval tier** to segment into words

20


Step 3: sound-level annotation with notes
Using an **interval tier** segment into sounds, focusing on the details of pronunciation
Here, **Tier 4** is used to make notes about interesting pronunciation features

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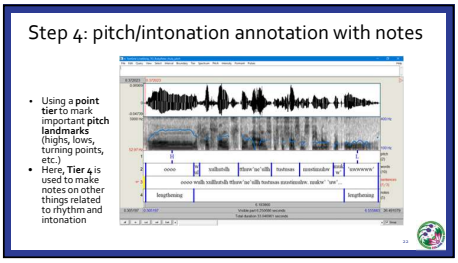
Step 4: pitch/intonation annotation with notes
Using a **point tier** to mark important **pitch landmarks** (highs, lows, turning points, etc.)
Here, **Tier 4** is used to make notes on other things related to rhythm and intonation

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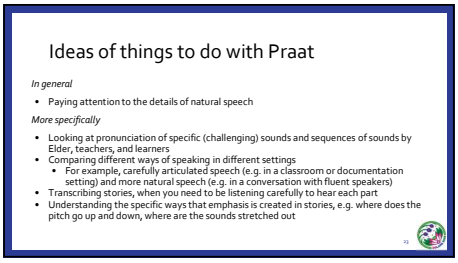
Ideas of things to do with Praat
In general
Paying attention to the details of natural speech
More specifically
Looking at pronunciation of specific (challenging) sounds and sequences of sounds by Elder, teachers, and learners
Comparing different ways of speaking in different settings
For example, carefully articulated speech (e.g. in a classroom or documentation setting) and more natural speech (e.g. in a conversation with fluent speakers)
Transcribing stories, when you need to be listening carefully to hear each part
Understanding the specific ways that emphasis is created in stories, e.g. where does the pitch go up and down, where are the sounds stretched out

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