

# Tahltan grammar synopsis

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**Objective:** to give a skeletal summary of Tahltan grammar, with a focus on sound structure (phonology) and word structure (morphology). This synopsis is mostly for internal use to help systematize our linguistic documentation activities, but the interested layperson may also find it useful as an index of the linguistics literature of Tahltan.

We attempt to make the terms commonly used in Athapaskan linguistics more accessible to the layperson, but if anything is unclear please email the first author <alderete@sfu.ca> for clarification.

## Nicknames

‘the dictionary’ refers to the Tahltan Children’s Illustrated Dictionary

‘the bibliography’ refers to the annotated bibliography, Alderete and McIlwraith (2008)

## Table of Contents

1. Introduction.....	2
2. Phonology.....	3
2.1 Phonemics.....	3
2.2 Neutralization rules.....	5
2.3 Suprasegmentals.....	7
2.4 Historical phonology.....	9
2.4.1 Obstruents.....	9
2.4.1 Sonorants.....	10
2.4.3 Vowels.....	11
2.4.4. Additional processes in stems.....	11
4. Nouns.....	12
4. Verbs.....	14
5. Topics for future study.....	19
Appendix A. Phonetic symbols and spelling.....	20
Appendix B. Pre-stem positions in verb words.....	21
References.....	22

## 1. Introduction

(1) Short descriptions of Tahltan (see also the bibliography)

Note: there is not a single authoritative work on Tahltan; the closest thing to that would be the phonology/morphology sketch given in Hardwick (1984)

- Consonant harmony: Hardwick (1984) and Shaw (1991)
- Stress system: Alderete and Bob (2005); see also Nater (1989) and Cook (1972) (though this is apparently an analysis of Kaska)
- Tone: Alderete (2005), see also Nater (1989)
- Laryngeals: Bob (1999), see also Hardwick (1984) on stem-initial fricative voicing
- Lexicon: Carter and Council (1994), about 975 with full Tahltan entries, and another 600 words from English to Tahltan glosses
- Historical phonology: Story (1975), Hardwick (1984); see also Nater (1989) for cursory but insightful classifications based on vowels, stem-initial mergers and tone, Nater (2006) on stem phonology, and also Alderete et al. (2014) for more on the development of affricates and stem phonology
- Noun and verb morphology: Nater (2006) on the historical phonology of verb stems, Hardwick (1984)

(2) Existing datasets with linguistically sophisticated coding and transcription

- Ken Hale William O'Grady tapes of Pete Henryu: hand-written fieldnotes (that don't actually correspond to the recordings) with wordlists and sentence paradigms; P. Henryu's speech is often noted by Tahltan native speakers as having idiosyncratic features
- Carter 1991 materials: all the recordings for the children's dictionary
- Shaw 1980-83 recordings: approximately 9 reels, focus on nouns and verbs that illustrate consonant harmony
- Alderete 1999-2005 TLCCDs: 23 CDs of questionnaire data and texts, the questionnaire data comes with a log file with time stamps for words/sentences; linguistic work focused on tone, length, the stem-initial consonant mergers, and vowels; many legends and ethnographic accounts
- Mellwraith materials: significant field notes with a focus on language use, place names, colloquialisms, fish and animal names; many recordings on interviews on the same topics (many transcribed/digitized), many word lists, and several texts, including some very nice legends with Robert and Jenny Quock
- Archiving: many of these collections are archived with Iskut First Nations in Iskut and the Tahltan Central Council in Dease Lake, as well as other external organizations; they can be accessed by petitioning these band governments

### (3) Linguistic background

- a. Vitality: critically endangered, spoken by very small numbers; less than 50 fluent speakers, but many more semi-fluent speakers and learners (2010 census report from the Tahltan Central Council and the Iskut Health authority)
- b. Areas: mostly in the communities of Telegraph Creek, Iskut, and Dease Lake, and cultural sites associated with these communities. Some speakers can also be found in central BC (e.g., Smithers and Terrace) and Vancouver.
- c. Linguistic classification: Eyak-Athabaskan, Athabaskan, Northern Athabaskan
- d. Sociolinguistics and variation: rather unclear, but many structural phenomena (e.g., series mergers, vocabulary) are not homogeneous within the three different communities; important to understand that each native speaker has a different language background.

### (4) Language pedagogy and language revitalization

- a. Language nests: one started in Iskut and Dease Lake in past few years
- b. Head start program: Iskut
- c. Master-Apprentice programs: many adult learners can team up with an elder and learn Tahltan through the master-apprentice model
- d. Other adult programs and resources: the three communities host other language programs for adults, including immersion learning, and with Simon Fraser University, app-based learning programs are being developed for adult learners
- e. Social media: many issues and ‘the word of the day’ are posted on a language Facebook page called the Tahltan Language Collective, a group with over 500 members
- f. Research on language learning: two recent university theses (Dennis 2014; Thompson 2012) have addressed several issues in language learning and presented positive examples of learning Tahltan

## 2. Phonology

**Goal**: describe the basic sounds, allophonic rules, natural phonological rules, morphophonemic rules, phonetic details of sounds, syllabification, stress patterns, historical phonology, anything else of interest, e.g., loanword phonology

### 2.1 Phonemics

*What are the phonemes of Tahltan and how are they realized?*

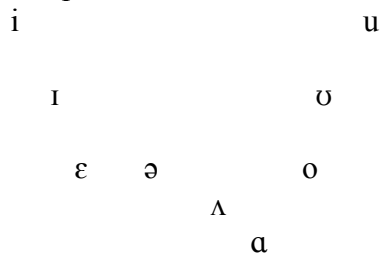
(5) Consonant phonemes (see spelling conventions in the appendix)

	bilabial	dental	dental/lat.rel.	interdental	alveolar	palato-alveolar	velar	velar rounded	uvular	laryngeal
voiced stop	b									
unaspirated stop		d	dl	dð	dz	dž	g	g <sup>w</sup>	G	
aspirated stop		t	tł	tθ	ts	tš	k	k <sup>w</sup>	q	
glottalized stop		t'	tł'	tθ'	ts'	tš'	k'	k <sup>w</sup> '	q'	ʔ
voiceless fricatives			ł	θ	s	(š)	x	x <sup>w</sup>	χ	h
voiced fricatives			l	ð	z	(ž)	ɣ	ɣ <sup>w</sup>	ʁ	
nasal stops	m	n ɳ								
glottalized nasals		n'								
approximant						y		w		

Observations:

- Transcription practice: we follow standard practice in Athabaskan languages of representing the unaspirated/aspirated contrast with the IPA symbols for voicing. Thus, t/d and k/g differ in aspiration, not voicing
- The bilabial /b/ (see Bob (1999)): /b/ differs from /d g/ in that it has many qualities of a voiced stop. When preceded by a sibilant (i.e., the possessive prefix *es-*), /b/ is partially voiced. It is also voiced when appearing between vowels or after a nasal. Bob thus argues that /b/ is voiced, but the non-labial stops use different laryngeal mechanisms for marking contrast. /b/ probably developed from \*w
- Palatal-alveolars: affricates are rather common, but /š ž/ have a very limited distribution and are probably not phonemes (Alderete et al. 2014; Hardwick 1984)
- Uvulars: rare, and for the most part, Proto-Athabaskan uvulars have merged with velars, except with some older speakers
- Patterning of /l/ and /y/: /l/ and /y/ are phonetically more like approximants, but they pattern with fricatives in voicing alternations, e.g., *łet, es-łed-e* ‘smoke’, so they are often treated as fricatives phonologically, hence the position of /l/ above.
- Dorsals: Nater (1989: 26) notes the following for Iskut speakers:
  - rounded velars (k<sup>w</sup>, ɣ<sup>w</sup>, etc.) vary freely with rounded uvulars (q<sup>w</sup>, χ<sup>w</sup>, etc.) phonetically in speech of q/k speakers, unless followed or preceded by o, o:, u, u:, Ex. łak<sup>w</sup>é: = łaq<sup>w</sup>é: ‘twice’
  - plain velars and rounded velars are neutralized before and after o, o:, u, u:; q/k speakers may but seldom do round uvulars in this position. Ex. ku:x = ku:x<sup>w</sup> ‘rice’ ≠ \*k/qu:χ<sup>(w)</sup>

## (6) Vowel phonemes



### Observations:

- Transcription: we write /e/ for [ε] and /a/ for [ɑ] for typographical simplicity
- /a/ and /e/ both have long/short contrasts, and probably /i u/ as well; Nater (1989: 28) suggests /a e i o u/ all have long-tense counterparts)
- Alderete (2005) shows that there is a tone-induced length on long vowels in syllables with low-marked tone.
- The diphthong /oɪ/ is found in a handful of words, e.g., *detθoɪ* ‘yellow’ (Hardwick, 1984: 4)
- Nater (1989: 28 ff.) argues that /ə/ has a special status in that it has no long-tense counterpart, is in near-complementary distribution with /i/, and freely varies with /e/; though he does assume that they are distinct phonemes.

## (7) Summary of the mis-matches between IPA and our phonetic transcription

- /e/ for [ε] and /a/ for [ɑ]
- /d t/ are phonetically [t t<sup>h</sup>]
- the laterally released sounds are written e.g., /dl/ rather than as a lateral release in superscript
- Again, bound by convention, we write /y/ for [j]

## 2.2 Neutralization rules

*What are the basic phonological rules that can neutralize phonemic contrasts?*

## (8) Syllable structure: CV(C)

Observations (see Nater 1989 and Bob 1999, chapter 3)

- To understand neutralization rules, we need a good characterization of the Tahltan syllable.
- Stems are typically CVC
- Word-initial and word-final consonant clusters are not allowed \*#CC, \*CC# (exceptions: *skádi* ‘crazy’, *sɣóhdze* ‘soapberries’, *k’unts* ‘potatoes’)
- Clusters of more than two consonants word medially are prohibited \*CCC

(9) Fricatives versus stops: distributions within a syllable (cf. stem-initial, stem-final)

	Stops			Fricatives	
	plain	aspirated	ejective	voiceless	voiced
$\sigma$ [ <u>    </u>	x	x	x	x	x
<u>    </u> ] $\sigma$	x			x	

- Like many Athapaskan languages, voicing is contrastive in fricatives but not in stops. Stops, on the other hand, have a three-way contrast between plain, aspirated, and ejective laryngeal setting.
- Alternations and distributional restrictions with laryngeal properties tend to be different for the two manner classes, though transcription practice sometimes obscures this (see below).

(10) Fricative voicing (Hardwick 1984, chap. 4/6, Bob 1999, chap. 5; see also Rice (1994))

- Stem-initial voicing: voiceless fricatives are generally voiced stem-initially (b) when preceded by a prefix, cf. (a), (all examples refer to (11) below)
- Syllable-final devoicing: when a voiced fricative appears in a syllable coda, it is devoiced (b-c), cf. (d)
- Exceptions: however, some stem-initial voiceless stems only voice after voiced segments (c), and some don't voice at all (d)

(11) Illustration: Fricative voicing alternations

	FV	bare	vls___ (1.sg)	vd___ (3.sg)	
a.	zzz	ʧandže	esʧandže	meʧandže	'goose'
b.	szz	ʃet	eslede	melede	'smoke'
c.	ssz	ʃu:t	esʃu:de	melu:de	'scab'
d.	sss	xʌs	esxʌse	mexʌse	'scar'

Analytical assumptions (see especially Hardwick):

- The core fricative voicing system is (a-b). This is analyzed by assuming a lexical specification [+voice] for the stem-initial C in (a) and [-voice] for (b), and that voicing in affixed forms is due to a morphological stem-initial voicing rule (with a [+voice] prefix, not unlike sequential voicing in Japanese compounds); many conservative speakers have this core system and only a few exceptions
- Pattern (c) emerges in some speakers from the loss of a morphological analysis of voicing and the full application of a voice assimilation rule
- Pattern (d), which has replaced many (b) patterns for innovative speakers, involves a loss of all fricative voicing neutralization rules.
- These exception classes are for stem-initial voicing; coda devoicing, however, is systematic and regular

(12) Fake voicing alternations in stops

- Stem-final stops are voiceless syllable-finally and are sometimes described as voiced when followed by a vocalic suffix (i.e. *-e*) (Hardwick, 1984: 43; Nater, 1989: 32). This is reflected in transcription practice as: *ba:t*, *esba:de* ‘gloves’
- However, this is not consistent with the normal phonetic description of stops as being marked plain /d/ versus aspirated /t/
- Bob (1999) argues stops are phonologically voiceless in both positions but may have phonetic properties of voiced stops intervocalically, giving the appearance of a voicing alternation
- Labial /b/, however, is phonemically a voiced stop, but it only appears in stem-initial position; the transcription of *ba:t*, *esba:de* is therefore more narrow than fricative voicing, because /t/ should be /d/, plain unaspirated in both contexts; in other words, this is a phonetic pattern and not neutralization

(13) Consonant harmony (Hardwick 1984; Shaw 1991)

- Applies to the three non-lateral coronal consonant series: interdental, alveolar, and palato-alveolar. The participating consonants undergo regressive assimilation where the target consonant in a prefix (or ‘formative’) is triggered by a stem-initial or stem-final consonant, or by a consonant in a following prefix. Interestingly, both interdentals and alveolars can assimilate to alveopalatals ( $\{\theta, s\} \rightarrow \text{š}$ ) and interdentals and alveolars will assimilate to each other ( $\theta \leftrightarrow s$ ).
  - interdentals in a prefix will become alveolars when a following prefix or the stem contains an alveolar consonant:
    - $/\theta/_{\text{prefix}} \rightarrow s / \_ [+ant, +str]_{\text{stem}}$  Ex. *nesitets* ‘we (pl) went to bed’.
  - interdentals in a prefix will become alveo-palatals when a following prefix or the stem contains an alveo-palatal consonant:
    - $/\theta/_{\text{prefix}} \rightarrow \text{š} / \_ [-ant, +str]_{\text{stem}}$  Ex. *ušidže* ‘we’re called’
  - alveolars will become interdentals when the following prefix or stem contains an interdental consonant:
    - $/s/_{\text{prefix}} \rightarrow \theta / \_ [+ant, -str]_{\text{stem}}$  Ex. *neθtθeŋ* ‘I’m fat’
  - alveolars will become alveo-palatals when the following prefix or stem contains an alveo-palatal consonant:
    - $/s/_{\text{prefix}} \rightarrow \text{š} / \_ [-ant, +str]_{\text{stem}}$  Ex. *nedenešditš* ‘I moved (a body part)’

### 2.3 Suprasegmentals

*What are the phonological structures above the segment?*

(14) Stress assignment rule (see Alderete & Bob 2005, also Nater 1989 and Cook 1972)

- Main stress rule: assign main stress to the stem syllable (generally final syllable, but exceptionally the penult) and secondary stress to alternating syllables counting backwards from the main stress. Additionally, there must be a stress on a pre-stem syllable, which can lead to two adjacent stressed syllables if there is only one pre-stem syllable.

- Phonetic correlations: main stress is indicated with higher F0, loudness and longer duration. Unstressed syllables are phonetically shorter, and phonemically long vowels are perceptibly shorter in unstressed syllables.

(15) Illustrations of stress (stem syllable, ó = main stress, ò = secondary stress)

a. ò ó

[mè-láʔ] "his/her hand"  
 [kà:#ts'ét] "I scratched it out"

b. ò ó o

[kâ#n-zéla] "did you (sg) holler?"  
 [ʔès-θóne] "my star"

ò o ó

[ʔùdes-ʔú:t] "I whistled"  
 [mè-detʔ'óɪ] "his/her pelts"

c. ò o ó o

[ʔùdĩŋ-ʔú:da] "did you (sg) whistle?"  
 [mèʔe-k'áhe] "his/her fat"

o ò o ó

[ʔedzi#da-dáʔ] "s/he's going hunting"  
 [ʔudèθi:-dlét] "we (dual) melted it"

(16) Tone (see Alderete 2005)

- Tahltan is a ‘low marked’ tone language, meaning that low-pitched syllables developed from words with syllables ending in glottalic consonants in Proto-Athabaskan. Phonologically, this is typically treated as a low tone on low-marked syllables, and no tone marking on unmarked syllables. However, some words in Tahltan do not have tone in the contexts predicted by ATT, and in some speakers, tone appears to be vestigial.
- Acoustic correlates: the words that do have low marked tone, like ‘trap’ below, are relatively lower in pitch and have a level pitch profile, which contrasts with unmarked tone, e.g., ‘pack’, which has a higher overall pitch and a sharp rise and fall missing in low-marked tone syllables. The average difference in pitch level is about 20 Hz.
- The durations of low-marked tone syllables, all else equal, also tend to be longer.

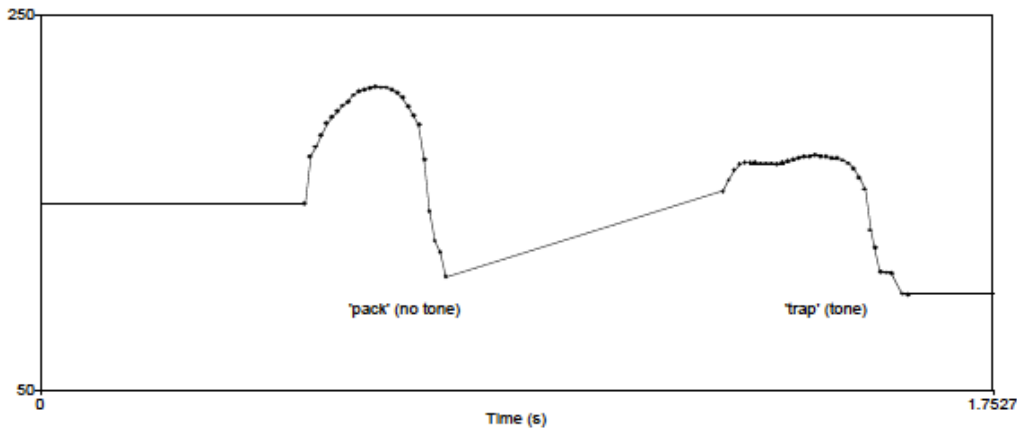


Figure 1: Pitch shape differences in [xe·ʔ] “pack” versus [xè·ʔ] “trap” for speaker 3



(17) Tone Minimal Pairs

Unmarked tone		Marked tone	
xiθ	‘pus’	xìθ	‘knoll’
ʔa:h	‘snowshoe’	ʔà:h	‘fog’
xe:ɬ	‘pack’	xè:ɬ	‘trap’

## 2.4 Historical phonology

*What were the sound changes leading up to present day Tahltan?*

### 2.4.1 Obstruents

Many Northern Athabaskan languages have undergone a “pull-chain shift” in the reflexes of PA affricate series, dubbed the Great Series Shift in Leer (1996).

(18) The Great Series Shift, see Leer (1996)

Stage 1: sibilants became interdental and “shibilants” became sibilants.

- Leer (1996) notes that some Northern languages, including Tahltan, had a flattened articulation for some PA series, where \*s is phonetically fronted and sounding closer to θ and \*ʃ is articulated with the tip of the tongue flattened, thus verging on [s].
- The Great Northern Series Shift occurred when the flattened varieties of \*s and \*ʃ were phonetically stabilized as [θ] and [s], respectively.
- Additionally, in most languages the PA rounded retroflex shibilants (\*tʃ<sup>w</sup>) merged with shibilants (\*tʃ).

Stage 2: the palatal onsets became shibilants and uvular onsets became velars (onsets only).

(19) The development of affricate series in Tahltan

- Krauss & Golla (1981), following Story (1975): based on data from an elder from Telegraph Creek, assumed the following development: \*ts/tʃ/tʃ<sup>r</sup>/k > ts/tʃ/tʃ
- Hardwick (1984) and Nater (1989), on the other hand, showed that a much more common obstruent system preserved a three-way contrast, as in \*ts/tʃ/tʃ<sup>r</sup>/k > tθ/ts/ts/tʃ. This is illustrated below with Hardwick’s proposed developments (see also Nater (1989) on uvulars and rounded velars).
- Alderete et al. (2014): confirmed the standard system of Hardwick and Nater, but also documented two new systems: \*ts/tʃ/tʃ<sup>r</sup>/k > tθ/tʃ/tʃ/tʃ and ts/ts/ts/tʃ; the former relates to the original development proposed by Story, with a simple shift of ts to tθ.

(20)	*D	*DL	*DZ	*DŽ	*DŽʳ	*Ĝ	*Ĝ	*Ĝ <sup>w</sup>	*H
Tahltan	D	DL	Dǎ	DZ		DŽ/Ĝ	Ĝ/Ĝ <sup>w</sup>		H
	d	dl	dǎ	dz		dž	g		
	t	tl	tθ	ts		tš	k (q)		?
	t'	tl'	tθ'	ts'		tš'	k' (q')		
		l	θ	s		ç	x	x <sup>w</sup>	h
		l		z		y	ʏ	ʏ <sup>w</sup>	

Summary of changes from PA to Tahltan (Hardwick, 1984):

- PA \*DZ has become an inter-dental series Dǎ, which is not in PA at all.
- PA labialized/retroflex and plain palatal series (\*DŽʳ and \*DŽ) have collapsed and are represented by Hardwick's dental affricate series, DZ.
- PA labialized uvular series \*Ĝ<sup>w</sup> has collapsed to the uvular Ĝ series in the stops and affricates only.
  - The labialized uvulars in PA are represented faithfully in fricatives in Tahltan (ʏ, x ʏ<sup>w</sup> x<sup>w</sup>) but with non-continuants, the labialization is realized by rounding the following vowel.
  - Uvulars (in parentheses) and velars are non-contrastive (and both infrequent in data) as uvulars only appear in data from older Tahltan speakers
- Laryngeal, dental stop and lateral series in PA are the same Tahltan reflexes.
- Like many Northern Athabaskan languages, glottalized obstruents were lost stem-finally. See 2.4.4 for additional stem-final changes

### 2.4.1 Sonorants

(21) Tahltan stem-initial sonorants reflexes for PA consonants (X=ay non-nasal obstruent)

PA		*w	*n	*ŋ	*y
Tahltan	/_V (X)	b	d	d	y
	/_V N	m	n	n	n

(22) Stem final sonorants

- More limited than those in stem initial position
- Stem final nasals spread to the vowel and/or delete
- Additional stem-final sonorant sound changes (Hardwick, 1984)
  - \*y > y
  - \*w, \*y > Ø / \_##
  - \*ŋ, \*n merge > n
  - \*ŋ<sub>2</sub>, \*w have labial reflex m
  - \*n, \*ŋ > voiceless or are deleted
- See Alderete et al. (2014) for descriptive statistics on the frequencies of sonorants and obstruents, sorted by position in the stem.

### 2.4.3 Vowels

(23) Vowel developments (see sources for explanation of symbols for PA vowels)

Story (1975)	*PA	*i	*æ	*ɔ	*u	*ʊ	*ə	*α
	Tahltan	i:	e:	a:	u:	u/o	i/e	ɑ
Hardwick (1984)	*PA	*i	*e	*a	*u	*ʊ	*ə	*α
	Tahltan	i	e = ε	a	u	o	oi/_*x <sup>w</sup> e/elsewhere	ɑ
Krauss & Golla (1981)	*PA	*i	*e	*a	*u	*ʊ	*ə	*α
	Tahltan	i	e	ɑ	u	u	i/e	ɑ

- Additional Vowel change rules (Hardwick, 1984):
  - \*e > i / \_ ɲ
  - \*ə > i / \_ \*[[+high], [+nasal], †]
  - > u / \_ \*w
  - > o / u / [α round, - α cont] \_\_[- α round]
  - > ə / [+round, +cont] \_
- Denasalization (Nater 2006)
  - \*V<sup>n</sup>:(?) → V<sup>n</sup>(?) → V<sup>n</sup>(')
  - \*V<sup>n</sup>:? → V:? → V:
  - \*V:n' → V:?' (cf. Nater 1989: 4.3.3)
  - stem-initial \*n → d

### 2.4.4. Additional processes in stems

Introduction:

- Some verb stems are 'invariable', meaning they do not alternate in different tense/aspect classes, e.g., *-bet* 'hungry'; *-koθ* 'cough'; *-h-tets* 'barking'; *-dos* 'boiling'.
- Most verb stems are variable, however, and the stem alternations are generally thought to be due to diachronic changes affecting sequences of morphemes.
- Pre-Proto-Athabaskan verb stems and PPA suffixes have undergone phonemic fusion and other changes to result in different (suffixless) PA stems (see Leer (1979))
- These PA verb stems underwent more sound changes to result in the modern Tahltan stems, as documented in Nater (2006), and summarized below.

(24) Evolution of Tahltan variable verb stems

Pre-Proto-Athabaskan (PPA)	Proto-Athabaskan (PA)	Tahltan
suffixes		
verb root morph-set	verb stem morph-set	
B', B', L, L', reduced	suprasegm. features	verb stem allomorphs

The variable stems are separated into 3 types depending on the phonemic makeup:

CVR Stems: stems ending in long/tense vowels, coronal nasals, palatal continuants, and glottal consonants (ʔ, h). The members of this group are different from CVK because (1) PPA suffixes are more easily traced for CVR stems than CVK stems (typical of all Athabaskan langs); (2) future (-ʔ) doesn't always affect the stem shape and (3) ʔ and h play an important role (Nater, 2006:60)  
 Ex. 'blow/ be windy' -tsih ~ -ts'i: ~ -ts'ə(-ʔ) (future ʔ)(p61)  
 'build' -tsi: ~ -tsi'ŋ

Mixed Stems: contain both CVR and CVK stems; small category  
 Ex. 'be cooked' -t'eθ ~ -t'et ~ -t'eh (p66)

CVK Stems: elsewhere case, Ex. -kət ~ -kət ~ -kəʔ 'ask' (p67)

(25) Phonological changes from Proto-Athabaskan to Tahltan (Nater 2006) (following his numbering)

- (1) aI. \*V:h# → V:#                      aII. \*V:h# → Vh#  
       bI. \*V:ʔ# → V:#                     bII. \*V:ʔ# → Vʔ#  
       cI. \*V(:)hC → V(:)C                cII. \*V(:)ʔC → V(:)C
- (2) a. \*k'/q'# → ʔ#  
       b. \*ʔk'# → tʃ# and \*ʔq'# → k#
- (3) assimilation of interdental, alveolar and prepalatal consonants (Nater 1989: 3.1)
- (4) a. \*e:yi# ~ e:yi# → e:i# (cf. Nater 1989: 3.3.2)  
       b. \*əx# → ih# (Nater 1989: 5.1)
- (5) a. \*V~Y) → Vŋ/n  
       b. \*e:n# → i:ŋ# and \*e:n'# → i:n'#  
       cI. \*V<sup>n</sup>:(ʔ) → V<sup>n</sup>(ʔ) → Vn(')  
       cII. \*V<sup>n</sup>:ʔ → V:ʔ → V:  
       cIII. \*V:n' → V:ʔ (cf. Nater 1989: 4.3.3)  
       d. stem-initial \*n → d
- (6) a. \*ə → e                                b. \*u → o
- (7) a. \*Vtʃ# → Vʃ#                        b. deletion of \*ʔ after fricative

## 4. Nouns

(26) Introduction

- a. Hardwick (1984): most comprehensive study, documenting noun types, various affixes and the structure of possessed nouns; this section summarizes much of this work
- b. Noun stem are one of the three major stem classes in Athabaskan languages, including nouns, verbs, and particles
- c. Major characteristic of nouns is that they are fully inflected for possession, showing person and number marking.

(27) Noun types, see especially Hardwick (1984)

- a. Independent stem nouns: unpossessed, stem only; can be used as verb stems with some changes. *Ex. bes* 'knife, *teŋ* 'ice', *-teŋ* 'freeze'
- b. Dependent stem nouns: inalienably possessed (generally kinship terms and body parts); can receive the *-e* suffix and/or *ʔe-* prefix. *Ex. -dah* 'eye', *-dze* 'heart', *-ʔela'e* 'bark', *-todze* 'breast' n (cf. *-totf*)
- c. Possessed nouns: any noun stem inflected for person and number of the possessor of the noun; see below.
- d. Other affixed stem nouns: prefix + stem; *ʔis-*, *ʔiç-*, *na-*, and *ʔe-* (can surface as *ʔi* or *ʔu*). *Ex. ʔist'osde* 'chickadee', *ʔiçdeθ* 'a lot of potlatch clothes', *nasda* 'linx', *ʔibeh/ʔubeh* 'summer'.
- e. Deverbal nouns: nouns formed from verbs via (i) (zero) conversion, or (ii) subj. noun + verb; (iii) prepositional phrase + verb; (iv) obj. noun + verb; or (v) phrases; these noun forms can also have nominalizer suffix *-i* (*-e*)

- Ex.s*
- (i) *meθten* 'tallow'
  - (ii) *na'ats'e'a* 'gambling game (lit. one gambles)', (*ts'e-* is an unspecified subj.), *tunadeθlin* 'waterfall; water is rolling' (subj N + V)
  - (iii) *me'eʔets'egidzi* 'pencil (lit. one writes with it)'
  - (iv) *tsiyaniduslehe* 'dragonfly (lit. he takes head hair out)'
  - (v) *dendadenegagi kime* 'church (men's praying house)'

(28) Morphological processes for nouns:

- a. Prefixation:
  - *ʔis-*, *ʔiç-*, *na-*, and *ʔe-* (which can surface as *ʔi* or *ʔu*) are prefixed to stems to form some nouns. (Hardwick 1984:33)
  - Possession is marked by a possessive pronoun prefix on nouns (see below)
- b. Suffixation: suffixes are used to make nouns out of verbs and to mark possession on nouns.
  - Nominalizing suffix *-i*: forms nouns from verbs i.e. 'one that is/does X'. Leer (1985) notes that in declarative sentences, the main verb (at the end of the sentence) varies freely between the plain form and the nominalized form.  
*Ex. ʔedih* or *ʔedihi* can be a statement of fact: 'it tastes good', but *ʔedihi* can also be used as a noun: 'one that tastes good'.
  - Suffixation of *-e* (or *-ʔ*), along with adding a syllable (i.e. a possessive prefix) marks possession
- c. Compounding:
  - Compounds are often (but not always) formed using the compound formative /s/ which surfaces as [s], [θ] and [ʃ] according to consonant harmony rules. There is no apparent predictor of when the formative is used since compounds either with or without the formative, cannot be grouped cohesively by structure or semantics. (Hardwick 1984:38)  
*Ex. kesg<sup>w</sup>ət* 'ankle knob' from *ke* 'foot' + *s-* + *g<sup>w</sup>ət* 'knee'

- 4 Types of compounds:
  - N+N: *yatʔule* 'rainbow' from *ya* 'sky' + *tʔutʔ* 'rope'
  - N+V: *ttheyaze* 'gravel' from *tthe* 'rock' + *yaze* 'young'
  - Prep+N: *etkux<sup>w</sup>* 'salt' from *et* 'with' + *kux<sup>w</sup>* 'rice'
  - Adv + N: *dugiddene:θ* 'today' from *dugi* 'now' + *ddene:θ* 'day'

(29) Possession, Hardwick (1984: 43-50)

- a. Marked on nouns & compounds by possessive pronoun prefixes and (usually) a possessive suffix.
- b. Possessive pronoun prefixes: alone and with noun *tθen* 'bone' (Hardwick 1984:45)

Singular	1	<i>es-</i>	<i>eθtθen</i>	Plural	1	<i>dah-</i>	<i>dahtθen</i>
	2	<i>en-</i>	<i>ntθen</i>		2	<i>hu-</i>	<i>hutθen</i>
	3	<i>me-</i>	<i>metθen</i>		3	<i>hu-</i>	<i>hutθen</i>

- c. There is an 'unspecified' possessive pronoun: *ʔe-* found before inalienable stems.
- d. The possessive suffix *-e* is identical to the stem formative *-e* in Tahltan, but in other languages, e.g., Slave, they are phonetic distinct. The suffix *-ʔ* is used for inalienable possession. Compounds canonically have a single *-e* attached to the entire compound, e.g., *es[etʔ]/[kuy]e* 'my salt', but exceptionally, it can be attached to both stems, as in, *es[liʔ]e[tθ'aʔ]e* 'my dog dish'.
- e. There is morpho-phonemic voicing of the stem-initial fricative, and devoicing of the stem-final fricative in absence of the suffix *-e*, e.g., *ʔeslede*, cf. *ʔet* 'smoke' (see above, Neutralization rules).

## 4. Verbs

(30) Template morphology

A template is a common way of describing the positions in Athabaskan verb words. Each class of prefixes has a slot and is arranged in linear sequence. They have been criticized in the literature as problematic as a linguistic analysis (see e.g., work by Joyce McDonough). But they are probably the best way of giving a 'road map' of the complexities of verb words, and they are also very useful in showing how Tahltan is related to other Athabaskan languages.

(31) The template in Hardwick (1984), based on work by Sharon Hargus and Keren Rice

Obl Obj	PostP	Adv	Distr	Inc Stem	Dir Obj	Spec Subj	Deriv	Conj	Mode	Subj	Cl	Stem
1	2	3	4	5	6	7	8	9	10	11	12	

Each position is exemplified below, and the full paradigm of pre-stem prefixes is given in appendix B.

- Abbreviations:
  - Obl obj = oblique object
  - PostP = post-position
  - Adv = adverb
  - Distr = distributive

Inc stem = incorporated stem  
 Dir obj = direct object  
 Spec subj = 'special subject', i.e., un specified and non-singular subject  
 Deriv = derivational  
 Conj = conjugation  
 Mode = mode (relates to tense and aspect)  
 Subj = subject  
 Cl = classifier

Examples (prefixes in parenthesis don't actually surface in this form):

dadenesgak 'I prayed' = da<sub>3</sub> + de<sub>8</sub> + ne<sub>8</sub> + (ye<sub>9</sub>) + (N<sub>10</sub>) + s<sub>11</sub> (d<sub>12</sub>) + gak  
 ?edediθtθ'ik 'I heard myself' = ?ede<sub>6</sub> + de<sub>8</sub> + (ye<sub>9</sub>) + (N<sub>10</sub>) + s<sub>11</sub> + (D<sub>12</sub>) + tθik  
 ?eyatΛθit'otθ = ?e<sub>1</sub> + γa<sub>2</sub> + tΛ<sub>3</sub> + (θe<sub>9</sub>) + (N<sub>10</sub>) + θiD<sub>11</sub> + (∅<sub>12</sub>) + ?otθ

(32) Classifiers (position 12): all verbs assumed to have one of the following classifiers:

- a. h- classifier – surfaces overtly as a phonetic [h] interacting with stem initial Cs and with preceding Subj pronouns (*s, n, θid, ah*).
  - after *s-* and *ah-*, *h* deletes; after *n-*, *n* and *h* merge to give voiceless nasal *ɲ*; after *θid*, results in *D Effect*. (see *d- classifier*, below)
  - Fricative initial stems preceded by 'h' classifier will result as voiceless fricatives, except for 1pl (*θid*) where there is *D-Effect*.
- b. ∅- classifier – no surface phonetic form
  - there is an alternating voicing pattern of stem-initial fricatives depending on the preceding segment (Subj); voiceless following voiceless segments and voiced following voiced.
  - 1s Subj is deleted in perfective
- c. l- classifier - does not surface phonetically
  - but rather [+voice] associated to the lexical entry of the word
  - results in constant voicing of stem-initial fricatives (i.e. voiced, even when following a voiceless segment)
  - 1s Subj is not deleted in perfective (but is in ∅- classifier perfectives and with h -classifier)
- d. d- classifier – only surfaces phonetically with stem-initial fricatives or ? (resulting in D Effect)
  - D Effect (Howren, 1971): d-classifier will surface as the corresponding affricate or stop before a consonant.
  - Can also occur to the final d in Subj prefix *θid-*
  - hard to identify paradigms unless stem-initial consonant is clearly a fricative or ? since neither *l-* nor *d-* classifiers surface before other consonants and neither has the 1s Subj deletion in perfective.
  - Generally assumed that this classifier is an abstract phonological segment, perhaps [-cont] that triggers certain changes below

(33) ‘The D-effect’, i.e., changes to stem-initial sounds caused by the *d*- classifier

- D + t → dt
- D + θ → dθ
- D + s → dz
- D + ç → dč (rare input segment)
- D + x → g
- D + ʔ → tʔ
- D + C → C where C = other consonants

(34) Function of *d*- classifier

- Most uses of classifiers are lexical in the sense that they ‘cross classify’ verbs for the changes that affect stem-initial sounds. Even the *d*- can be used this way.
- Some uses of the *d*-classifier signals *reflexive*: (along with ‘ede- the reflexive prefix)  
 Ex. na+ne+ye+n̄+s+ Ø +’etθ *nani’etθ* “I kicked Obj”  
 -na+’ede+ne+ye+n̄+s+ d +’etθ *na’adeneθt’etθ* “I kicked myself”

(35) Subject Pronouns (position 11)

1 singular	<i>s</i> -	1 plural	<i>θid</i> -
2 singular	<i>n</i> -	2 plural	<i>ah</i> -
3 singular	Ø-	3 plural	Ø-

- /s-/: can surface as [s], [ʃ], [θ] due to consonant harmony (see above) and is deleted in perfective of Ø- and *h*- classifiers. /n-/: surfaces as [n] except with *h*-classifier verbs where its devoiced [n̄]
- /θid-/: due to consonant harmony, can surface as [θid], [sid], [ʃid]. Final *d* does not surface except to trigger D-effect in fricative or ʔ initial words.
- /ah-/: always surfaces as [ah-]
- Third person plural is null in position 11 but can be marked by a prefix *he*- in position 7: “unspecified/non-singular subject prefix” position.

(36) Mode and Conjugation (Positions 9 and 10) (Hardwick p64-74)

- Mode prefixes, imperfective Ø- and perfective n̄-, follow 1 of 4 conjugation prefixes: ye-, θe-, ne-, Ø-. Two mode prefixes are assumed to combine with 4 conjugation patterns, giving eight different ways of conjugating Tahltan verbs. Only three conjugations have really been investigated to date, however.
- Perfectives: the perfective n̄- will not surface phonetically but will act like [n] to raise e → i.
  - *θe*- perfectives (*θe* + *n̄*-):
    - *θe* + *n̄* deletes in the first person plural in any position (ie word initial, after disjunct prefixes (pos 1-5) and after conjunct prefixes (pos. 6-8)
    - *θe* + *n̄* is reduced to θ in third person following conjunct prefixes



- $\theta e + \tilde{n}$  is deleted in first and second persons after derivational (pos. 8) and pos. 7 prefixes but not after the direct object (pos. 6)
- strident harmony occurs
- perfective rules of deletion occur as expected (i.e. the first person singular subject ( $s-$ ) is deleted in  $\emptyset$ - and  $h$ - classifier verbs but not in  $d$ - and  $l$ - classifiers)
- $y$ - perfectives ( $ye- + \tilde{n}$ ):
  - word initially  $ye- + \tilde{n}$  will appear except for 1pl where it deletes.
  - no data for disjunct prefix +  $ye$  in Hardwicks corpus.
  - after conjunct prefixes,  $ye- + \tilde{n}$  never surfaces overtly but can be recognized by the prefix vowel raising  $e \rightarrow i$ , except 1pl where  $ye- + \tilde{n}$  deletes and 2pl where vowel  $e$  deletes before  $ah$
- $n$ - perfective ( $ne- + \tilde{n}$ ): p72
  - extremely rare in Hardwicks data. 1 example with a  $d$  classifier after a disjunct prefix where  $ne$  surfaces in  $1s$ ,  $1pl$  and  $3pl$  but is otherwise deleted.
- Imperfectives:
  - Hardwick gives examples of the  $\emptyset$ -imperfective ( $\emptyset$ - conjunction and  $\emptyset$ - mode) in different positions (word initial, after disjunct and after conjunct prefixes) with different classifiers but has no data at all of  $\emptyset- + \{ye-, \theta e-, ne-\}$
- Progressive: marked by  $ye-$  conjunction,  $\emptyset$ - mode and a stem suffix  $i-$ . (H pg 74)

(37) Derivational (position 8) (Hardwick p74 ff.)

- One position where more than one prefix can occur, ranked hierarchically, according to Hardwick (1984 and Hargus, 1984 in Hardwick) which differs from Rice (1983) who analyzes this as two prefix positions: theme and aspect.
- $u$ ,  $de$ ,  $ne$ ,  $i$  can all appear here. If more than one in a verb base, they appear according to this hierarchy:  $u > de > \{de, ne\} > i$ 
  - $u$  appears alone or followed by  $de$  or  $ne$ . Function is unclear.
  - $de$  is most common derivational prefix; can occur in any combination with the other derivational prefixes; appears with stem suffix  $-t$  to mark future; can mean “for oneself”; sometimes must be in lexical entry for verb. see hardwick for examples of each.
  - $ne-$  is also common and can carry the meaning ‘face’; ‘terminative’ (along with  $\theta e-$  conjugation) or no apparent meaning and is part of the verbs lexical entry.

(38) Unspecified/non-singular Subject (position 7) (Hardwick p79)

- Two prefixes:  $he-$  3 person dual/plural human subj; and  $ts'e-$  unspecified subj marker.

(39) Direct Object (position 6) (Hardwick p79)

1 singular	<i>se-</i>	1 plural	<i>hwe-</i>	unspecified	' <i>e-</i>
2 singular	<i>ne-</i>	2 plural	<i>hwe-</i>	reflexive	' <i>ede-</i>
3 singular	$\emptyset$ -, <i>ye-</i> or <i>he/hi-</i> (depends on subject)	3 plural	<i>hu-</i>	reciprocal	<i>te-</i>

- Third person singular object :
  - null when there is a non third subject, *ditθ'ik* 'I hear him'
  - *ye-* when subject is a third singular, *yeditθ'ik* 'he hears him'
  - *he/hi-* when subject is third plural, *hiditθ'ik* 'they hear him'
- First person singular object *se-* can surface as [se], [θe] or [je] (consonant harmony)
- Unspecified obj '*e-*' may have a cultural referent –usually moose in Tahltan.
  - *xa'eθtaθ* 'I'm cutting hair off Obj (moose hide)'
  - '*edžinassa* 'I'm going hunting (for moose)'

(40) Incorporated Stem (position 5) (pg 80)

- May be filled with stems related to the verb
- Ex.  $\underline{xa}+de+ye+\tilde{n}+\emptyset + t'at\theta$  *xadit'atjθ* 'I cut hair off Obj'  
 5 8 9 10 12 *xa* 'hair'

(41) Distributive (position 4), Hardwick 1984: 81

- *da-*; which may mean plural of subj or obj; can refer to action done separately on pl objs or collectively on plural subjs.
- Ex. *dahadebet* 'they were hungry'  
*dadahset* 'they (pl) hollered'

(42) Adverb (position 3) Hardwick 1984: 81

- Many different shaped prefixes can appear here, such as *ka* 'out, down'; *tan-* 'back to'; *tfa-* 'sleep'
- Some require other derivational or conjugation prefixes, such as *t'an(e)-* (with *θe* perfective) 'around'; *ti-* (with *ne-* perfective) 'away'; *te-* (with *θe-* conjugation) 'into pieces or sections'

(43) Postpositions and Oblique Objects (positions 2 and 1)

- Postpositions always occur with either an oblique object pronoun or an object noun.
- Oblique objects:

1 singular	<i>es-</i>	1 plural	<i>dah-</i>	unspecified	' <i>e</i>
2 singular	<i>en-</i>	2 plural	<i>dah-</i>	areal obj	<i>ho-</i>
3 singular	<i>me-</i> , <i>ye-</i> or <i>hi-</i> (with non-3rd, 3s and 3pl Subjects)	3 plural	<i>hu-</i>		

- Postpositions: *k'e-* 'on'; *mek'e'edihgan* 'I burned Obj'  
*hok'ediθtθ'et*

## 5. Topics for future study

### (44) Phonetics and phonology

- Voiceless nasals: some stems end in a /nh/ voiceless nasal that is characterized by a lack of vocal fold vibration, but nasal is realized after a coda /h/ when a suffix is added, e.g., tθ'enh[ŋ] 'ice', eθ-tθ'eh.ne. The /nh/ is a voiceless nasal in the IPA. What are the phonetic properties of this alternations? Is it phonological or phonetic? What accounts for the ordering of the /h/ component? Tanya Bob was interested in this topic at one point, and prepared a handout about it.
- Loan phonology: how do loans differ from native words? To answer this question would require compiling a list of loans, as the current lexical databases don't have loans.
- Acoustic analysis of the vowels: give an acoustic description of Tahltan vowels, i.e., the four full ones and the weak vowels; plot the F1 and F2 data and look for factors based on position or speaker; the high back vowel sounds very front in many speakers. Could use McDonough's study as Navajo as a model.
- Phonotactics and syllables: an analysis of Tahltan syllables based on quantitative data from the stem phonology; Alderete et al. (2014) is a start, but it would be better to have a larger stem list

### (45) Morphology

- Compounds: study of the types and structure of compounds; see Hardwick (1984) for preliminary account.
- Derivational morphology in nouns
- General statement of verb structure: more comprehensive study of the verb classes, conjugation patterns, and component morphemes for verb paradigms; need to go beyond Hardwick (1984) and Nater (2006) to have more complete paradigms; and also there is a need to make a document that is more accessible to the educated layperson

### (46) Lexicon

- Place names: draw on existing lists and make a description of their structure and summary of the inferences that can be made about occupancy. Place names mostly part of TUS studies, but need to be included in lexical databases too.
- Classificatory verbs: an important topic in Athabaskan languages, but undocumented as yet

### (47) Other topics

- Palgrave project: the Tahltan language described by Rev. Palgrave seems extremely different in lexicon and grammar than Tahltan described from 1970 onward. Why? Could assemble lists of cognates and study grammatical features, assess if a different language is involved.

## Appendix A. Phonetic symbols and spelling

### Consonants—phonetic symbols

b		d t t'		g k k'	q q'	ʔ
	dɔ̌ tθ tθ'	dz ts ts'	dʒ tʃ tʃ'	g <sup>w</sup> k <sup>w</sup>		
	θ	dl tɬ tɬ'	š	x x <sup>w</sup>	χ	h
	ɔ̌	s ɬ	ž	ɣ ɣ <sup>w</sup>		
m		z l				
w		n ŋ n' ŋ'				
		y				

### Consonants—orthographic symbols (compare with positions above, X = not used)

b		d t t'		g k k'	X X'	'
	dʒ tʃ tʃ'	dz ts ts'	j ch ch'	g <sup>w</sup> k <sup>w</sup>		
	s	dl tɬ tɬ'	sh	kh khw	yh	h
	z	s ɬ		gh ghw		
m		z l				
w		n nh X X'				
		y				

### Vowels

#### Phonetic symbols

#### Orthographic symbols (rows correspond)

i	i:	i	ī
ɪ		i	
e	e: (=ɛ)	e	ē
a	a: (=ɑ)	a	ā
o	o:	o	ō
u	u:	u	ū
ʊ		u	
ə		e	
ʌ		a	

## Appendix B. Pre-stem positions in verb words

Obl. Obj.	PostP	Adverb	Distr.	Inc. Stem	Dir. Obj.	Subj. 2	Deriv.	Conj.	Mode	Subj. 1	Classifier
1	2	3	4	5	6	7	8	9	10	11	12
es (1.sg) en (2) me (3) ye (3.sg) hi (3.pl) dah (1.pl) dah (2.pl) hu (3.pl) ho (areal) ʔe (unspec)	k'e k'a ya tʃ'a ka na kah ga	k'e 'out/down' tʃ'an(e) 'around' tan 'back to' ti 'away' (ne-P) te 'into water' le 'into pieces' (θe) k'a (unidirect-ional motion) ni 'across' (θe) tʃa 'sleep' da 'up/above' (θe) te ta 'to shore' (θe) na na...ne su 'good' ga la kiθ	da		se (1.sg) ne (2) 3.sg/Subj: ∅ /non3rd ye /3.sg he/hi /3.pl hwe (1.pl) hwe (2.pl) hu (3.pl) ʔe (unspec) ʔede (refl.) le (recip.)	he (3.du/ pl human) ts'e (unspec)	u / de ne / i	ye θe ne ∅	∅ (imperf.) [+high] (perf.)	s (1.sg) n (2.sg) ∅ (3.sg) θiD (1.pl) ah (2.pl) ∅ (3.pl) (cf. 7)	h ∅ [+voice] [-cont] (refl.)

## References

- Alderete, John. 2005. On tone and length in Tahltan (Northern Athabaskan). *Athabaskan prosody*, ed. by S. Hargus & K. Rice, 185-207. Amsterdam: John Benjamins.
- Alderete, John, Amber Blenkiron & Judith C. (Edōsdi) Thompson. 2014. Some notes on stem phonology and the development of affricates in Tahltan (Northern Athabaskan). Ms., Simon Fraser University and Northwest Community College.
- Alderete, John & Tanya Bob. 2005. A corpus-based approach to Tahltan stress. *Athabaskan prosody*, ed. by S. Hargus & K. Rice, 369-91. Amsterdam: John Benjamins.
- Alderete, John & Thomas McIlwraith. 2008. An annotated bibliography of Tahltan language materials. *Northwest Journal of Linguistics* 2.1-26.
- Bob, Tanya. 1999. Laryngeal phenomena in Tahltan: University of British Columbia M.A. thesis.
- Carter, Colin & Tahltan Tribal Council. 1994. *Tahltan Children's Illustrated Dictionary* Dease Lake: Tahltan Tribal Council.
- Cook, Eung-Do. 1972. Stress and related rules in Tahltan. *International Journal of American Linguistics* 38.231-33.
- Dennis, Oscar/Hotseta Na-Dene. 2014. How I learned the language: Pedagogical structure of the Tahltan language: University of Northern British Columbia.
- Hardwick, Margaret. 1984. *Tahltan morphology and phonology*: University of Toronto M.A. thesis.
- Howren, Robert. 1971. A formalization of the Athapaskan d-effect. *International Journal of American Linguistics* 39.96-114.
- Krauss, Michael & Victor Golla. 1981. Northern Athapaskan languages. *Handbook of North American Indians*. Volume 6. Subartic, ed. by J. Helm, 67-85. Washington: Smithsonian Institute.
- Leer, Jeff. 1979. *Proto-Athabaskan verb stem variation, part one: Phonology* Fairbanks, Alaska: Alaska Native Language Center University of Alaska.
- . 1996. The historical evolution of the stem syllable in Gwich'in (Kutchin/Loucheux) Athabaskan. *Athabaskan language studies*, ed. by E. Jelinek, S. Midgette, K. Rice & L. Saxon, 193-234. Albuquerque: University of New Mexico Press.
- Nater, Hank. 1989. Some Comments on the Phonology of Tahltan. *International Journal of American Linguistics* 55.25-42.
- . 2006. Athabaskan verb stem structure: Tahltan. What's in a verb? *Studies in the verbal morphology of the languages of the Americas*, ed. by G. Rowicka & E.B. Carlin, 53-72. Utrecht: LOT.
- Rice, Keren. 1994. Laryngeal features in Athapaskan languages. *Phonology* 11.107-47.
- Shaw, Patricia. 1991. Consonant harmony systems: The special status of coronal harmony. *The special status of coronals*, ed. by C. Paradis & J.F. Prunet, 125-57. New York: Academic Press.
- Story, Gillian. 1975. *Tahltan: An Interpretation of Ken Hale's Data at Telegraph Creek*. Unpublished handwritten manuscript.
- Thompson, Judith C./Edōsdi. 2012. Hedekeyeh hots'ih kāhidi – “Our Ancestors are in us”: Strengthening our voices through language revitalization From A Tahltan worldview: University of Victoria.