

# KRAUSS (2005) TONOGENESIS TABLES: IPA TRANSCRIPTION

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This paper discusses the transcription into IPA symbols of the nine tables in Michael Krauss's (2005) paper on Athabaskan tone, in an Excel spreadsheet, and searchable, to simplify correspondences across contemporary data from these languages, or for those unfamiliar with Krauss's orthography. The purpose of this paper is to provide a useable tool and a dataset to build on, to continue to develop an understanding of tonal patterns in these languages. A .pdf version is also provided for any needed comparisons between the tables.

## 1 Introduction

One of the most thorough papers on comparative Athabaskan tone was published in 2005 by Michael Krauss, titled 'Athabaskan Tone', with a commentary paper by John Kingston. Both were published in a volume on Athabaskan prosody edited by Hargus and Rice (2005). It remains an important work on the reconstruction of comparative tone systems in the Athabaskan language family. The paper had been handed around unpublished since the 1970's; this was the first published version. In the introduction to this version, Krauss states that the purpose of the paper is to map "the Athabaskan language area for tone." He also acknowledges the contribution of Jeff Leer (1979, 1999), his long-time colleague, to the reconstruction analysis.

The reconstruction Krauss presents is based on noun forms. The choice of nouns as a basis of the reconstruction needs explanation since 1) nouns are a closed-class group of words, 2) verbal forms are predominant in the lexicon and 3) the language family is well known for its complex verbal morphology. Krauss states that the noun system is better documented and similar in phonological structure to what is found in what he calls the verbs<sup>1</sup>. He also notes another critical

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<sup>1</sup> The term 'verbal complex' is adopted on the advice of Navajo colleagues who point out that these are complexes more than simple 'verbs', in the sense that the word is used in languages like English. They contain verbal elements,

factor related to the complexity of the verbal constructions, that is, it is very difficult to compare tone patterns in the verbal complexes even within a language, never mind across the family of languages. This is due to the density of the Athabaskan lexicon; a verb form is related to hundreds of other forms by virtue of the extensive paradigmatic variability found inside the verbal complex. Tone in the verbal complex marks grammatical and inflectional meaning, as well as, or in addition to lexical. Tone in nouns is more straightforwardly lexical.

A second reason for using nouns rather than verb stems lies in the verb stem variants; verb stems are inflected for mode. A verb stem shows four or five stem internal variations (written in small caps as a ROOT in (1)); no stem variant is demonstrably default. The variations may occur in various positions in the monosyllabic stem: in its onset, in vowel quality, tone, length, and nasality, and in coda (though not in all positions at once). As an example, in (1) are the five occurring variants for *TAAŁ* 'act w feet or move quickly' (Young and Morgan 1987:318). Systematic alternation patterns across the ROOTS are frustratingly elusive (Hardy 1985; Eddington and Lachler 2006).

- (1) Five occurring variants of verb root *TAAŁ*:  
 tał tááł taal taal tal

Crucially these variants are drawn from the fully inflected forms they appear in. The stems with their 'classifiers' and their mode marking, are called stem sets in the literature. An example of a full set of stem sets for *TAAŁ* is found in (2) (Young and Morgan 1987). The stem sets for *TAAŁ* are given in the five modes reported for the Navajo verb stems: imperfective (IPV), repetitive (REP), perfective (PFV) future (FUT) and optative (OPT). The shape that a stem takes is dependent on many factors, including the aspect of the fully inflected word (rightmost column) and the classifier (leftmost column). Each stem set, a line in the example below, appears in at least one set of the related verbal complexes, by definition. Young and Morgan use the imperfective form for its dictionary entry. See McDonough (this volume) for a discussion of the construction and conjugation of the verbal complex in Young and Morgan.

- (2) Stem shapes for verb root *TAAŁ*

VL	IPV	REP	PFV	FUT	OPT	Asp
∅	∅taal	∅tal	∅tááł	∅tał	∅taal	MOM
∅	∅tał	∅tal	∅tał	∅tał	∅tał	SEM
∅	∅tał	∅tal	∅tááł	∅tał	∅tał	REP
ł	łtaal	łtal	łtááł	łtał	łtaal	MOM
d	dtaal	dtał	dtáál	dtał	dtał	REP
l	ltał	ltał	ltáál	ltał	ltaal	CON

Like nouns, verb stems are closed-class. The nouns do not show these variations, and offer a more transparent comparison across the languages.

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along with elements that occur outside English type verbs in auxiliaries. The term 'verb form' refers to an individual complex word form associated to its set of related words.

## 2 The tables

The nine tables in Krauss's paper listed in (3) are constructed from a variety of sources; I refer the reader to Krauss's paper for the extensive discussion of his sources and the construction of the tables. The tables divide the noun stems into two main groups, termed 'non-constricted' and 'constricted' vowel stems. These terms are taken from Leer's (1979) work. The term 'constriction' refers to a phonation type, constriction of the larynx, that preceded the development of tone and has been observed in some records of the Athabaskan languages, Krauss refers to Morice's comments in his (1932) grammar of Carrier.

### (3) Krauss' tables

Table 1	Non-constricted full-vowel stems: open or closed with plain sonorant
Table 2	Non-constricted full-vowel stems: open or closed with plain obstruent
Table 3	Non-constricted full-vowel stems: closed with glottalized obstruent
Table 4	Non-constricted reduced-vowel stems: closed with plain sonorant or obstruent
Table 5a	Constricted full-vowel stems: open
Table 5b	Constricted full-vowel stems: sonorant-closed
Table 6	Constricted full-vowel stems: closed with plain obstruent
Table 7	Constricted full-vowel stems: closed with glottalized obstruent
Table 8	Constricted reduced-vowel stems: closed with glottalized sonorant or obstruent

The term 'constricted' points to the presence in pre-Proto Athabaskan (PPA, itself a reconstruction of a reconstruction) of a glottal stop, ejective obstruent or glottalized sonorant in the *coda* of the stem. Stem syllables are open or closed, and with long or short vowels. Krauss's basic syllable types are listed in (4), C refers to any consonant, and R to a resonant (sonorant). The development of tone does not involve fricatives.

### (4) Basic syllable types

CV  
CVV  
CVC  
CVVC  
with possible CVVRC

Glottalized or glottal stops are represented by C', R' for glottalized resonants. The differences among the tables are found in the effect of the coda consonant (glottalized or not) on the vowel and coda of different syllable types, and across the two reconstructions, pre-proto (pre-PA) and proto-Athabaskan (PA).

Krauss states the process of tonogenesis arose from a process of glottalic constriction in the stem coda affecting the phonation quality of the vowel: "The rules for deriving from pre-PA the PA vowel-constriction which gave rise to the later tone-marking are quite simple..." (Krauss 2005: 77). A stem with a constricted (glottalized resonant, glottal stop or ejective) coda resulted in 'constriction' in the preceding vowel, except for long vowels, which, Krauss notes, 'blocked this process' (2005:77).

(5)	PRE-PA	PA
	CV'	CV':'
	CV':R'	CV':R'
	CV'C	CV':C
	CVR'	CV'R'
	CVC'	CV'C'

Thus glottal stops, glottalized obstruents (ejectives), or glottalized resonants (sonorants) in coda resulted in constricted vowels, which gave rise to the register tone system of the tone languages in Athabaskan. Kingston's (2005) paper in the same volume lays out a phonetic explanation for this tonogenesis. The reader is also referred to Table 2 in Kingston's paper.

However, the details of the Athabaskan system are complex and are related to a further reconstruction into PPA. Krauss makes these distinctions:

1. unmodified vowels in pre-PA became reduced vowels in PA.
2. modified vowels (V' and V:) became full vowels in PA

Thus PA has reduced and full vowels, though in neither system are the vowel qualities described, nor likely could they be. An unmodified vowel is a simple modal vowel V; the reduced vowels are transcribed as [ə ɑ ɔ] (using IPA symbols) though no phonetic values or features are assigned to them. The modified vowels (V' and V:) "become full vowels." Krauss's correspondence is not transparent and I repeat it here verbatim (2005:77):

- (6) Pre-PA modified vowels to PA full vowels<sup>2</sup>  
 i, e (= [æ]), a (= [ɑ]), u

In our transcription to IPA, we defer to his vowel symbols. In the Krauss tables, the vowel symbols he uses are listed below in a chart format; we make assumptions about the correspondence to the IPA vowel chart for the low vowels.

(7)	i		u
	e	ə, ʌ	o
	æ	ɑ	a

He also uses the Athabaskan diacritics: nasal mark /ǀ/ and high /ǂ/ and low tones /ǃ/. Length /v:/ in IPA is marked with a high dot /v:/ in Krauss, as in Sapir. We used the IPA symbols, as noted, for these sounds as in Table 1.

The titles of the Krauss tables are self-explanatory. Before each table, Krauss provides a commentary explaining the categories, to which we refer the reader.

A fundamental pattern that underlies the Krauss-Leer analysis is found between the two sets of tables, constricted and non-constricted. Note these PA toneless forms in Table 1 and Table 5a: /\*ce/ [tse:] 'stone' and /\*-ci/ [tsi?] 'head' respectively. For each table, three different patterns occur in the Athabaskan languages: two tone language groups (Group 1 and Group 2) with polar

<sup>2</sup> The reconstruction of the vowel systems in PA and pre-PA show the reductionism of the reconstructions (Sapir 1925:fn197). These are not naturally occurring vowel systems. But these reconstructions are not, of course, based on phonetic realities and are not under discussion here.

tones, and the toneless (Group 3). In Table 1, forms reconstructed with non-constricted vowels, in Group 1 (so-called ‘L-tone marked’), the daughter forms are low-toned; in Group 2 (‘H-toned marked’ languages), they developed H tones. In Table 5a, the constricted vowels, the exact opposite pattern is observed: H for Group 1, L for Group 2.

Table 1 is a generalized chart of Americanist symbols used by Krauss with their IPA symbols in brackets, as far as we can determine. The correspondences follow those in Mithun (2001:viii).

Table 1. The symbol correspondences used in the transcription of the Krauss table to IPA.

	bilabial	alveolar	post alveolar	palatal	velar	uvular	glottal
stops				ḳ [c] ġ [t]	k g		ʔ [ʔ]
fricative			š [ʃ] ž [ʒ]	x̣ [ç]	x γ [ɣ]	χ [χ] ʁ [ʁ]	h
lateral fricative		ɬ [ɬ]					
affricate		c [ts] ʒ [dz]	č [tʃ] ʒ̣ [dʒ]				
lateral affricate		ɬ̣ [tɬ] λ̣ [dɬ]					
rhotics							
approximant	W [w̥]			ɥ [j]			

In the transcribed charts we offer, words that contain symbols we are uncertain about are in red. For those forms, we left Krauss’s symbols intact.

Krauss notes that the first four tables are simple for ‘mono-syllabic nouns’ with full vowels. In the tables Krauss terms “disyllabic” (quotes are his) those forms with a final sxhwa: CVCə (see ‘mosquito’ in Table 1 \*c'u'y(ə)), otherwise the forms are monosyllables. Also important are the terms ‘H-tone marked’ and ‘L-tone marked’. This is confusing terminology, and is opposite to the use of ‘marked’ in markedness theory to refer to a special case. In Athabaskan tone, in L-tone marked languages, H tone is the less common, orthographically marked tone. Navajo, a L-tone marked language, orthographically marks the H tone with an accent, /tó/ [txó]<sup>3</sup> ‘water’, and leaves the L tone unmarked, /k’os/ [k’os] ‘cloud’<sup>4</sup> (the tones are ‘marked’ with the non-‘unmarked’ tone). In this paper we will refer to the languages as ‘L-tone marked’ or ‘H-tone marked’ according to Krauss’s classification, but refer to the ‘marked tone’ in a language as the tone that is orthographically marked H or L, which is H in the L-marked languages and L in the H-marked languages (8). We will refer to the tone of this classification system as the ‘classification tone’.

(8)	classification tone	marked tone	table
L-tone marked	L	H	Group 1
H-tone marked	H	L	Group 2

Where the ‘classification tone’ is the default (unmarked) tone

The tables provide Krauss’s examples. This classification is also noteworthy because it is tied directly to the asymmetry in the distribution of tone in the verbal complex; the classification tone

<sup>3</sup> The /t/ in Navajo is an affricate [tx] in Navajo and in many other Athabaskan languages, see Young and Morgan (1987) and McDonough, 2003 on Navajo; McDonough and Wood (2008) and sources cited within on similar properties in Athabaskan stops across the family. Sapir (1925) refers to them as more strongly aspirated than English, but in fact they also have clear supralaryngeal constriction and show alternation patterns common to velars.

<sup>4</sup> For a discussion of ‘toneless’ syllables in Navajo, see Young and Morgan (1986) and McDonough (1999).

is the default tone for what are sometimes called ‘toneless’ syllables of the non-stems. These are found in the pre-stem domains of grammatical or inflectional type tone (though the stems in verb forms also carry grammatical tone marking without default tone, see (2)). In his gossipy section on history of the study of Athabaskan tone, Krauss points to an observation made by Sapir that the non-stem tone is ‘subsidiary’ tone that lost ‘their distinctive tone’. This observation is crucial to understanding the tonal patterns in the verbal complex, including the development of classification and marked tones in the inflectional system; this is not under discussion in the Krauss paper but nevertheless merits attention.

The last 5 tables (Table 5a-8) concern ‘constricted’ vowels. The forms are reconstructed from constricted vowels in PA. These tables follow the same structure as the first set of tables.

The languages within the Krauss tables are divided into three groups, as mentioned, according to this classification of L- and H-tone marked (group 1 and 2) and toneless (group 3) languages. The reader is referred to the Krauss and Kingston papers in the same volume for extensive discussion of the Krauss-Leer reconstruction for the different languages (Krauss 2005), and of the phonetic basis of a H-L tone split (Kingston 2005). The Kingston paper provides a discussion of the phonetic basis of tonogenesis and ‘constriction’ in the vowels caused by the glottalization imposed by glottalic elements in coda affecting the nucleus of the syllable.

Krauss is also concerned with a characteristic property of the Athabaskan tone languages: the H-L flip-flop of tones, which we will refer to simply as tone polarity. Some Athabaskan tone languages develop H and some developed L tones for the same word. Krauss appears to hold the hypothesis that this developed as part of tonogenesis. Kingston argues both that the H and L tone could both arise from laryngeal constriction, but also that the tone flip-flop, or tone polarity, has occurred several times in the history of the tone languages, not just once at the tonogenesis. Tone polarity has been observed to be a natural and not uncommonly occurring phenomena (Hyman & Schuh 1978; Schuh 1979; Newman 1995). With respect to the Athabaskan polarity, speakers seem to have no problem with it; Krauss himself notes that “the tones are important, but not necessarily decisive, for mutual intelligibility” (Krauss 2005:70).

There is a single (so far) Athabaskan language with a three-tone system, Tsuut’ina (Sarcee), which Krauss lists with the L-marked languages, also worthy of note. Only passing comment is provided on this three Tsuut’ina tone system in the paper, with references to Leer, Sapir and the (still) unpublished Starlight-Donovan work. Krauss references Sapir (1925) noting that the third tone in Tsuut’ina (M) is a neutralized tone: “Sarcee ... basically besides [having] low-marking from constriction, the two other levels that have developed can be explained on historical or morphological grounds...” (Krauss 2005:109). All Athabaskan tonal reconstruction is, of course, based on the same factors.

Sapir’s discussion of Tsuut’ina (Sarcee) tone in verbal forms offers insight into this three-tone system. His insights include: the existence of variable tone syllables, including stem syllables, sensitive to tone sandhi<sup>5</sup>; a register tone system, which he observes may result in the development of the middle register from tone sandhi rules; and one other fact that is still unanswered, the ‘secondary’ nature of grammatical or inflectional tone in Athabaskan. That is to say, a system in which grammatical/inflectional tone in Athabaskan arose from the original lexical tones, which lost their distinctive tone, and not as an independent system.

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<sup>5</sup> “None of the elements of the [Sarcee] language, whether radical, prefixed, or suffixed, can be accurately understood without a consideration of its tone and of the tone shifts which it undergoes in combination with other elements.” (Sapir 1925)

The contemporary Athabaskan languages have inflectional units in the verbal complex that disallow complex onset clusters, exhibiting a highly reduced inventory of onset consonants compared to stems, and with CV syllables. The vowel contrasts are also reduced to a short default vowel conditioned by phonological processes, often resulting in consonants which are broken up by the short default vowel, possibly epenthetic (McDonough 1999, 2003). These are the so-called ‘underlyingly toneless’ vowels of the pre-stem domain. These are the syllables that received the classification tone of the language; and these are the units of grammatical tone contrasts that may have caused the tone shifts Sapir makes reference to, including the development of the Tsuut’ina M tone. In these respects, the inflectional domains in the verbal complex have had the most extreme changes, and are crucial to understanding the tonal systems.

Krauss’s paper remains an important paper on the comparative reconstruction of tone in nouns across the language family. Many of the references in Krauss’s paper are from unpublished manuscripts and his reference section alone is worth study. In the paper itself, Krauss notes many exceptions to the noun patterns. Since the languages exhibit tone polarity, it is not surprising that some individual lexical items might also do this, especially given the development of aspectual tone marking in the verb stems. But the overall patterns stand as points of reference in a complex system.

Future work can add to this database; we have begun to collect sound recordings of lexical items from the Krauss wordlist from a range of Athabaskan/Dene languages and communities, which can be used to expand our understanding of the tonal systems. But equally important is the patterns of tone in the verbal complexes. By making accessible and searchable the data in this important paper, we hope this spreadsheet will encourage further investigation into the phonetics of tone among the Athabaskan/Dene languages.

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